5.17 Water Resources

This AFC section addresses water resources issues associated with the BSEP. It discusses applicable LORS, required permits, existing water resources, potential Project environmental impacts and proposed mitigation measures.

Appendix J contains the data and detailed analyses used to evaluate water resources and assess effects from the Project use of groundwater and diversion of an ephemeral drainage around the BSEP plant site. The information was gathered from the United States Geological Survey (USGS) and Department of Water Resources (DWR) database sources and additional information was obtained from California City, the Honda Proving Center, and other local property owners. Inquiries were made of all agencies managing groundwater in the vicinity of the Project, and of local property owners; the data that were compiled are summarized in Appendix J.

5.17.1 LORS Compliance

Federal, State, County and local LORS applicable to water resources are summarized on Table 5.17-1 and discussed in text following the table.

Table 5.17-1 LORS Applicable to Water Resources

LORS	Applicability	Where Discussed in AFC
Federal:		
Clean Water Act (CWA), Section 402, 33 USC Section 1342; 40 CFR Parts 112, 122 through 136	The objective of the CWA (1977) is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. The CWA regulates both direct and indirect discharges, including storm water discharges from construction and industrial activities.	Section 5.17.3
State:		
California Constitution, Article 10, Section 2	Prohibits waste or unreasonable use of water, regulates use and of diversion of water, and requires conservation and reuse of water to the maximum extent possible.	Section 5.17.3
The Porter-Cologne Water Quality Control Act, California Water Code Section 13000 et seq.	Requires the SWRCB and the nine RWQCBs to adopt water quality criteria to protect State waters, including identification of beneficial uses, narrative and numerical water quality standards, and implementation procedures.	Section 5.17.3

LORS	Applicability	Where Discussed in AFC
Federal CWA, implemented by the State of California - California Storm Water Permitting Program: California Construction Storm Water Program, California Industrial Storm Water Program	Construction activities that disturb equal to or greater than one acre are required to obtain coverage under California's General Construction Permit, which requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). Industrial activities with the potential to impact storm water discharges are required to obtain a NPDES permit for those discharges.	Section 5.17.3
California Water Code Section 461	Stipulates primary interest of the people of the state is conservation of available water resources. Requires the maximum reuse of reclaimed water.	Section 5.17.1
California Water Code Section 1200 – Water Rights	Defines California water rights as in one of three categories: surface water, percolating groundwater, and "subterranean streams that flow through known and definite channels". Percolating groundwater has two sub-classifications: overlying land use, and surplus groundwater. Land owners overlying percolating groundwater share a right to reasonable use of the groundwater aquifer but, cannot take unlimited quantities without regard to the needs of other users.	Section 5.17.1
California Water Code Section 13260 et seq.	Requires filing with the appropriate RWQCB a Report of Waste Discharge that could affect the water quality of the state, unless the requirement is waived pursuant to California Water Code section 13269 (a).	Section 5.17.3
California Water Code Sections 13550, 13551, 13552.6.	Requires the use of recycled water for industrial purposes subject to recycled water availability, quality, quantity, cost, public health impacts. Prohibits use of potable domestic quality water for non-potable uses if suitable recycled water available and allows public agency to require use of reclaimed water in cooling towers if availability and other criteria are met.	Section 4.3
California Water Code Section 13571	Requires well completion report for constructing, altering, or destroying a water well, cathodic protection well, groundwater monitoring well, or geothermal heat exchange well.	Section 5.17.3
State Water Resources Control Board Resolution 75-58	Encourages the use of wastewater for power plant cooling and sets an order of preference for water use for cooling purposes.	Section 4.3

LORS	Applicability	Where Discussed in AFC
California Code of Regulations, Title 23, Division 3, Chapter 9, Chapter 15	Establishes requirements for waste discharge report and requirements specifying conditions for protection of water quality. Outlines classification and siting and construction criteria for waste management units and discharges of waste to land. Provides guidance for surface impoundments and Land Treatment Units, also stipulates operational and maintenance procedures to minimize mobility of waste materials.	Section 5.17.3
California Code of Regulations, Title 27, Division 2, Chapter 3	Provides guidance for surface impoundments and Land Treatment Units.	Section 5.17.3
California Code of Regulations, Title 22 Sections 64400.80 through 64445	Requires periodic monitoring of water quality for potable water wells (non-transient, non-community water systems).	Section 5.17.1
Public Resources Code, Section 25300 et seq., 25523(a)	The CEC will approve the use of "fresh inland" water for cooling purposes by power plants only under certain circumstances. Requires submission of information to the CEC concerning proposed water resources and water quality protection in the AFC.	Sections 5.17.1 through 5.17.5
Local:		
Kern County Ordinance Code, Title 4, Chapter 14.08 – Water Supply Systems	Describes requirements for permitting, siting, constructing and destroying groundwater wells. Stipulates conditions for abandonment and taking wells out of service, including filing of a "Notice of Intent" and required reoccurrence filing frequency.	Section 5.17.3
Kern County Ordinance Code, Title 14, Chapter 12 – Sewer Systems	Ordinance regards general management requirements, installation regulation, cleaning and termination or abandonment of private sewer systems.	Section 5.17.1
Kern County Uniform Plumbing Code, Chapter 17	Describes installation and inspection requirements for locating disposal/leach fields, seepage pits.	Section 5.17.1

5.17.1.1 Federal LORS

Clean Water Act of 1977 (including 1987 amendments) Sections 402 and 402, 33 USC Section 1342; 40 CFR Parts 112, 122 – 136

The primary objective of the Clean Water Act (CWA) is to restore and maintain the chemical, physical, and biological integrity of the Nation's surface waters. Pollutants regulated under the CWA include "priority"

pollutants, including various toxic pollutants; “conventional” pollutants, such as biochemical oxygen demand, total suspended solids, oil and grease, and pH; and “non-conventional” pollutants, including any pollutant not identified as either conventional or priority.

The CWA regulates both direct and indirect discharges. The National Pollutant Discharge Elimination System (NPDES) Program (CWA §502) controls the direct discharges and storm water discharges into waters of the United States. NPDES permits contain industry-specific, technology-based limits and may also include additional water quality-based limits, and establish pollutant-monitoring requirements. A NPDES permit may also include discharge limits based on Federal or State water quality criteria or standards. In 1987, the CWA was amended to include a program to address storm water discharges for industrial and construction activities. The Lahontan Regional Water Quality Control Board (RWQCB) administers both the NPDES and storm water discharge permits under the CWA in the Project area.

The US Army Corps of Engineers (USACE) has determined that the ephemeral drainage on the site is not “Waters of the United States” (see Appendix K).

5.17.1.2 State LORS

State of California Constitution Article 10, Section 2

Article 10, Section 2 prohibits the waste or unreasonable use of water, regulates the method of use and method of diversion of water and requires all water users to conserve and reuse available water supplies to the maximum extent possible.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act of 1967, Water Code Section 13000 *et seq.* requires the State Water Resources Control Board (SWRCB) and the nine RWQCBs to adopt water quality criteria to protect State waters. Those criteria include the identification of beneficial uses, narrative and numerical water quality standards, and implementation procedures. Water quality criteria for the proposed project area are contained in the Water Quality Control Plan for the Lahontan Region (Basin Plan) which was adopted in 1994 and is in the process of being amended. This plan sets numerical and/or narrative water quality standards controlling the discharge of wastes to the State’s waters and land.

California Storm Water Permitting Program

California Construction Storm Water Program. Construction activities that disturb equal to or greater than one acre are required to obtain coverage under California’s General Permit for Discharges of Storm Water Associated with Construction Activity, Water Quality Order 99-08-DWQ (General Construction Permit CAS 000002). Activities subject to permitting include clearing, grading, stockpiling, and excavation.

The General Construction Permit requires the development and implementation of a SWPPP that specifies Best Management Practices (BMPs) that will reduce or prevent construction pollutants from leaving the site in storm water runoff and will also minimize erosion associated with the construction project. The SWPPP must contain site map(s) that show the construction site perimeter; existing and proposed structures and roadways; storm water collection and discharge points, general topography both before and after

construction; and drainage patterns across the site. Additionally, the SWPPP must describe the monitoring program to be implemented.

California Industrial Storm Water Program. Industrial activities with the potential to impact storm water discharges are required to obtain a NPDES permit for those discharges. In California, an Industrial Storm Water General Permit, Order 97-03-DWQ (General Industrial Permit CAS 000001) may be issued to regulate discharges associated with ten broad categories of industrial activities, including electrical power generating facilities. The General Industrial Permit requires the implementation of management measures that will protect water quality. In addition, the discharger must develop and implement a SWPPP and a monitoring plan. Through the SWPPP, sources of pollutants are to be identified and the means to manage the sources to reduce storm water pollution described. The monitoring plan requires sampling of storm water discharges during the wet season and visual inspections during the dry season. A report must be submitted to the RWQCB each year by July 1 documenting the status of the program and monitoring results.

California Water Code

Section 461. Stipulates that the primary interest of the people of the State of California is the conservation of all available water resources and requires the maximum reuse of reclaimed water as an offset to using potable resources.

Section 1200 "Water Rights". The law in California requires that water be identified as in one of three categories: surface water, percolating groundwater, and "subterranean streams that flow through known and definite channels". Only surface water and subterranean stream water are within the permitting jurisdiction of the SWRCB. Appropriation of those waters requires a SWRCB permit, and is subject to various permit conditions.

Water subject to appropriation is defined in Water Code Section 1201, as "all water flowing in any natural channel", except water that is or may be needed for use upon riparian land or water that is otherwise appropriated. The SWRCB's authority over groundwater extends only to the water in un-appropriated subterranean streams that flow through known or define channels, except as it is or may be reasonably be needed for useful and beneficial purposes upon lands riparian to the channel through which it is flowing. In establishing whether there is a condition of subterranean streams, the SWRCB uses a finding that there must be evidence of bed and banks and water flowing along a line of a surface stream (Sax 2002). Based on a review of the subsurface conditions, there is no evidence to support that the groundwater is flowing in subterranean streams, and as such, there is no permit required for appropriation from the SWRCB.

"Percolating groundwater" has two sub-classifications: overlying land use, and surplus groundwater. Land owners overlying percolating groundwater may use it on an equal basis and share a right to reasonable use of the groundwater aquifer. In this right, a user cannot take unlimited quantities without regard to the needs of other users. Surplus groundwater may be appropriated for use on non-overlying lands, provided such use will not create an overdraft condition.

Water rights in California can be held by any legal entity. There are no restrictions on who can hold water rights, thus the owner can be an individual, related individuals, non-related individuals, trusts, corporations and/or government agencies. Water rights are considered real property (they can be owned separately

from the land on which the water is used or diverted) and can be transferred from one owner to another (SWRCB 2007 WRIMIS internet reference).

Section 13260 et seq. Requires filing with the appropriate RWQCB a report of waste discharge (ROWD) that could affect the water quality of the State, unless the requirement is waived pursuant to Water Code section 13269 (a). The report shall describe the physical and chemical characteristics of the waste that could affect its potential to cause pollution or contamination. The report shall include the results of all tests required by regulations adopted by the board, any test adopted by the Department of Toxic Substances Control (DTSC) pursuant to Section 25141 of the Health and Safety Code for extractable, persistent, and bio-accumulative toxic substances in a waste or other material, and any other tests that the SWRCB or RWQCB may require.

Section 13550. Requires the use of recycled water for industrial purposes subject to recycled water being available and upon a number of criteria including: provisions that the quality and quantity of the recycled water are suitable for the use, the cost is reasonable, the use is not detrimental to public health, and the use will not impact downstream users or biological resources.

Section 13551. A person or public agency, including a State agency, city, county, city and county, district, or any other political subdivision of the State, shall not use water from any source of quality suitable for potable domestic use for non-potable uses if suitable recycled water is available as provided in Section 13550.

Section 13552. Specifically identifies the use of potable domestic water for cooling towers is an unreasonable use of water within the meaning of Section 2 of Article 10 of the California Constitution, if suitable recycled water is available and the water meets the requirements set forth in Section 13550.

Section 13571. Requires that anyone who constructs, alters, or destroys a water well, cathodic protection well, groundwater monitoring well, or geothermal heat exchange well, file a well completion report with the DWR.

State Water Resources Control Board Resolution 75-58

On June 19, 1975, the SWRCB adopted the Water Quality Control Policy on the Use and Disposal of Inland Waters used for Power Plant Cooling. The purpose of the policy is to provide consistent statewide water quality principles and guidance for adoption of discharge requirements, and implementation actions for power plants that depend on inland waters for cooling. State policy encourages the use of wastewater for power plant cooling and sets the following order of preference for cooling purposes: 1) wastewater being discharged to the ocean; 2) ocean water; 3) brackish water or irrigation return flows; 4) inland waste waters of low total dissolved solids (TDS); and 5) other inland waters. The criteria for the selection of water delivery options involves economic feasibility; engineering constraints, such as cooling water composition and temperature; and environmental considerations such as impacts on riparian habitat, groundwater levels, and surface and subsurface water quality.

California Code of Regulations

Title 23, Waters, Division 3, Chapter 9. Requires the RWQCB issue a report of waste discharge for discharges of waste to land pursuant to the Water Code. The report requires submittal of information

regarding the proposed discharge and waste management unit design and monitoring program. Waste Discharge Requirements (WDRs) issued by the RWQCB provide construction and monitoring requirements for the proposed discharge. The SWRCB has adopted general waste discharge requirements (97-10-DWQ) for discharge to land by small domestic wastewater treatment systems.

Title 23, Waters, Division 3, Chapter 15. Outlines siting, construction and monitoring requirements for waste discharges to land for landfills, surface impoundments, land treatment units and waste piles. The chapter provides closure and post-closure maintenance and monitoring requirements for Class II designated waste facilities and surface impoundments that are applicable to the Project.

Title 27, Division 2, Chapter 3. §20375 Provides guidance for surface impoundments, including construction requirements (Table 4.1), operation, maintenance and inspection. §20377 provides guidance for Land Treatment Units, referencing general criteria (§20320) and precipitation and drainage control (§20365) and seismic design requirements (§20370). The regulations stipulate operational and maintenance procedures to minimize mobilization of the waste materials (§20250).

Title 22, Article 3, Water Wells, Sections 64400.80 through 64445. *R*equire monitoring for potable water wells, defined as non-transient, non-community water systems (serving 25 people or more for more than six months); the Project will employ 66 workers during operations. Regulated wells must be sampled for bacteriological quality once a month and the results submitted to the California Department of Health Services (DHS). The wells must also be monitored for inorganic chemicals once and organic chemicals quarterly during the year designated by the DHS. DHS will designate the year based on historical monitoring frequency and laboratory capacity.

Public Resources Code

Section 25300 et seq. In the 2003 “Integrated Energy Policy Report”, consistent with SWRCB Policy 75-58 and the Warren-Alquist Act, the CEC adopted a policy stating they will approve the use of “fresh inland” water for cooling purposes by power plants only where alternative water supply sources and alternative cooling technologies are shown to be “environmentally undesirable” or “economically unsound.”

Section 25523(a). The Public Resources Code provides for the inclusion of requirements in the CEC decision on an Application for Certification (AFC) to assure protection of environmental quality and requires submission of information to the CEC concerning proposed water resources and water quality protection.

The administering agencies for the State LORS are the CEC, the SWRCB, and the Lahontan RWQCB. The Project will comply with the applicable State LORS related to water use and quality during construction and operation.

5.17.1.3 Local LORS

Kern County Ordinance Code, Title 14, Chapter 14.08 – Water Supply Systems

Section 14.08.160 Report of Excavation. Requires submittal to the health officer a report of well excavation for all wells dug or bored for which a permit has been issued 60 days after completion of the drilling. Department of Water Resources Form 188 as stipulated under California Water Code Section 13571 shall satisfy this requirement.

Section 14.08.260 Annular Seal- Sealing off Strata. Outlines the requirements for placement of the annular seal for water supply wells including stipulation for running an electric log, location of the seal and type of sealing materials. Further, requires that the drill cuttings be made available for inspection at the request of the health officer.

Section 14.08.330 Water Quality Testing. Stipulates that water from wells that provide water for beneficial use shall be tested radiologically, bacteriaologically and chemically as indicated by the health officer and by a State of California Certified Laboratory. The results of said testing shall be provided to the healthy office within 90 days of pump installation.

Section 14.08.360 Well Destruction. Provides that all abandoned wells shall be destroyed in such a way that they will not produce water or act as a channel for the interchange of water, or will present a hazard to the safety and well-being of people or animals. Destruction of the well shall follow requirements stipulated in DWR Bulletin No.74-81, provided that at a minimum the top 50 feet shall be sealed with concrete, or other approved sealing material. Applications for well destruction shall be submitted 90 days following abandonment of the well and in accordance with Section 14.08.170.

Section 14.08.370 Out of Service Wells. Requires that any well that has not been used for a period of one (1) year shall be properly destroyed unless the owner has filled a "Notice of Intent" with the health officer declaring the well out of service and declaring his intention to use the well again.

Section 14.08.500 Inspections. No water from a well shall be used pending final inspection on the well and the water quality data are approved by the health officer.

Kern County Ordinance Code, Title 14, Chapter 14.12 – Sewer Systems

Section 14.12.360, "Private system installation – Applicable regulations. The type, capacity, location and layout of each private system shall comply with the rules and regulations of the health officer, and the waste discharge requirements of the regional board. B. A private system shall be constructed and maintained on the lot which is the site of the building it serves, unless the health officer in his discretion authorizes a different location.

Section 14.12.370, "Private systems – General management requirements. Each private system shall be managed, cleaned, regulated, repaired, modified and replaced from time to time by the owner or owner's representatives, in accordance with the rules, regulations and other reasonable requirements of the health officer in conformity with the WDR issued by the regional board and in a manner which will safeguard against and prevent pollution, contamination or nuisance.

Kern County Title 17 Chapter 17,20 Uniform Plumbing Code

Section 17.20.170, Appendix K, Section K1 amended –Private Sewage Disposal – General. In certain areas of the County which have poor soils or other problems relative to sewage disposal, the sewage disposal system shall be installed and inspected before the building foundation inspection is made.

Section 17.20.180 Appendix K, Section K6(i) amended – Disposal fields. Disposal fields, trenches, and leaching beds shall not be paved over or covered by concrete or any material that can reduce or inhibit any

possible evaporation of the sewer effluent unless the area of the disposal fields, trenches and leaching beds is increased by a minimum of twenty five percent.

The administering departments for the Local LORS are within the Kern County Resource Management Agency. The Project will comply with the applicable Local LORS related to water use and quality.

5.17.1.4 Involved Agencies

Agencies involved include the Lahontan RWQCB (WDRs, storm water permitting) and Kern County (groundwater well and septic system permits). Contacts for these agencies are provided in Table 5.17-2.

Table 5.17-2 Water Resources Agencies and Contact Information

Contact	Phone/Email	Permits/Issue
Mike Plaziak Senior Water Resources Control Engineer Lahontan RWQCB Victorville Office 14440 Civic Drive, Suite 200 Victorville, CA 92392	(760) 241-7325 mplaziak@waterboards.ca.gov	Waste Discharge Requirements (WDR) and Storm Water Permits
Beverly Briano Permit Specialist Kern County Environmental Health Services Department Bakersfield Office 2700 M Street, Suite 300 Bakersfield, CA 93301-2370	(661)862-8797 bbriano@co.kern.ca.us	Groundwater Supply Well Permits
Nina Brennan Permit Specialist Kern County Environmental Land/Water/Housing Division Bakersfield Office 2700 M Street, Suite 300 Bakersfield, CA 93301-2370	(661).862-8700 brennan@co.kern.ca.us	Septic System

5.17.1.5 Required Permits and Permit Schedule

Water resources-related permits include a WDR as part of the proposed effluent discharge to onsite evaporation ponds; per discussions with RWQCB staff (Plaziak, 2008), this WDR is expected also to cover the bioremediation unit and land farm unit associated with treatment of soil from cleanup of spills of heat transfer fluid (HTF). Storm water permits also are required for the construction and operation of the facility. Groundwater produced from onsite wells will be used for plant cooling, other process and domestic uses, and thus, modifications to existing wells permits will be required. Wells that have previously been permitted as agricultural will be reactivated, as appropriate. Those not used to provide water for the Project or to monitor groundwater pumping will be abandoned consistent with the Kern County and State requirements. Table 5.17-3 lists the water related permits that are required for the Project. This table also provides the schedule for when applications for these permits are needed.

Table 5.17-3 Required Water Resources Permits and Schedule

Permit/Approval	Schedule
WDR, Evaporation Ponds, Bioremediation Unit and Land Treatment Unit	A WDR from the Lahontan RWQCB is required for discharge of effluent to the evaporation ponds. The WDR application will be submitted after AFC submittal and the permitting process is expected to take six to nine months. Per discussions with RWQCB staff (Plaziak, 2008), one permit application will be prepared that includes the evaporation ponds, bioremediation unit and land treatment unit.
Notice of Intent (NOI) - Construction Phase Storm Water Permit	A Construction General Permit is required. A SWPPP that specifies BMPs will identify measures to reduce or prevent construction pollutants from leaving the site. The NOI will be submitted shortly prior to commencing construction. It is anticipated that the NOI will be secured within one month of submittal.
Storm Water Pollution Prevention Plan Operations Phase Storm Water Permit	An Industrial General permit will be required for the Project operations phase. A separate SWPPP is required that outlines the monitoring and reporting plan, along with BMPs for the facility. The permit application package will be submitted to the RWQCB prior to commencing operations.
Well Permits	Permit modifications will be required to return the wells to active usage and change their status from agricultural use to industrial. Additionally, as required, well permits will be needed should additional supply or monitor wells be installed. This is not a lengthy or complicated process. Upon determination of the status of the wells on the site and of their role in the Project applications for change of status and/or re-activation will be submitted. This will be done after AFC submittal. Wells not used for supply or to monitor pumping will be abandoned consistent with Kern County and DWR requirements.
Septic System	Permitting of the septic system would be through the Kern County Building Inspection and Plumbing Department. This will be done prior to the start of construction. It is anticipated that it would take one to two months to complete the permitting of the septic system.

5.17.2 Affected Environment

The BSEP site is located in the Fremont Valley, northeast of the Antelope Valley in the Mojave Desert, southeastern California. The Mojave Desert is characterized by barren mountain ranges and isolated hills with broad alluvial-filled valleys. Surface water in the Fremont Valley drains from the surrounding mountains toward Koehn Lake, a dry lake or playa, which is located about six miles northeast of the BSEP plant site. Groundwater beneath the plant site and surrounding area is contained within the Koehn sub-basin, a part of the larger Fremont Valley Groundwater Basin. This basin encompasses an area of about 523 square miles (DWR 2003) including the Fremont Valley, the northeastern part of the Antelope Valley and the Tehachapi, El Paso, and Rand Mountains. Water resources, their occurrence and use are complicated issues within the Mojave Desert. In this desert environment, groundwater provides an important resource for domestic, agricultural, commercial and industrial use and is often used to supplement imported water from the State Water Project or Colorado River. In the Koehn sub-basin, groundwater is the sole source for domestic water supply.

Because the linear facilities (transmission line and gas pipeline) associated with the Project will not require water as part of their operations and only minimal amounts during construction, the following discussion focuses on the plant site within the Koehn sub-basin and the Fremont Valley.

5.17.2.1 Climate and Precipitation

The climate in the Mojave Desert is dry and arid and characterized by low precipitation. The region experiences a wide variation in temperature, with very hot summer months with an average maximum temperature of 104 ºF occurring in July and cold dry winters with an average minimum temperature of 28 ºF occurring in December. Annual precipitation in the Mojave Desert ranges from three to six inches (U.S. Department of Agriculture 1981). Table 5.17-4 displays the average monthly and annual minimum and maximum temperatures and total precipitation from 1971 to 2000, collected from a gauging station in Cantil (Station 041488), about one mile north of the Project. Typically, monthly precipitation is less than the monthly evaporation rate, even during the wettest season (December through February) (Weir, et. al., 1965). Precipitation on the valley floor is subjected to high losses from evaporation and transpiration; however, during an exceptionally wet season runoff occasionally originates on or crosses the valley floor and sometimes reaches the playas and Koehn Lake to the northeast of the plant site (Bloyd 1967).

According to a study conducted by the United States Geological Survey (USGS) for the Antelope Valley-East Kern Water Agency (AVEK), the average annual evaporation rates vary greatly in the area, depending largely on altitude, with the highest evaporation rates recorded at the lowest elevations (Bloyd 1967). Annual evaporation data collected from the Backus Ranch (Station 040418) evaporation gauge, located approximately six miles south of Mojave, and about 20 miles from the plant site, from 1939 to 1959 varied between a minimum of 104.6 inches in 1952 to a maximum of 128.8 inches in 1940. The average annual evaporation for the 20-year period was reported at 114 inches. The average monthly evaporation was greatest in July at approximately 18 inches and least in January at approximately 2.8 inches (Bloyd 1967). Water in Koehn Lake northeast of the Project was estimated to evaporate at a rate of 114 inches per year (Weir et. al. 1965, Bloyd 1967).

Table 5.17-4 Cantil, California Climate and Precipitation Summary[1] 1971 through 2000

Climate	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual[2]
Ave. Max. Temp (ºF)	58.9	65.6	71.5	76.2	86.5	97.7	104.3	102.1	93.1	80.2	64.1	58.0	80.1
Ave. Min. Temp (ºF)	28.9	33.9	40.8	46.1	55.0	63.8	69.2	67.1	57.1	44.1	34.7	28.2	47.5
Ave. Total Precip (in)	0.71	0.48	0.33	0.09	0.15	0.05	0.10	0.12	0.05	0.03	0.43	0.54	3.05

[1] Source - Western Regional Climate Center, http://www.wrcc.dri.edu/ (Climate Station 041488 – Cantil)
[2] Refers to the annualized average of monthly temperature and precipitation values-

Key:
Ave – Average
Max – Maximum
Temp - Temperature
ºF - degrees Fahrenheit
Precip – Precipitation
in – inches

5.17.2.2 Groundwater

Groundwater in the area of the Project site is contained within the South Lahontan Hydrologic Region, which covers about 33,100 square miles of eastern California (RWQCB 1994). The South Lahontan Hydrologic Region is bound to the west by the crest of the Sierra Nevada; to the north by the watershed divide between Mono Lake and East Walker River drainages; to the east by the California-Nevada border; and to the south by the crest of the San Gabriel and San Bernardino mountains and the divide between watersheds draining south toward the Colorado River and those draining to the north. The South Lahontan Hydrologic Region includes the Owens, Mojave, and Amargoso River systems, the Mono Lake drainage system, and numerous other internally drained basins.

The South Lahontan Hydrologic Region is subdivided into 76 groundwater basins that cover approximately 18,100 square miles (RWQCB 1994). As a part of the South Lahontan Hydrologic Region, the Fremont Valley Groundwater Basin is divided into six sub-basins: California City (which contains a portion of the linears associated with the Project), Koehn (which includes the plant site), Chaffee, Gloster, Oak Creek, and Willow Springs (Figure 5.17-1). The sub-basins are typically separated by faults that form partial, and in some cases, complete barriers to groundwater movement (Bloyd 1967, Koehler 1977, Saint-Armand 1991). The Koehn sub-basin is bounded to the east and southeast by the Randsburg-Mojave Fault and Rand Mountains; to the northwest by the El Paso Mountains; to the west by the Sierra Nevada Mountains and the Garlock East Fault; to the northeast by the confluence of the El Paso and Rand Mountains (Weir et al. 1965, Bloyd 1967, DWR 1968, Moyle et. al., 1985, DWR 2003). The Koehn sub-basin is bounded by the California City sub-basin to the southeast, the Chaffee sub-basin to the south and the Oak Creek sub-basin to the southwest (Figure 5.17-1).

The lowest point of the Fremont Valley Groundwater Basin is Koehn Lake at an elevation of 1,940 feet above mean sea level (msl). The topography of the BSEP plant site is characterized by low relief and elevations that gently slope toward Koehn Lake at grades between one and three percent. Koehn Lake is approximately six miles to the northeast of the Project site, where the surface elevation ranges from approximately 2,260 feet above mean sea level (msl) in the southwest to 2,030 feet above msl in the northeastern portion of the plant site. The Fremont Valley Groundwater Basin and subsequently, the Koehn sub-basin have a closed surface drainage, whereby surface water does not “exit” the basin and flow from the surrounding mountains to Koehn Lake, or other small playas in the area (Dutcher 1959).

5.17.2.3 Hydrogeology

The Fremont Valley is composed of two broad geologic units, consolidated rocks and unconsolidated alluvium (Weir et al. 1965, Bloyd 1967, Koehler 1977) (Figure 5.17-2). The consolidated rocks consist of igneous and metamorphic rocks, which form the basement complex, and Tertiary sedimentary and volcanic rocks. The Tertiary rocks are largely absent in the area, so the unconsolidated alluvium overlie the basement complex (Bloyd, 1967; Koehler, 1977). The consolidated rocks are nearly impermeable except for areas where fracturing or weathering has occurred. These rocks are believed to yield little water to the overlying alluvial aquifer system.

The unconsolidated alluvium is composed of older alluvium, older fan deposits, younger alluvium, dune sand, lacustrine and playa deposits (Weir et al. 1965, Bloyd 1967, DWR 1968 and 2003). The DWR (2003), states that the alluvial deposits are approximately 1,190 feet in thickness near the margin of the Fremont Groundwater Basin and thin toward the middle of the basin in response to local faulting. Well data from Koehler (1977) showed an alluvial thickness of 500 to 800 feet north of the Cantil Fault and an alluvial thickness of 400 to 900 feet south of the fault. Information from water supply wells completed on the plant site suggest that the thickness reported by Koehler (1977) of 800 feet may be low, as the total depths of the wells on the site vary from about 800 to 1,700 feet below the ground surface (bgs). If the wells were completed in alluvial materials, these depths suggest that unconsolidated materials may be thicker than reported by Koehler (1977) in the area of the plant site.

The older alluvium is of Pleistocene Age, and consists of poorly-sorted gravel, sand, silt, and clay of granitic origin. These deposits become finer grained and better sorted toward the axis of the valley. The younger sedimentary deposits are generally above the groundwater table, so the older alluvium deposits represent the principle water-bearing zone in the sub-basin (Weir et al. 1965, Bloyd 1967, DWR 2003).

A review of available boring log data (Dutcher 1959, DWR 1960, 1962 and 1969) revealed limited information on the lithology of the unconsolidated younger and older alluvium. It is important to note that while there are 14 wells on the plant site, no lithologic information could be obtained because the well logs were unavailable for review.

Of the wells in the Koehn sub-basin, drillers logs could only be found for about two percent of the wells within the sub-basin (See Appendix J.1). Drillers logs (DWR Form 188) provide only generalized descriptions of subsurface geology, reporting repetitive sequences of alluvial sands and clays and inter-bedded shales and granite. The information provided in these logs was insufficient to derive a meaningful understanding of the hydrostratigraphy below the plant site and within the Koehn sub-basin. In general, the data suggest that alluvial sediments are composed of a higher percentage of sand near the margins of the Koehn sub-basin near the alluvial fans and creek outfalls, and tend to be composed primarily of fine-grained sediments toward Koehn Lake. Data from five deep borings drilled though the Koehn Lake playa, found that that sediments below the lake are predominantly clay to the total depth explored of 515 feet bgs (Dockter 1979).

5.17.2.4 Groundwater Occurrence and Flow

Groundwater within the Koehn sub-basin flows to the northeast toward the Koehn Lake playa, the area of lowest altitude in the Fremont Valley. As discussed in Section 5.17.2.2 above, the Koehn sub-basin is considered a closed basin; all water flowing into the basin remains within the basin. The only natural mechanism for water to exit is through evaporation. Groundwater in the Koehn sub-basin is reportedly contained under generally unconfined conditions, except in the vicinity of Koehn Lake, where lacustrine deposits locally create confined conditions (DWR 2003).

The depth to groundwater below the site, measured in October 2007 from wells on the plant site, ranged from about 210 to 436 feet bgs. Figure 5.17-3 shows the water level contours for the Koehn Sub-basin from water level data taken from the USGS and DWR databases for 2007. The contours show that groundwater flows to the east-northeast below the plant site at a gradient of about 0.012 feet per foot (ft/ft). Groundwater levels for 2007 reveal a localized depression below and northeast of the plant site.

Historic water level data and hydrographs for selected wells within the Koehn sub-basin and adjacent portions of the California City and Chaffee sub-basins are provided in Appendix J.1. Figure 5.17-4 shows hydrographs for selected wells, within the Koehn sub-basin with water level data from wells with data starting from 1927 to 1974 through 2007. Please note that these are not all the wells with hydrograph information and refer to Appendix J.1 for a complete listing of water level data and additional hydrographs.

The hydrographs shown on Figure 5.17-4 reflect the response to significant pumping during a period of agricultural development, which was marked by an increase in agriculturally developed acreage from about 100 acres in 1965 to 9,900 acres in 1976 (Koehler 1977). Total consumptive use of groundwater during this period ranged from about 18,500 acre-feet in 1965 to 60,000 acre-feet in 1976. Koehler (1977) estimated that an average of about 20,000 acre-feet per year (AFY) was being removed from storage as evidenced by the significant decline in water levels during that time. In the vicinity of the Project site and in the area southwest of Koehn Lake, groundwater levels during that time were lowered up to approximately from 200 to 250 feet from levels measured in the early 1970's (see Figure 5.17-4, Wells 30S37E-27H02, 31S37E-04J01, 31S37E-04Q01).

More recently, as agricultural operations have substantially curtailed, water levels have recovered in the Koehn Sub-basin. A review of satellite images and a field survey of the area show that only about 136 acres are presently being used for agriculture in the Koehn sub-basin. Since approximately 1986 when the significant reduction in agricultural operations occurred, groundwater levels have recovered between about 100 and 130 feet in wells located within the vicinity of the Project site. This reflects a positive water balance, i.e., recharge exceeds discharge from the Koehn sub-basin.

A map of the rate in feet per year of increasing or decreasing water levels from wells with available water level data for the period between about 1978 and 2007 is shown on Figure 5.17-5. The figure shows that the Koehn sub-basin is recovering from historic pumping at rates of up to over five feet per year in the vicinity of the Project site, and in areas southwest of Koehn Lake. The highest rate of increase in water levels is on the west side of the sub-basin, suggesting the source of the recovery is mountain front recharge and drainage from Pine Tree Creek and Cottonwood Creek. The figure also shows that water levels are stable in the eastern part of the Koehn sub-basin and slightly in decline in the western portion of the California City sub-basin across the Randsburg-Mojave fault. Using estimates of the area of recovery, and an average recovery rate within the contour lines shown on Figure 5.17-5 and specific yield of 0.11 percent after Koehler (1977), the volume in AFY of recovery for the area southwest of Koehn Lake is estimated to be about 9,000 AFY. Specific yield, or drainable porosity, is a ratio indicating the volumetric fraction of the aquifer volume that a given aquifer will yield when all the water is allowed to drain out of it under the forces of gravity

5.17.2.5 Recharge to the Koehn Sub-basin

Recharge to the Koehn sub-basin is derived from the infiltration of precipitation and runoff from the foothill arroyos along the western and eastern margins of the Sierra Nevada, El Paso and Rand Mountains. In addition, recharge to the sub-basin is also derived from underflow from the Chaffee and California City sub-basins (Dutcher 1959, Bloyd 1967, Koehler, 1977, Saint-Armand 1991). The estimates of recharge to the Koehn sub-basin have varied widely, though most scientists report that recharge principally occurs from underflow from adjacent sub-basins rather than infiltration from precipitation and runoff. Bloyd

(1967), using stream runoff vs. precipitation estimates, suggested that recharge is about 18,000 acre-feet annually to the Fremont Valley Groundwater Basin. Koehler (1977) estimated the recharge to the southwestern part of the Valley, including the Koehn sub-basin to be around 10,200 AFY, with 9,500 AFY coming up the valley from the southwest toward Koehn Lake and the rest coming from stream runoff infiltration. Saint-Armand (1991) also suggested limited infiltration from precipitation and indicated that underflow into the Koehn sub-basin from the Chaffee and California City sub-basins is about 10,000 AFY. The recovery data shown on Figure 5.17-5 suggests that mountain front recharge and recharge from infiltration of runoff funneled from Pine Tree and Cottonwood Creeks to the Koehn sub-basin may be more significant than previously suggested.

An analysis of infiltration to groundwater from precipitation using the approach developed by Bloyd (1967) and updated using digital elevation maps and precipitation data for the area was performed in an attempt to reconcile the estimates of recharge to the Koehn sub-basin. From this update, runoff from the surrounding mountains in the Koehn sub-basin is estimated to be 22,000 AFY (Appendix J.2). Using estimates from various authors on the percent of runoff that becomes recharge to the groundwater basin (estimates between 15 percent and 100 percent) yields recharge rates to the Koehn sub-basin of between 3,300 and 22,000 AFY. The estimate of recharge using recovery rates of about 9,000 AFY for the area southwest of Koehn Lake as described above fits within this range and is similar to the value proposed by Koehler (1977) for the Koehn sub-basin; Kohler assumed that 50 percent of the runoff or about 11,000 AFY would become recharge.

5.17.2.6 Aquifer Properties

Koehler (1977) estimated that in 1976, during a significant period of agricultural operations, the Koehn sub-basin had a storage capacity of about 4,100,000 acre-feet and a specific yield of about 0.11 percent. According to several investigations, moderate yields of groundwater can be extracted in areas of the Koehn Sub-basin where the older alluvium extends a minimum of 200 feet below the water table (Weir et al. 1965, Bloyd 1967). Weir et al. (1965) state production wells can yield groundwater at a rate of 500 to 2,000 gallons per minute (gpm) where the saturated thickness of the older alluvium is 200 to 500 feet. The specific capacity for water supply wells in the Koehn Sub-basin (Appendix J.1) and in the California City Sub-basin (Saint-Armand 1991) range from about 10 to 200 gallons per minute per foot of drawdown (gpm/ft).

Project Water Supply Wells

Research (Switzer, 2007) identified 14 wells on the plant site, as shown in Figure 5.17-6. Table 5.17-5 is a summary of the available information on these wells. With the exception of one domestic well and one USGS well, all the wells on the plant site were used to support former agricultural operations. Additional details for the wells on the plant site are provided in Appendix J.1.

Table 5.17-5 Well Completion Data for Water Supply Wells on the Plant Site

Well Number	Well Construction		Screen Interval		Specific Capacity (1980)[4] (gpm/ft)
	Ground Surface[1] (ft msl)	Total Depth[2] (ft bgs)	Top[3] (ft bgs)	Bottom (ft bgs)	
Domestic	2178	505	--	--	--
USGS	2104	--	--	--	--
Well No. 41	2176	600	--	600	131
Well No. 42	2173	603	--	603	17
Well No. 43	2069	864	300	864	31
Well No. 44	2134	604	--	604	69
Well No. 45A	2117	803	--	803	49
Well No. 45B	2115	--	--	--	--
Well No. 46	2050	820	--	820	31
Well No. 47	2252	810	--	810	147
Well No. 48	2223	813	250	813	139
Well No. 49	2145	830	--	830	124
Well No. 50	2081	903	--	903	3
Well No. 51	2083	785	--	785	29
Well No. 63	2131	1740	500	1740	--

[1] Wells resurveyed October 2, 2007.

[2] Total depth as reported by Switzer (2007). Depths confirmed for well nos. 43 and 48 during pumping test program. Debris in well no. 63 blocked measurement of TD.

[3] Top of screen confirmed by video logging performed during pumping test. Switzer (2007) reported that the top of the screen in all wells was between 300-400 feet bgs.

[4] Specific Capacity measured during pumping test 1980.

Key:
ft msl – feet above mean sea level
ft bgs – feet below ground surface
gpm/ft – gallons per minute per foot of drawdown
-- no reported data

From the information provided, the total depth of the onsite wells range from 505 to 1,740 feet bgs. Wells vary from 14 to 16 inches in diameter and are gravel packed and screened from depths below 300 to 400 feet to the total depth of each well. The most recent water levels were collected following a pumping test program conducted at the BSEP plant site in 2007. The data collected during this effort indicates that the saturated thickness in these wells is between about 200 to 1,500 feet depending on the total depth of the well. Turbine pumps with diesel or electric 100 to 250 horsepower motors were installed in each of the wells; available data indicate that the pump bowls are set between 350 and 450 feet bgs. Field inspection shows that most of the pumps are not operational, and most probably could not be repaired.

The information provided for a Phase I ESA conducted at the site (ENSR 2007a) reveals that wells were pumped in April 1980 at rates between 500 to 1,693 gpm during a short-term pumping test to evaluate pump efficiency. Drawdown measured in the pumping wells ranged between nine and 168 feet, which equates to specific capacities ranging from about 10 to 200 gpm/ft (Table 5.17-5). The highest specific capacities (>100 gpm/ft) were measured in wells no. 41, 47, 48 and 49 in the southwestern corner of the BSEP site in the area nearest the outfall from Pine Tree Creek to the Fremont Valley. As noted above, well logs and lithologic data for the onsite wells were not available, nor were data on the annual volume pumped per well during the agricultural operations.

Aquifer Testing Program

Based on a work plan provided to CEC staff (ENSR 2007b), a pumping test program was conducted in the fall of 2007 at the BSEP site. The objectives of the program were:

- Estimating well yield and efficiency, and their capacity to meet Project water supply requirements;
- Determining the hydraulic influence from pumping;
- Assessing the hydraulic boundary effect of the Cantil Valley fault; and,
- Estimating the aquifer characteristics.

The details of the pumping test program are provided in Appendix J.3. The testing program consisted of an eight-hour step-drawdown and 72-hour constant-rate discharge tests; the tests were conducted in September and early October 2007.

Based on a reconnaissance of well conditions, their depth, location across the site and centrality to adjacent wells that could be used as monitor wells, and their historic performance, well nos. 43, 48 and 63 were selected for the pumping test program (Figure 5.17-6). The pumps were removed from well nos. 43 and 48 prior to conducting the test. No pump was installed in well no. 63. Prior to conducting the pumping test, each well was video logged (Appendix J.3). The video logging revealed mild to moderate scaling and growth and that the wells were completed using vertical slots. Video logging also revealed that the screen interval begins at depths below about 300 feet in well no. 43, 250 feet bgs in well no. 48, and at 500 feet bgs in well no. 63. This is generally consistent with what was reported by Switzer (2007).

Debris was observed in each of the three wells. The debris was removed to the total depth of well no. 43 and no. 48, and was removed to allow for the pumping test to proceed in well no. 63. The debris consisted of wires, insulators, and power pole fragments, some being over 10 feet long. Vertical conductivity and temperature logging was conducted to the total depth of wells no. 43 and no. 48 at the end of each test, to assess whether vertical changes in water quality in the aquifer below the plant site exist (Appendix J.3). Though well no. 63 was reported to be about 1,700 feet deep, the well could not be entirely cleaned out due to a significant obstruction at a depth of about 900 feet bgs. As such, the total reported depth of well no. 63 could not be confirmed as proposed in the work plan (ENSR 2007b). The pump motors and bowls removed from the wells were not replaced in well nos. 43 and 48 at the conclusion of the testing program.

The wells were pumped at rates of 1,700 to 2,000 gpm during the constant-rate test, based on step-drawdown results, and water levels were monitoring in the pumping wells and nearby wells using

pressure transducers and data loggers. Additionally, temperature and conductivity were measured in the effluent from the pumping well using a transducer to evaluate changes in water quality during the course of the 72-hour constant-rate discharge test. Monitoring of pumping across the Cantil Valley Fault to the east of the plant site could not be performed as access to the closest adjacent offsite water supply well could not be arranged. Lastly, to provide an assessment of aquifer water quality, water samples from the effluent of the pumping well were collected near the end of the constant-rate discharge test. Raw data from the transducers is provided in Appendix J.3.

Aquifer Analytical Methods and Results

Aquifer testing data was analyzed by hand curve fitting using Theis (1935) and Cooper-Jacob (1946) transient solutions and the Neuman (1974) solution for delayed drainage in an unconfined aquifer. The analyses were validated using automated programs, AQTESOLV (Duffield 1996) and a program provided by the USGS (Halford and Kuniansky, 2002). A summary of the results of the aquifer testing are provided in Table 5.17-6 below.

Table 5.17-6 Aquifer Test Results

Well Name	Pumping Rate (gpm)	Specific Capacity	Average Transmissivity[1]				Storativity
			Pumping Test		Recovery Test		
		gpm/ft	gpd/ft	ft^2/day	gpd/ft	ft^2/day	
Well No. 63	2,000	71	278,000	37,150	256,225	34,254	0.0019 to 0.00098
Well No. 48	1,770	25	519,945	69,500	608,900	81,400	0.0023 to 0.0003
Well No. 43	2,000	10	122,150	16,330	168,000	22,500	0.0158 to 0.0006

[1] The average values were estimated from all methods of analysis using data from both pumping and observations wells.

Key:
ft^2/day – feet squared per day
gpd/ft – gallons per day per foot of drawdown
gpm/ft – gallons per minute per foot of drawdown
gpm – gallons per minute

The results of the aquifer testing indicated significant aquifer transmissivity, a measure of how much water can be transmitted horizontally under prevailing viscosity and a unit hydraulic gradient. The aquifer testing conducted indicates that the groundwater pumped from onsite wells will support pumping rates of at least 2,000 gpm. Specific capacities for the pumping wells follow, in general, those estimated from 1981 pumping data reported by Switzer (2007) (Table 5.17-5). The lower specific capacity and transmissivity results for well no. 43 probably reflect an increasing percentage of fine-grained material below the northeastern portion of the plant site. The percentage of fine-grain material increases toward the center of the Koehn Sub-basin and toward Koehn Lake (Bloyd 1967) (Figure 5.17-2). The estimates of storativity, the volume of water released from storage per unit decline in hydraulic head in the aquifer, per unit area of the aquifer, would suggest that the aquifer is confined to semi-confined.

The cone of depression developed from water level data for wells nos. 63, 48 and 43 are shown on Figures 5.17-7, 5.17-8 and 5.17-9, respectively. The development of the cone of depression and elongation parallel to the Cantil Valley Fault, suggest that the fault is a partial boundary to groundwater flow, which supports prior investigation conclusions (Koehler 1977). The asymmetry in the cone of depression developed for each well would also suggest heterogeneity in the aquifer materials and subsequently the hydraulic conductivity.

Based on the cone of depression that developed after pumping well nos. 43 and 48 for 72 hours, offsite wells north and east across the Cantil fault were likely not affected during the period of the test. Figure 5.17-10 shows the water level contours from measurements taken on October 11, 2007, about two weeks after the pumping test program was completed. The contours suggest a source of recharge to the west and groundwater flow toward the east and northeast and toward the Cantil Valley fault at an average gradient of about 0.0085 ft/ft.

Temperature and conductivity data measured in the effluent of the pumping well remained stable during the term of each pumping test. The conductivity data indicated total dissolved solids (TDS) concentrations in the range from about 480 to 550 milligrams per liter (mg/L), which is consistent with what was reported for this part of the Koehn sub-basin. The stability of the temperature and conductivity data in the pumping effluent would suggest a consistent source of water to the wells and little stratification of different water types within the influence of the pumping well. The vertical temperature and conductivity logging of wells no. 43 and no. 48 also did not show any stratification in water quality or decreasing water quality with depth. In general, the water quality data would tend to support, in general, a homogeneous water type and limited stratification of water quality in the aquifer below the plant site.

5.17.2.7 Groundwater Geochemistry

Koehn sub-basin

The groundwater quality in Koehn sub-basin varies in relationship to Koehn Lake. In the southwest portion of the Sub-basin, water quality is of the sodium bicarbonate or calcium-sodium bicarbonate type (DWR 2003). Water quality decreases and TDS concentrations increase toward Koehn Lake due to the evaporative concentration of salts. At Koehn Lake, the TDS concentration of the groundwater is 100,000 mg/L (Dockter, 1979, DWR, 2003). Southwest of the dry lake, and in the vicinity of the BSEP plant site, typical TDS levels are reported to be in the range of about 500 mg/L. This is consistent with the pumping test data as described above in Section 5.17.2.6. Appendix J.4 contains a summary of the geochemical data that was available from the DWR and USGS for wells in the Koehn Sub-basin.

Figure 5.17-11 shows the TDS iso-concentration contour developed using water quality data available in the DWR and USGS database for the period between 1953 and 1958 and water quality data from samples collected between 1999 and 2004, including wells that were sampled as part of the pumping test program and data reported for wells located at the Honda property northeast of the plant site. The iso-concentration contours show an increasing trend in the TDS concentration toward Koehn Lake. By comparison to the more recent data there does not appear to have been significant changes in the water quality over time in response to the varied pumping history for the sub-basin. The absence of variation in the TDS data over time suggests limited influence and mobilization of high TDS water from the Koehn Lake during the periods of intense agricultural pumping, which included the plant site. Further, as the summary of geochemical data

in Appendix J.4 shows, there is not a significant change in water quality over time below the plant site or within the sub-basin. Water quality data has remained relatively stable for wells southwest of Koehn Lake (Appendix J.4).

Plant Site Groundwater Quality

Three water samples were collected near the end of the pumping test from the effluent of wells no. 43, 48 and 63. The analytical results from these samples are summarized in Table 5.17-7 and the certified analytical laboratory reports are provided in Appendix J.3. Case narratives provided by the laboratory as part of their Tier II data validation requirement indicate the data quality is acceptable.

Table 5.17-7 Summary of Water Quality Data
Water Samples Collected from Wells Nos. 43, 48 and 63

Analyte	Concentration Range[1] (all results reported in mg/L)
Arsenic	0.003 – 0.0041
Bicarbonates (HCO_3)	200 – 360
Boron	0.14 – 0.24
Calcium	45 – 50
Carbonates (CO_3)	ND <2 – 120
Chloride	14 – 18
Iron	0.014J – 0.067
Magnesium	0.015 – 0.057
Manganese	0.015 – 0.057
Nitrate (N)	1.0 – 1.5
Selenium	0.00031J – 0.00048J
Sodium	74 – 84
Sulfate	110 – 120
Total Hardness ($CaCO_3$)	160 – 170
Total Dissolved Solids (TDS)	470 – 550
pH	~8.0

[1] Metals data reported from the unfiltered ("total") sample.

Key:
mg/L – milligrams per liter
ND – not detected at the practical quantitation limit shown
PQL – practical quantitation limit
MDL – method detection limit
J – estimated value (concentration detected between the PQL and MDL)

The water quality data closely follows the data for a June 1981 water sample collected at the site and is similar when compared to average water quality data for selected wells adjacent to the plant site. The water quality appears to be generally similar to adjacent water supply well data and meets most of the State and Federal requirements for drinking water as follows:

- TDS concentrations are around 500 mg/L, which is the recommended standard for a drinking water resource in California.
- Chloride concentrations (15-18 mg/L) are low and below State Secondary Maximum Contaminant Levels (MCLs) for drinking water.
- Sulfate concentrations (110-120 mg/L) are also low and below State Secondary MCLs for drinking water.
- The Nitrate concentration is well below the State MCL of 10 mg/L for drinking water.

The minor exceptions to the good water quality are reported concentrations for arsenic and manganese. Arsenic was reported in all the effluent samples at concentrations similar to what has been reported for the Koehn sub-basin. Although above the EPA Region IX Preliminary Remediation Goal (PRG) for tap water, these concentrations are below the primary State and Federal MCL for Arsenic. Manganese was reported in one sample (57 mg/L) slightly above its State and Federal Secondary MCL (Table 5.17-7). The highest manganese concentration was reported from an un-filtered sample suggesting there might have been some minor interference from suspended solids. The same sample, which was filtered, did not contain a manganese concentration above the Secondary MCL.

With the exception of two organophosphorous pesticides, no organic chemicals were reported in the water samples analyzed above their respective practical quantitation limits (PQLs). Dimethoate and fensulfothion were reported at very low concentrations estimated between the method detection limit (MDL) and the PQL in samples from well no. 43 and well no. 63. While these compounds were “seen” on the instrument above the MDL, their concentrations should be considered an “estimate”, as the analytical laboratory was not able to accurately quantify the compound concentrations at these very low levels. MCLs have not been established for either dimethoate or fensulfothion for drinking water, though a PRG has been established by EPA Region IX for dimethoate (Appendix J.4). The single reported value for dimethoate is below the EPA Region IX PRG for tap water.

The presence of these pesticides would be consistent with past reported agricultural uses of the property. Both compounds are commercially available insecticide and nematocides. Given that the compounds were estimated at levels below the PQL, and that the dimethoate concentration was well below the PRG for tap water, the concentrations reported in the samples from wells nos. 43 and 63 would not be expected to pose a threat to human health or the environment. Groundwater that will be pumped for domestic purposes will be treated prior to be used as potable water at the site.

5.17.2.8 Groundwater Use within the Koehn sub-basin

The South Lahontan RWQCB Basin Plan (RWQCB 1994) designates the groundwater in the Fremont Valley Groundwater Basin as having the following beneficial uses: municipal, domestic, agricultural, industrial, and freshwater replenishment. Water users in the Koehn sub-basin derive their supplies only from groundwater sources. California City, located in the adjacent California City sub-basin, uses both

groundwater and water provided from the State Water Project (SWP) through the AVEK (Quad Knopf, 2002).

As described in Section 5.17.2.4, historic uses of groundwater supported both domestic and agricultural uses. Agricultural uses were significant in the area beginning in the mid-1960s and ending in the mid-1980s. As described above, agricultural uses over this period caused a decline in groundwater levels of over 200 feet from their late 1950's levels. The significant reduction of agricultural operations in the area have produced a general increasing trend in water levels in the area of the plant site of about 100 feet since 1985. More recently groundwater is being used for single- or multi-family residential use and industrial use at the Honda Proving Center. Agricultural acreage has been significantly reduced by comparison to pre-1985 acreage and is estimated to be 136 acres for the Koehn sub-basin.

Antelope Valley – East Kern Water District (AVEK)

The Project site lies within the AVEK District (Figure 5.17-12). AVEK encompasses an area of 3,300 square miles, which includes nearly all of the Antelope and Fremont Valleys (Weir et al. 1965). AVEK currently does not use groundwater from this basin, and imports water exclusively from the California Aqueduct as part of the SWP. AVEK currently has an allocation for purchasing up to 141,400 AFY from the SWP (AVEK 2005, 2006). It should be recognized that AVEK is a supplier of imported water from the SWP for the Antelope and Fremont Valley region, and that it is a secondary rather than a primary source of water (AVEK 2005). The water provided by SWP through AVEK is used by area consumers in lieu of or in addition to pumped groundwater.

California City

The BSEP plant site is located about eight miles northwest of the central area of California City (Figure 5.17-12). The California City water supply is largely from groundwater that is pumped from five wells at depths between 529 feet and 750 feet bgs located in the central area or "First Community" (Figure 5.17-12). These wells pump at rates of between 800 and 1,000 gpm and make up about 93 percent of the city's water supply during 2001-2002 (Quad Knopf, 2002). The remainder of California City's water comes from the SWP through a turnout with AVEK.

Water usage in 2002 was established at about 340 gallons per day per person, or about 3.25 million gallons per day (MGD). Water usage is projected to be about 6.4 MGD in 2020 reflecting a projected population growth of about 10,000 people from 2002 and a city population of about 20,000 people. To meet the projected population growth, Quad Knopf (2002) recommended that four to five new wells to be installed, that the City fully utilize its allotment of AVEK water to the capacity of 1,700 gpm, and to consider boosting the AVEK capacity to 4,000 gpm through a booster pump.

Water Supply Wells in the Koehn sub-basin

A total of 271 water supply wells were identified in the Koehn sub-basin from a search of the DWR and USGS database information (Appendix J.1). A field survey was conducted in November 2007 to identify their location, confirm operational status, and estimate their use in the Koehn sub-basin. The field survey consisted of walking or driving County roads and conducting an interview of property owners as access would allow. In the case where access or an interview could not be secured, well status was determined from the nearest road. Many of the historic wells could not be located and are presumed abandoned or

destroyed. The wells that could be located from the field survey are shown on Figure 5.17-13 and are categorized as either domestic, industrial, agricultural or municipal wells based on land use or information provided by the property owner. It is important to note that in some cases, while the well could be identified, its operational status could not be determined because access to the land was not available.

From the field survey, a total of 36 wells were identified, most of which support domestic operations for single-family residences. Of the wells identified from the field survey, four serve multi-family residences, four support industrial activities associated with the Honda Proving Center, and eight support current agriculture operations. A municipal supply well belonging to the California Water Company was located near the southern terminus of the Koehn sub-basin, and reportedly serves 76 connections in the small community in that area of the sub-basin. An inquiry was made in November 2007 to a California Water Company representative as to the production history and well completion data, but no information has been provided.

Based on information provided by Honda (Foster, 2007), four water supply wells are used in support of automotive test track operations (Figure 5.17-13). These wells were formerly used to support alfalfa farming and range in depth from 468 to 1040 feet bgs. These wells have been tested at flow rates between about 950 and 1,500 gpm, which, when coupled with associated drawdown data, yield specific capacities between 32 and 57 gpm/ft. These specific capacities are generally lower than what was estimated from the pumping test for wells on the BSEP site (see Table 5.17-6). The Honda site wells are used on an intermittent basis to provide water for the facility. Total annual average usage from these all the wells was about 150 AFY for the period between 1999 and 2007.

Available information for water supply wells located within one-mile radius of the BSEP plant site are summarized on Table 5.17-8 and shown on Figure 5.17-13.

Table 5.17-8 Well Completion Details
Water Supply Wells within a One Mile Radius of the Plant Site

State Well Number	Common Name	Depth		Screen Interval		Specific Capacity gpm/ft
		Elevation (ft msl)	TD (ft bgs)	Top (ft bgs)	Bottom (ft bgs)	
30S37E-34H02	--	2025	456	--	--	--
30S37E-35D01	HONDA No. 35	2014	1040	474	712	57
31S37E-02D02	HONDA No. 17	2032	878	418	856	34
31S37E-05M01	CINCO GAS STATION NO.1	2150	205	--	--	--
31S37E-06J01	W. Paganeu--	2170	--	--	--	--
31S37E-10A01	J. Hunter--	2105	320	--	--	--

Key:
ft msl –feet above mean sea level
ft bgs – feet below ground surface
gpm/ft – gallons per minute per foot of drawdown
-- data not provided or available in either the DWR or USGS database

5.17.2.9 Surface Water

The Project site is located on the alluvial sediments of the Fremont Valley, due east of the alluvial fans emanating east from the Sierra Nevada and southwest of the Koehn Lake. The topography slopes gently to the northeast at grades of between one and three percent. The dry wash of Pine Tree Creek cross-cuts the plant site, meandering in a northeasterly direction toward Koehn Lake. The Los Angeles Aqueduct is located about one mile to the west of the plant site in the foothill area of the Sierra Nevada.

Surface runoff and water discharged from springs along the valley perimeter move toward lower altitudes where there are alluvial deposits and gentle slopes. As the surface water descends, seepage into the permeable deposits occurs and evaporation increases. The lack of protective vegetation combined with a large amount of solar energy results in limited surface water flow into the Koehn Sub-basin. The losses are reportedly so great that stream flow rarely occurs below 3,500 feet mean sea level msl except during exceptionally wet seasons (Bloyd 1967). SCS (1981) indicates that the predominant soil type on the plant site, Cajon Loamy Sand and Rosamond Clay Loam, which are well-drained to excessively drained soil having moderate to rapid permeability and slow to moderate surface runoff. See Section 5.12, Soils for further discussion of soil types on the BSEP plant site.

According to the Federal Emergency Management Agency (FEMA) flood insurance rate map, the plant site contains areas predisposed for minimal flooding and areas within the 100-year flood zone (FEMA 1996). Pine Tree Creek, which originates in the Sierra Nevada Mountains to the west, trends north-northeast through the plant site and usually is a dry wash. The 100-year flood zone follows this trend of the Pine Tree Creek drainage through the plant site (Figure 5.17-14).

There are two gauging stations located next to the Los Angeles Aqueduct in Pine Tree Creek and Cottonwood Creek (Figure 5.17-14). The Pine Tree Creek drainage cross-cuts the plant site in a north-northeast direction as it merges with a portion of the Cottonwood Creek drainage meandering toward Koehn Lake. The Cottonwood Creek Drainage does not encroach onto the plant site. Information provide by the USGS (2007b) for these gauging stations is summarized as follows:

Pine Tree Creek (USGS 10264750) – Period 1959 to 1979

- Maximum Recorded Peak Stream Flow – 7,500 cubic feet per second (cfs) (1978).
- Average Annual Stream Flow ranged between – 0.0 to 2.12 cfs.

The peak stream flow for the period was significantly lower than the 1978 value generally being lower than 1,000 cfs. In many cases, the average annualized flow for the station in Pine Tree Creek was zero (1968, 1970, 1971 and 1974), and in most cases was below 0.5 cfs.

Cottonwood Creek (USGS 10264770) – Period 1967 to 1972

- Maximum Recorded Peak Stream Flow – 1,100 cfs (1968)
- Average Annual Flow – 0.0 to 0.159 cfs.

Similar to Pine Tree Creek, the average annualized flow for the Cottonwood Creek station in was zero for 1970 and 1971. It is important to note that the stream gauging information for Pine Tree Creek, was from a station located on the west side of the Los Angeles Aqueduct about four miles west of the BSEP plant site. It would be expected, given the nature and infiltration characteristics of the creek-bottom sediments, that the flows recorded at the station would be significantly higher than those realized if flows were to reach the southern boundary of the plant site. There are no flood control facilities currently located on the Project site. Flood control facilities are present across SR-14 to the west where Pine Tree and Cottonwood Creek cross the highway.

5.17.3 Environmental Impacts

Project water supply impacts would be considered significant if the Project resulted in:

- Substantial depletion of groundwater resources and interference with local wells,
- Substantial interference with groundwater recharge, or
- Use of water in a wasteful manner.

Project water quality or erosion/flooding-related impacts would be considered significant if the Project resulted in:

- Degradation of groundwater quality,
- Discharge into surface waters resulting in any alteration of surface water quality, or
- Activities that cause or contribute to substantial erosion or flooding off the site.

The direct effects of the Project on local water resources will be those associated with using groundwater for construction, specifically for demands during site grading, and with the plant's operational process water needs. No surface water will be used, though there will be an effect on the 100-year flood plain and solar facilities.

Currently, construction plans are to clear and grade the site with heavy equipment to provide a uniform gently northeasterly sloping grade and to construct drainage channels and roads. The preliminary cut and fill volume is estimated to be 5,160,000 cubic yards. The cut and fill will be balanced under an assumption of seven percent shrinkage factor, as such, there are no plans to import fill material during general grading operations. Due to the amount of soils and vegetation affected by grading activities, substantial water erosion control and dust control measures will be required to minimize offsite impacts. Overall, the Project will result in disturbance of approximately 2,000 acres at the plant site. A construction phase SWPPP and Drainage, Erosion and Sediment Control Plan (DESCP) to meet CEC requirements will include a series of management controls and BMPs to minimize erosion and impacts to drainage.

To support the evaluation of environmental impacts, both a numerical groundwater and conceptual drainage study, which included hydrologic modeling were performed to evaluate effects from groundwater usage and to provide a preliminary design of the proposed re-routing of Pine Tree Creek and drainage structures. The groundwater model and conceptual drainage study are presented in Appendix J.2 and Appendix J.5 respectively, and are summarized below.

Groundwater Model

To evaluate the effects of the Project on groundwater resources, a numerical groundwater model was developed with the objectives of:

- Providing a basis for understanding the hydrogeology of the Koehn sub-basin; and
- Estimating the potential impacts to groundwater resources from the Project, including resource sustainability, pumping influence and aquifer geochemistry.

The groundwater model for the Koehn sub-basin was constructed using the MODFLOW2000 model (Harbaugh et al, 2000) developed by the USGS. MODFLOW2000 is the latest version of the MODFLOW family of models. MODFLOW is the most popular groundwater flow model used in the U.S. and has become the standard for groundwater flow modeling in the country. The model was designed using Environmental Simulations' Groundwater Vistas software (ESI, 2005), which creates the MODFLOW2000 input files and allows for analysis of the results.

The groundwater model domain covers the Koehn sub-basin in the Fremont Valley, from just north of California City eastward to the edge of the valley fill sediments in Fremont Valley as they terminate northeast of Koehn Dry Lake. The model boundaries were selected to be coincident with fault or bedrock boundaries, including the Garlock, Muroc and Mojave-Randsburg Faults. No-flow boundaries were placed in a model where the aquifer is not present or where leakage of water into the model is negligible. No-flow boundaries were placed along the mountain blocks in the model and at basin boundaries.

The model was calibrated to hydrologic conditions assumed to be prevailing in 1958, which represents the most comprehensive set of water level data and the first period with published records of water levels and groundwater pumpage (Koehler, 1977). While there was some agricultural pumping in 1958, total withdrawals were relatively low and documented. The model was then further calibrated to simulate three aquifer tests conducted on the plant site (e.g., transient calibration) as described in Section 5.17.2.6 (with further detail included in Appendix J.3).

As discussed in Appendix J.2, for the 1958 calibration, mountain front recharge was divided into two sources, 10,500 AFY was assumed to occur near the mountain blocks and 4,500 AFY was assumed to infiltrate in stream channels emanating from the mountain blocks. Total recharge to the basin was therefore 15,000 AFY. These same recharge rates were assumed to be constant during the transient portion of the simulation as well. In addition to recharge, some inflow (1,000 AFY) was assumed to come from the California City area through the gap between the Muroc Fault and the Rand Mountains into the Fremont Valley. Pumping in the valley in 1958 was assumed to be concentrated southwest of Koehn Lake in an agricultural area.

The model was sub-divided into nine zones of differing conductivity which ranged from a low of 0.11 feet per day (ft/d) in the northeastern corner of the plant site to a high of 68.8 ft/d on the northern edge of the model. Hydraulic conductivity values were low in the eastern portion of the model in order to match very high water levels in that area. The hydraulic conductivity values for areas outside the plant site were derived mainly from the 1958 time period calibration. The transient calibration to the three onsite aquifer tests provided the detailed hydraulic conductivity on the plant site.

The model met the calibration standards as described in Appendix J.2, and as indicated in the work plan (ENSR, 2007b). Predictive simulations of Project operational phase were evaluated for a period of 30 years for two locations on the site, and the results are described below in Section 5.17.3.2. Additionally, a simulation was also performed for the proposed construction phase water usage during grading and site clearing, which is projected to be substantial for about five months.

Conceptual Drainage Study

A conceptual drainage study was performed to evaluate site hydrologic conditions and provide a preliminary design basis for onsite drainage structures, detention area, and the rerouting of Pine Tree Creek. The evaluation was designed following guidance provided in the Kern County Hydrology Manual and the Kern County Division Four – Standards for Drainage.

To provide a preliminary design basis for drainage control structures and rerouting of Pine Tree Creek, the hydrologic analysis followed USDA Natural Resource Conservation Service Technical Release 55 for estimating runoff. Onsite ditches and channels, and the rerouting of Pine Tree Creek were sized using Manning's Equations and Bently Flowmaster (2005) computer program, and detention structures were sized using the SCS Synthetic Unit Hydrograph method and HydroCAD (Appendix J.5).

The portion of the existing Pine Tree Creek wash to be rerouted is about 8,150 feet long on a diagonal through the site, varies in width from 600 feet to more than 1,000 feet, and is about 10 feet deep in average for the 100-year flood event (Figure 5.17-15). The discharge from a 100-year flood event was estimated to be between 14,000 to 20,000 cfs for Pine Tree Creek.

The rerouted and reshaped dry desert wash will follow the plant site's southern and eastern boundaries to ultimately match the original sheet flow drainage path at the northeast corner of the site (Figure 5.17-15). The rerouted wash segment will be approximately 14,000 feet long, designed to meet Kern County requirements, and also revegetated with native vegetation to minimize habitat disturbance. The rerouting of Pine Tree Creek was designed to convey the 100-year storm event around the southern edge of the facility, returning the flow to its natural course at the northeastern corner of the plant site. The wash will slope from a minimum of 0.5 percent to a maximum of 1.4 percent. Under these grades, and to accommodate the velocities produced by a 100-year event, modeling indicated that the channel depth would need to be between 3.5 to about six feet, while the velocity would be between eight to 13 feet per second (fps). Under these velocities, erosion would occur and mitigation measures along the channel bottom and sides are recommended along with the revegetation. The erosion control measures will be designed to maintain the infiltration characteristics of the channel reach similar to pre-construction conditions.

The realigned dry desert wash is designed as a trapezoidal channel having 3:1 side slopes, with a minimum bottom width of 345 feet to a maximum of about 2,900 feet at the end of the transition back to sheet flow at the northeast of the site. The wash will have a minimum depth of eight feet, to produce a minimum freeboard of one foot over the water surface.

An existing railroad drainage crossing is located west of the plant site. The flow from this crossing will be rerouted in a swale to convey the flow from this drainage crossing east across the plant site to the rerouted dry wash discussed above. The swale will be approximately 9,000 feet long with an average depth of one foot and a minimum bottom width of 15 feet.

5.17.3.1 Construction

Construction activities are expected to take place over a period of approximately 25 months. It is anticipated that water use during this period will be from onsite groundwater using the wells proposed for operational supply (i.e., well nos. 41, 42, 49 and 63) plus wells nos. 44B, 47 and 48 and possibly the domestic well for the initial monthly requirement to support grading (Figure 5.17-15). It is anticipated that water usage for the construction period will proceed along the following schedule:

- Month One – Five million (M) gallons per day (gpd),
- Month Two through Four – 10M gpd,
- Month Five – 5M gpd, and,
- Month Six through Twenty six – 10,000 to 400,000 gpd.

Initial water usages will be in support of site preparation and grading. Subsequent to Month Five of construction, water usage will be in support of dust suppression and normal construction water requirements that are associated with construction of the buildings, power block and solar array. This section describes potential impacts to water resources related to construction activities. Potential impacts on water resources during construction include water consumption, water quality impacts, erosion, and drainage impacts.

Water Use

The Project proposes to use water from onsite wells equipped with temporary pumps to support site pre-watering, grading and normal construction activities (e.g., mixing concrete, dust control). Initially, water demand for the Project will be significant through the first five months of site preparation and rough grading. During grading, water usage will be between 5 million and 10 million gpd, five days per week for a total period of 22 days per month for five months or 110 days. This scenario was modeled using the MODFLOW2000 numerical groundwater model (Appendix J.2) to evaluate the pumping influence under the assumption that the water would need to be provided over an eight-hour day, five days per week for five months or 110 non-consecutive days. Under these assumptions, between about 7,000 and 14,000 gpm of water would be required daily from seven wells to support initial construction activities. To evaluate the impacts from the pumping, the groundwater model was run under the assumption that the seven wells would pump continuously over a five month period at rates of about 4 million and 80 million gpd (daily rates adjusted for continuous pumping). Figure 5.17-16 shows that the pumping would not significantly impact offsite water supply wells within a one-mile radius of the plant site, as only one offsite well will be affected and the drawdown is predicted to be about five feet after five months. Further, this would be a short-term effect that would cease when water usage drops significantly during the remainder of Project construction

Following the initial grading period, groundwater usage will drop dramatically with daily rates ranging from 10,000 to 400,000 gpd. This period of usage is ranges from less than 1 percent to 8 percent of the groundwater usage during the grading period and water usage and effects on surrounding wells and groundwater quality will be less than significant.

Water Quality

Water quality impacts could result from releases of chemicals used during construction, such as motor oil, fuel, and solvents. These chemicals can potentially contaminate surface waters during heavy storm events, or groundwater through infiltration. A number of mitigation measures are in place to prevent spills of chemicals, as well as to respond to spills should they occur. The SWPPP and DESCP will require storm water BMPs, and temporary erosion control measures including revegetation, dust suppression and construction of beams and ditches, which will prevent accelerated soil erosion or dust generation. Adhering to proper material handling procedures and complying with the SWPPP will ensure that construction-related water quality impacts are less than significant.

Due to the short-term nature of the groundwater pumping and limited influence (Figure 5.17-16), there will be no significant changes to the groundwater quality below the site. Historic pumping for significantly longer periods of time from the mid-1960's to mid-1980's did not render any changes to the groundwater quality, as described in Section 5.17.2.7.

Drainage Impacts

As noted above, site grading activities will be ongoing for the first five months of the construction schedule. During that time the site will be broken into areas and grading will proceed from one area to the next until the entire site grading has been completed. During this time, site drainage will be managed according to the BMPs provided in the construction SWPPP and DESCP will be employed to minimize erosion and manage storm water runoff. Though infiltration at the site is expected to be rapid, mitigation measures will include local soil berms and a detention area that will contain storm water runoff during construction. Heavy grading will occur within the plant site boundaries. Temporary erosion controls including crushed rock, silt fences and fiber rolls will be used as needed to minimize erosion in active grading areas. Additionally, water will be used to control dust and will be applied at a rate so as to minimize runoff.

Activities and products that have the potential to contaminate groundwater and surface water will be properly stored and used in a manner consistent with the approved grading plan, SWPPP, and DESCP. Good housekeeping and prompt removal of spills and leaks will be implemented to minimize storm water contact with contaminated materials. With the implementation of BMPs and procedures and protocols provided in the DESCP, it is anticipated that during construction, drainage and erosion control measures will adequately protect surface and groundwater resources and impacts will be less than significant

5.17.3.2 Operation

This section describes potential environmental impacts on water resources related to Project operations..

Water Use

Operations. The Project proposes to use a wet cooling tower for power plant cooling. Water for cooling tower makeup, process water makeup, and other industrial uses such as mirror washing will be supplied from selected onsite groundwater wells. Water from the onsite wells also will be used to supply non-potable water for employees (e.g., showers, sinks, toilets). A water treatment system will be used to treat the groundwater pumped for domestic use. Four existing water supply wells (nos. 41, 42, 49 and 63), will be used to supply water for the operation of the Project (Figure 5.17-15). Details for these wells are provided in

Table 5.17-5 and in Appendix J.1. Pumping test data (Section 5.17.2.6) has shown water supply wells on the plant site to have the capacity to meet BSEP water supply requirements. The results of the aquifer testing indicated that the existing wells tested will be able to support the maximum estimated pumping rate of approximately 4,050 gpm during Project operations. New water supply wells may need to be installed if the existing water supply wells do not meet performance requirements or are damaged or destroyed during construction. The four existing wells identified above, and located in the central and southwestern portion of the plant site, will be used on a rotating basis to provide the needed water supply. These multiple wells will provide backup for each other in the event of outages or maintenance.

The remaining wells will be used to monitor water levels during pumping and to evaluate groundwater quality in support of the proposed waste management facilities. Wells located in the solar array field will have their pump motors and bowls removed and cut down to near-surface grade elevations. Wells in the solar array field located within a footing will be destroyed consistent with applicable LORS. Additional monitor wells will be installed if a significant number of wells within the solar array are destroyed and the remaining wells no longer provide a sufficient monitoring network to evaluate the Project pumping and to support monitoring of the waste management facilities.

Based on the estimated solar energy and plant operating profile, approximately 1,600 AFY of water will be used by the BSEP processes and about 5 gpm or about 8 AFY will be used for domestic supply for plant personnel. Water usage is projected to follow the monthly schedule shown in Table 5.17-9. The water use schedule shown in Table 5.17-9 estimates water usage during the months of April through September to average between 1,100 to 1,900 gpm. During the winter months of October through March, the flow rate is significantly reduced to be between 34 gpm (December) and 731 gpm (October). The peak flow rate expected is approximately 4,000 gpm; the average flow rate for the entire year is about 990 gpm. These flow rate estimates are conservative since they do not take into account shutdown periods for facility maintenance.

Table 5.17-9 Estimated Water Usage

Month	Approximate Water Usage Acre-Feet (gpm)[1]	Month	Approximate Water Usage Acre-Feet (gpm)[1]
January	31 (224)	**July**	239 (1,741)
February	40 (321)	**August**	235 (1,724)
March	102 (741)	**September**	175 (1,316)
April	148 (1,119)	**October**	100 (731)
May	242 (1,764)	**November**	35 (265)
June	247 (1,866)	**December**	5 (34)

[1] The estimated groundwater usage in gallons per minute (gpm) is based on average daily consumption. Peak groundwater pumping rates during the summer months will be up to 4,000 gpm.

Water Quality. Operation of the Project has the potential to impact water quality through improper storage and use of materials and from soil erosion. As discussed in Section 5.12, Soils, soil erosion during the operation of the Project will be minor. Adhering to proper material storage and handling procedures and complying with the SWPPP will result in impacts to water quality that are less than significant. The SWPPP

and DESCP will identify BMPs to mitigate pollutants and conditions of concern including spill and leak prevention, waste handling, and employee training. Through compliance with the General Industrial Permit, all potential pollutants generated during the industrial phase will be sufficiently mitigated such that water quality standards will not be violated. Thus, surface water and groundwater quality impacts during the operations phase will be less than significant.

Groundwater use. Figures 2-12 and 2-13 in the Project Description present the BSEP water balance for both the peak summer usage (104°F dry bulb/68°F wet bulb) and for typical annualized operation (71°F dry bulb/52°F wet bulb). A raw water storage tank with a capacity of 2,840,000 gallons will hold 2,480,000 gallons of water for plant operations (sufficient to cover an 18-hour interruption of water supply to the facility) and 360,000 gallons of raw water dedicated to the plant's fire protection water system. There also will be a treated water tank with a capacity of 2,350,000 gallons. The water will be used as raw make-up water in the cooling towers and as support for domestic water use and quench water. Water for the plant processes will be treated via ion exchange to reduce scale forming species from entering the cooling water system.

The groundwater will be treated with a biocide (sodium hypochlorite) prior to storage in the 2,840,000-gallon onsite raw water storage tank. There also will be a 150,000-gallon storage tank for storage of de-mineralized water and an 80,000-gallon storage tank for neutralization. Water storage tanks will be vertical, cylindrical, field-erected steel tanks supported on foundations consisting of either a reinforced concrete mat or a reinforced concrete ring wall with an interior bearing layer of compacted sand supporting the tank bottom.

Extraction of groundwater to support power plant requirements can result in changes to local groundwater elevations. This, in turn, could potentially reduce the pumping capacities of nearby wells and increase the energy costs of pumping from those wells. As discussed in Section 4.0. Alternatives, groundwater is the only cooling water source whose availability and feasibility has been established; however, the potential availability of reclaimed water has been studied carefully. Moreover, as discussed in Section 4.0, Beacon Solar is monitoring closely the progress of a planned expansion project to increase reclaimed water production capacity at the California City wastewater treatment plant. As indicated in a February 2008 letter from California City officials (see Appendix K), tertiary treated reclaimed water may become available at some point fairly early in the Project's commercial operations phase as an alternative supplemental source of water supply for the BSEP via a pipeline from California City's expanded treatment plant.

Historic water level and geochemistry data and the pumping test program provide an initial evaluation of the environmental impacts from the Project groundwater use. A summary of conclusions as presented in the discussion earlier in this section are as follows:

- The 2007 pumping test data provided a preliminary assessment of the proposed groundwater pumping on surrounding groundwater resources. As described in Section 5.17.2.6, the influence of the pumping over a 72-hour period from three onsite wells revealed that the drawdown off site and across the Cantil Fault was insignificant (less than one foot across the fault and offsite to the northeast).
- A comparison of TDS data from 1958 and 2004 provides insight into historic groundwater movement and the effects from historical pumping. The 1958 data was collected prior to the period of significant agricultural pumping that caused a large cone of depression southwest of Koehn Lake beginning in the mid-1960's to the mid-1980s. It would be expected that the large cone of depression caused by the period of intense pumping might have drawn higher TDS water from the Koehn Lake area to the

southwest. As discussed above in Section 5.17.2.7, the 2007 TDS data does not suggest that higher TDS water was "pulled" from that area during the pumping program. Given the significant pumping during that period compared to the expected Project pumping, the data would suggest that there would not be a significant influence from the Project pumping on the aquifer geochemistry in the vicinity of the BSEP site.

- As discussed in Section 5.17.2.4 and shown on Figure 5.17-4, there has been significant rebound of groundwater levels following the period of significant agricultural development. The estimate of recovery of for the area, including the plant site, southwest of Koehn Lake is 9,000 AFY. The proposed groundwater usage for the Project is about 18 percent of this volume, which would suggest that proposed Project groundwater use would merely slow somewhat the rate of recovery in the Koehn Sub-basin.

Groundwater modeling was employed to further evaluate operational impacts over the term of the Project and during the period of significant water use at the onset of construction and site grading (Appendix J.2). Two predictive simulations were run to evaluate pumping affects over the term of the Poject. The first simulation was run using well no. 48 solely as the pumping well and the second using well no. 63 solely as the pumping well.

The wells were pumped in the model at a rate of 1,600 AFY (approximately 990 gpm), for a period of 30 years. These locations were selected because the wells had the highest specific capacity and sufficient available drawdown to meet Project water requirements. The predicted drawdowns of well no. 48 (Figure 5.17-17) and well no. 63 (Figure 5.17-18) are very similar.

From the numerical simulations, the maximum onsite drawdown below the site over 30 years is about 35 feet and the Cantil Fault limits the impact to the north side of the fault. The maximum drawdown south of the Cantil Fault is about seven feet after 30 years. Impacts propagate to the northeast between the Cantil Fault and the Garlock Fault. The distance from the eastern edge of the plant site to the five feet drawdown contour is about four miles. Figures 5.17-17 and 5.17-18 also show the saturated thickness based on recent water level data and total well depth available in the USGS or DWR database for wells surrounding the plant site. The projected drawdown from the modeling indicates that the saturated thickness in these wells will change between approximately one and seven percent.

Additionally, because of the limited drawdown near Koehn Lake of five feet or less and the presence of the Honda Proving Center water supply wells between the Project and the lake, it is unlikely that any highly saline water from the lake area would reach the Project. Also, the additional drawdown of five feet or less between the Honda Track and Koehn Lake is not likely to cause the migration of highly saline water into the wells on the Honda site wells.

In summary, from the numerical simulations and additional analyses described above:

- Project water use would not cause substantial depletion of groundwater resources.
- Drawdown of local wells would be between 5 and 10 feet to the north of the Cantil Fault and about five feet to the south of the fault; drawdown beneath the site itself would be about 35 feet after 30 years;

- The Project would not significantly affect groundwater recharge; Project withdrawals will merely slow by less than 20 percent what has been a substantial rate of recovery over recent years in the area of the site and,
- Project withdrawals would not significantly degrade groundwater quality. Groundwater modeling demonstrated there would be no significant effect after 30 years of pumping. Additionally, historic pumping to support former agricultural development was done at significantly higher rates for a period of about 20 years. This period of pumping did not change the aquifer geochemistry of the Koehn Sub-basin. This would support model conclusions that water quality would not be affected by Project pumping.

Process and Sanitary Waste Water Management

Process water wastes, including cooling tower blowdown and waste streams from the neutralization tank will be disposed to lined, onsite evaporation ponds. An estimated peak summer discharge for all process wastewater to the evaporation ponds is estimated at 563 gpm, with an annualized average for the Project of 462 gpm. The ponds will be sized to retain all solids generated during the life of the plant. However, if required for maintenance, dewatered residues from the ponds will be characterized and, as appropriate, will be sent to an appropriate offsite landfill as non-hazardous waste. The discharge to the ponds is estimated to be 710 tons annually and a total of 21,000 tons for the 30-year Project operational life.

Three evaporation ponds will be constructed with a nominal surface area of 8.3 acres each, for a total of 25 acres (see Section 2.0, Project Description). Multiple ponds are planned to allow plant operations to continue in the event that a pond needs to be taken out of service for some reason (e.g., needed maintenance). Each pond will be designed to have enough surface area so that the evaporation rate exceeds the process wastewater and cooling tower blowdown rate at peak design conditions and at annual average conditions.

The water-balance diagrams provided in Section 2.0, Project Description (Figures 2.12 and 2.13), show the expected wastewater streams and flow rates for the Project under summer (representing the peak in usage) and annualized conditions. Wastewater generated from the Project will include cooling tower blow down, sanitary wastewater, and storm water.

The WDR permit obtained from the RWQCB will require the preparation of a Water Quality Monitoring and Response Plan that includes monitoring of the Project pond liner to detect leaks, as well as groundwater monitoring. Groundwater monitoring will be done using existing wells where possible and may include additional monitoring wells as needed to provide adequate monitoring of groundwater quality.

Sanitary wastewater from sinks, toilets, and other sanitary facilities is handled on site by a septic system and leach field that will be permitted under a WDR from the RWQCB. Other water streams like plant drains and other miscellaneous water waste streams are collected and recycled back into the cooling towers. No water quality impacts from the treatment and discharge of these small quantities of wastewater to the evaporation pond is expected. Table 5.17-10 shows the estimated constituent concentrations for various waste streams within the plant and the discharge to the evaporation ponds.

Table 5.17-10 Waste Constituent Concentrations at Points within the Process and Discharge to the Evaporation Ponds (all values in mg/L or ppm)

Component	Mean Well Water Concentration	Cooling Tower Blowdown 90% Demin + 10% Raw at 15 Cycles	Ion Exchange Regeneration with H2SO4 and NaOH	Evaporation Pond Feed Concentration
Calcium (total)	47	141	538	369
Magnesium (total)	11	33	126	86
Sodium (total)	78	234	892	612
Potassium (total)	4.1	12.2	47	32
Iron (total)	0.047	0.135	0.538	0.366
Ammonia	0.038	0.120	0.435	0.301
Aluminum (total)	0.023	0.075	0.263	0.183
Zinc (total)	0.012	0.036	0.137	0.094
Boron (total)	0.18	0.540	2.059	1.411
Chloride	15.5	46.65	177	122
Sulfate	118	777.8	1350	1106
Nitrate	1.183	3.560	13.533	9.280
M-Alkalinity	207	142.1	2368	1419
HCO_3 (bicarbonate alkalinity)	257	204.2	147 (3)	141 (3)
Fluoride	0.459	1.380	5.251	3.600
Cyanide (total)	0.007	0.011	0.080	0.050
Silica	33.3	99.9	381	261
Silicon	15.7	24	180	113
Phosphate (total)	0.019	0.060	0.217	0.150
Phosphorous (total as P)	ND	0	0	0
Arsenic (total)	0.0035	0.005	0.040	0.025
Strontium (total)	0.78	1.170	8.923	5.617
Selenium (total)	0.00039	0.0006	0.0045	0.0028
pH	8	7.70 (2)	6 – 9	6 - 9
Suspended Solids	0	0	----	----
Total Dissolved Solids	550 (1)	1590	8689	5662
98% Sulfuric Acid	0	332	1981	----
50% Sodium Hydroxide	0	0	417	----

[1] – Use maximum of 3 wells at 470 ppm, 470 ppm and 550 ppm
[2] – Sulfuric acid addition to circulating water system to establish pH = 7.70
[3] – Assume 95 percent CO2/HCO3 removed by degasifier

Drainage and Flood Control

The plant site slopes to the northeast at grades between one and three percent and is bisected by a dry wash (Pine Tree Creek). Sheet flow in the solar field will be managed through the construction of internal drainage facilities that will route water to the northeast, directing it towards the natural drainage of Pine Tree Creek, the rerouted channel and a detention area in the northeastern section of the solar field. The power block will drain via sheet flow away from equipment foundations to the solar field. The runoff will then flow through ditches to the relocated dry wash channel to the east. Local area containments will be provided around certain locations, such as oil-filled transformers and chemical storage areas. The water from these areas and from other plant drains will be sent to an onsite oil-water separator and then added to the plant cooling water.

The current Pine Tree Creek wash that runs diagonally through the plant site will be rerouted around the southern and eastern plant site boundaries (see Figure 5.17-15). The diversion will be designed to handle a 100-year flood event and for flows of up to 20,000 cfs; it will direct the waters from the entry point of the creek on the southwestern side of the plant site, around the facility to the east, and redirect water back into the natural drainage beyond the northeastern corner of the plant site. The wash will be designed to match the sheet flow conditions in Pine Tree Creek wash as it exits the plant site at the northeast boundary of the property.

An existing railroad drainage crossing is located west of the plant site. The flow from this crossing will be rerouted in a swale to convey the flow from this drainage crossing east across the plant site to the rerouted dry wash discussed above. The swale will be approximately 9,000 feet long with an average depth of one foot and a minimum bottom width of 15 feet.

A comprehensive system of controls including operations phase BMPs will be used to manage storm water runoff and to control erosion and sedimentation. The controls will be detailed in the DESCP (see Appendix L) and SWPPP documents prepared for the Project and are summarized below:

- Initially grading will only proceed in those areas needed for site construction and operation of the facility. Areas that are undisturbed will remain so and be clearly marked so that existing vegetation will remain in-place.
- Gravel berms will be used at the based of slopes or check structures to control sediment loss and erosion. As indicated for the channel diversion structure, rip-rap or other erosion control measures will be used to minimize scour and erosion.
- Roads and paved areas will be kept free of dust, dirt and visible soil materials. An entrance/outlet tire wash will be developed. Water will be used to control dust and but water application will be minimized to control runoff.
- Erosion control measures will be used for the rerouted channel of Pine Tree Creek wash. Measures will be designed to maintain the infiltration characteristics of the channel reach similar to pre-construction conditions.
- BMPs will be applied and repaired as soon as possible when erosion is evident. Temporary erosion control measures will be implemented as needed to control erosion. Temporary sediment control materials will be maintained on site throughout the term of the Project for responding to unforeseen conditions as they arise.

With the implementation of BMPs, it is anticipated that the Project will effectively minimize impacts to drainage and/or control flood conditions.

5.17.3.3 Cumulative Impacts

The potential for cumulative water resources impacts exists where there are two or more individual projects proposed in an area that, when considered cumulatively with the proposed Project, could result in an impact to water resources. Projects with overlapping construction schedules and/or operations collectively could result in a demand for water that cannot be met by the Project area water supply resources or could result in water quality impacts to surface or groundwater resources. Two projects, the Pine Tree Wind Development Project and the LADWP Barren Ridge-Castaic Transmission Project, have been identified within the Project area as projects to consider cumulatively for potential impacts.

As discussed above, the BSEP proposes to use groundwater as the primary source during construction and operation. The Pine Tree Wind Development Project does not propose to use groundwater as a supply for water during construction or operation. The LADWP Barren Ridge-Castaic Project is in early stages of the environmental review process; therefore, no specific data on water resource impacts data is available. However, transmission line projects are not generally heavy consumers of water and no significant impacts to groundwater supply should be expected. Therefore, when considered cumulatively with the projects proposed in the Project area, the BSEP will not contribute to a significant cumulative water supply impact.

The cumulative impacts on surface water quality associated with the BSEP are expected to be less than significant. The other cumulative projects each would be required to comply with the requirements of the California Storm Water Permitting Program, as would the BSEP. Further, the location of construction activities for the Barren Ridge-Castaic and Pine Tree projects are sufficiently separated from the BSEP site such that runoff from the various projects would not cause significant cumulative effects.

5.17.4 Mitigation Measures

The following mitigation measures will be implemented to ensure that the Project will not have significant impacts on water resources. Water quality will be protected through implementation of the SWPPP and DESCP for construction and operations. To ensure that no significant adverse effects to water quality or supply are caused by the Project, Beacon Solar proposes the following mitigation measures during construction and operation.

5.17.4.1 Construction

WTR-1 Prior to beginning any clearing, grading or excavation activities associated with construction of the project, the project owner will prepare an approved construction phase SWPPP as required under the General Storm Water Construction Activity Permit and a DESCP to meet CEC requirements .

WTR-2 The project owner will obtain final WDRs issued by the Lahontan RWQCB for the project's proposed wastewater discharge.

WTR-3 The project owner will obtain permits for construction of a septic system prior to construction of the plant. A copy of the permits will be provided to the CEC CPM 60 days prior to the beginning of construction activities.

WTR-4 The project owner will revise and reclassify well permits from Kern County for those wells that will be used to monitor groundwater and provide water supply to the project. Those wells not being used will be destroyed consistent with Kern County requirements.

5.17.4.2 Operation

WTR-5 Prior to commercial operation, the project owner, as required under the General Industrial Activity Storm Water Permit, will develop and implement an operations phase SWPPP.

WTR-6 The project owner will record on a monthly basis the amount of groundwater pumped by the project. This information will be supplied to the CEC and the Kern County Water Agency.

WTR-7 The project owner will measure groundwater levels in the onsite monitoring wells on a monthly basis for the first six months following the project start up and thereafter on a quarterly basis and submit periodic monitoring reports to the CEC.

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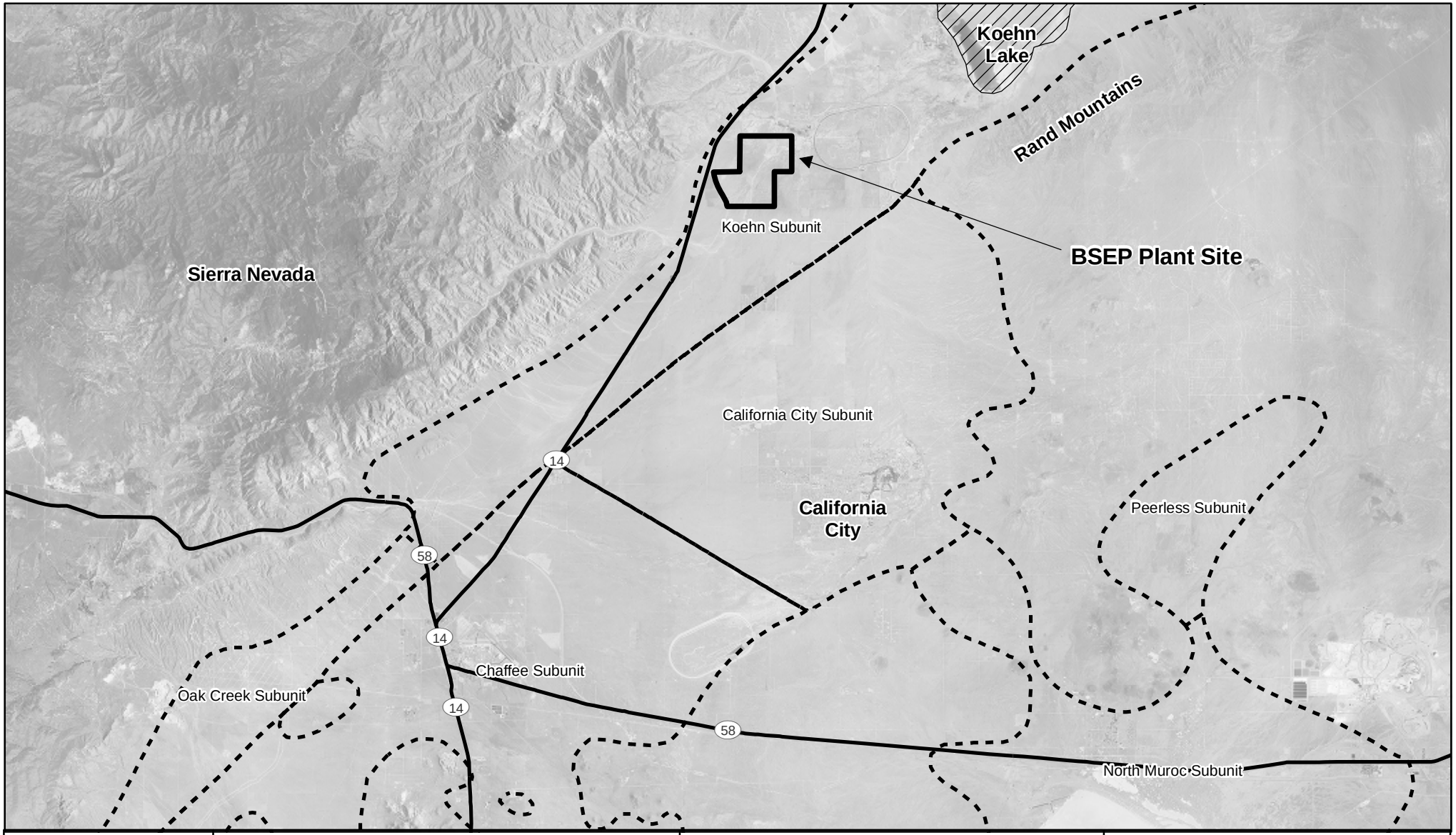

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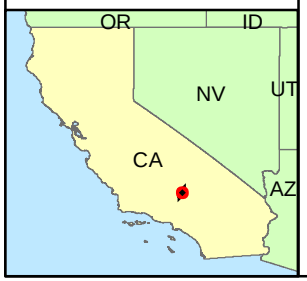

Legend

- Koehn_Lake
- Groundwater Sub-Basin Boundary
- BSEP Plant Site Boundary

N W E S

0 2 4 6 8 Miles

1:253,440

BSEP

Figure 5.17-1
Sub-Basins of the
Fremont Valley Groundwater Basin

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008

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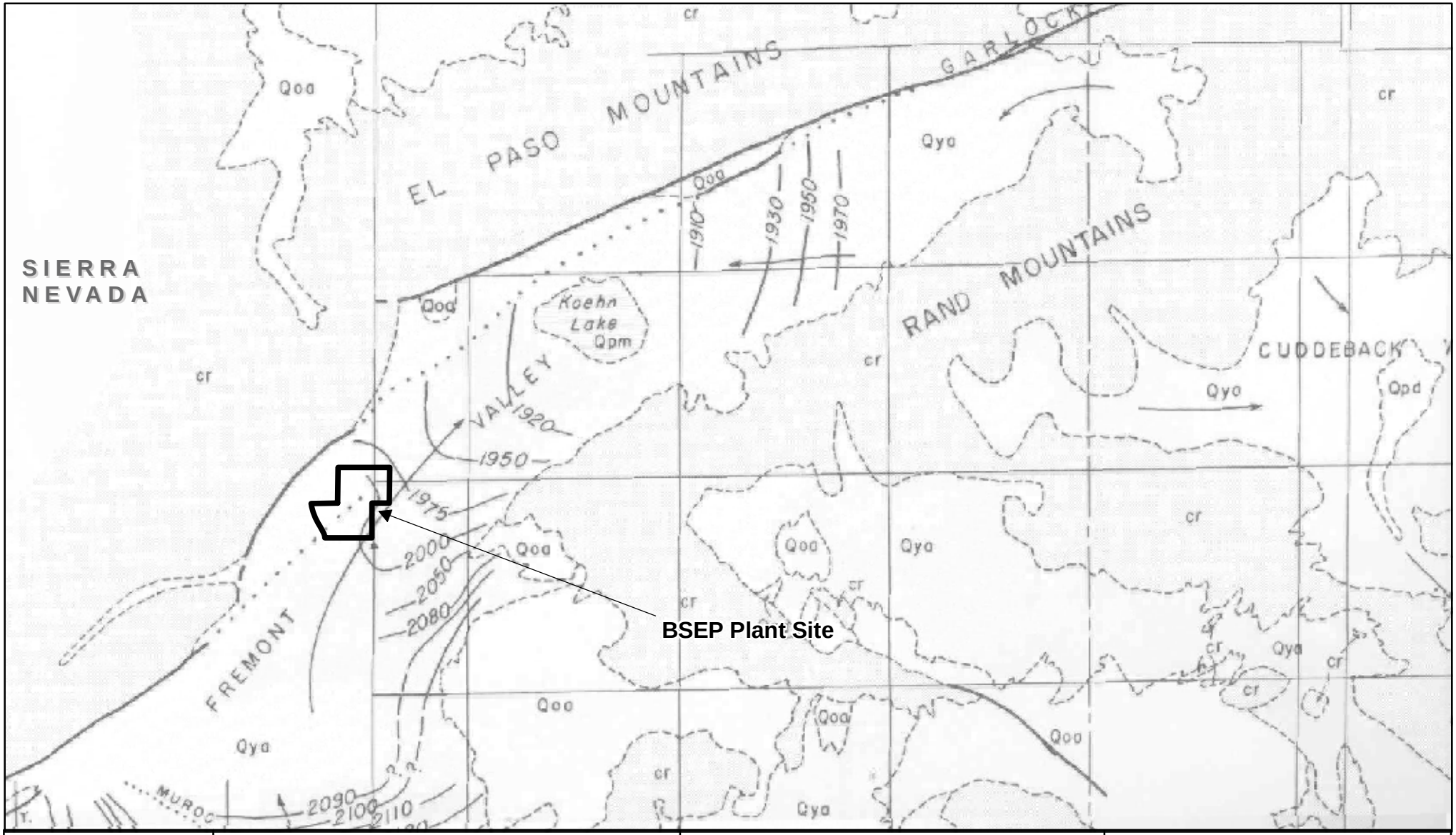

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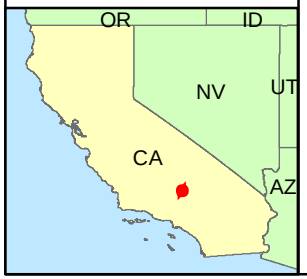

Legend

BSEP Plant Site Boundary

Source: Kunkel, U.S.G.S, 1962

0 2 4 6 8 Miles

1:253,440

BSEP

Figure 5.17-2
Regional Geology in the Area of the Project Site

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008

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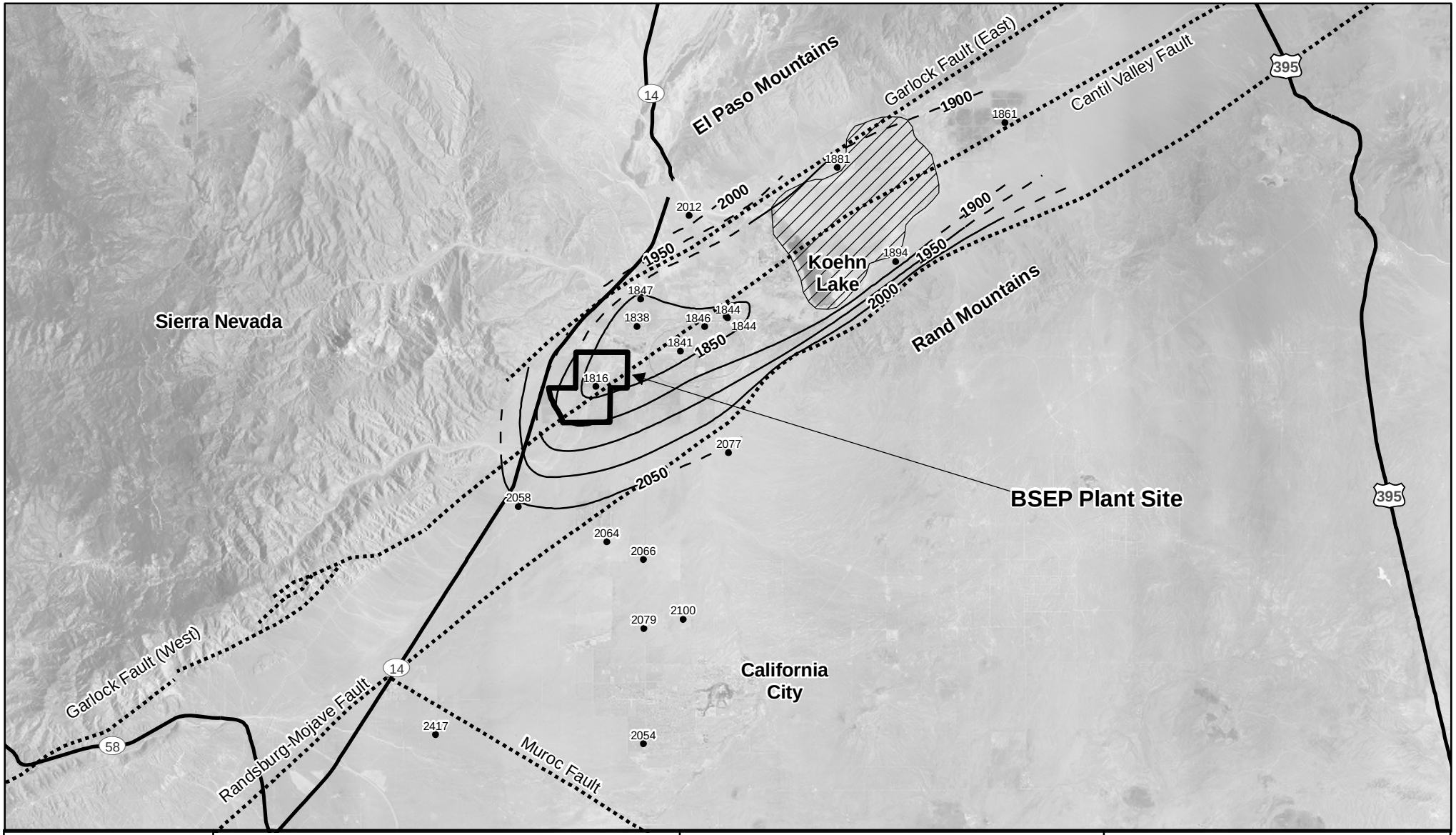

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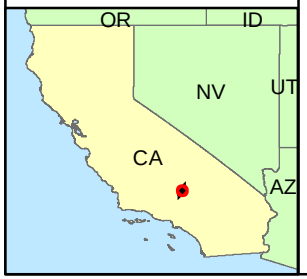

Legend

- Wells with Water Level Data (2007)
- Groundwater Contour (feet amsl)
- Dashed where Inferred
- BSEP Plant Site Boundary
- Fault

Note: Fault locations are approximate

0 2 4 6 8 Miles

1:253,440

N W E S

BSEP

Figure 5.17-3
Water Level Contour Map (2007)
Koehn Sub-Basin

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008

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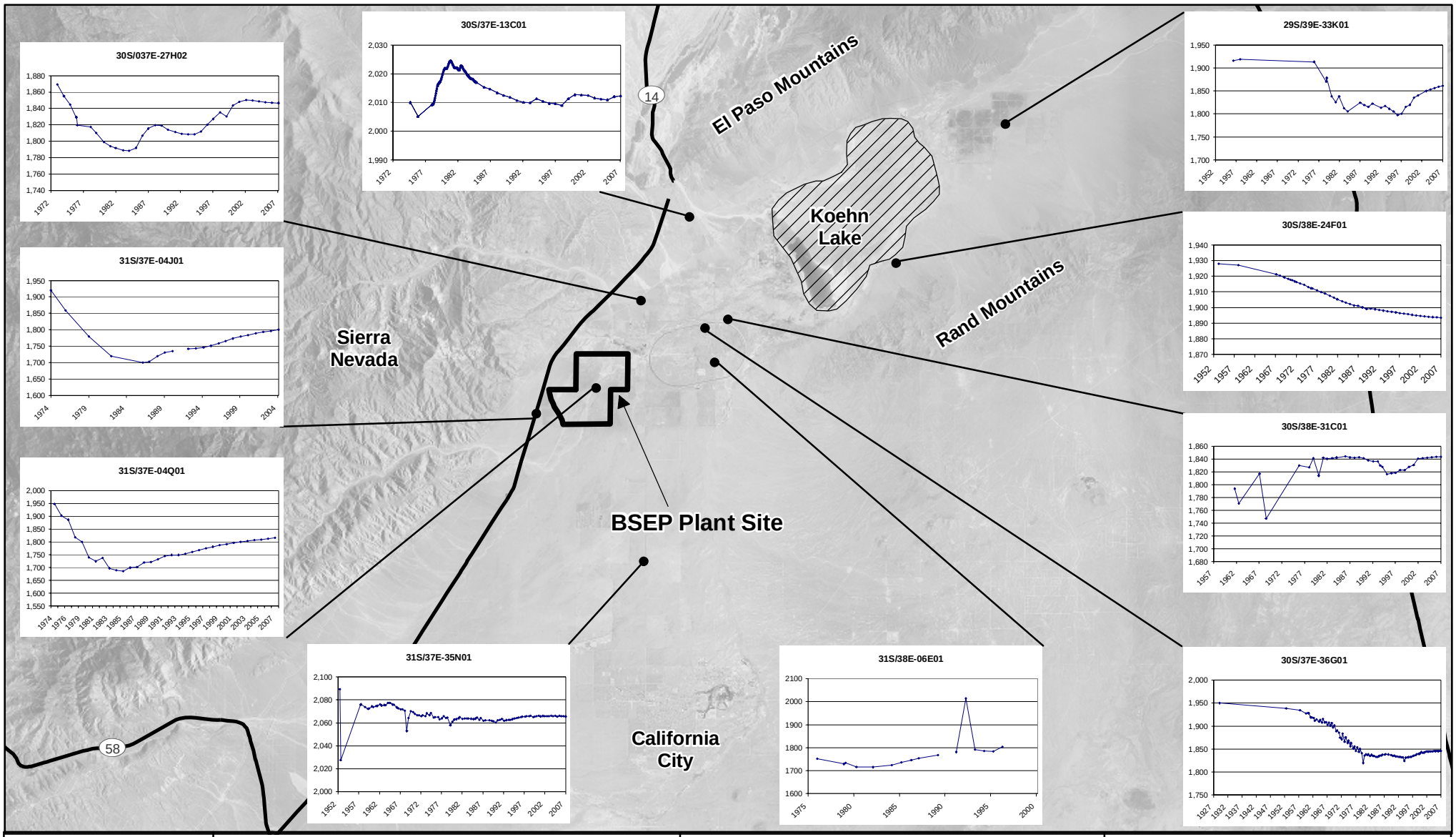

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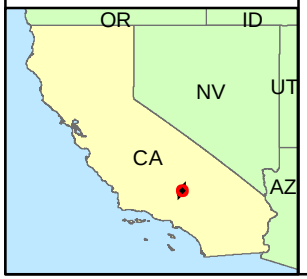

Legend

BSEP Plant Site Boundary

Note: Additional hydrographs presented in Appendix J.1

0 2 4 6 8 Miles

1:253,440

BSEP

Figure 5.17-4
Hydrographs of Selected Key Wells within the Koehn Sub-basin

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008

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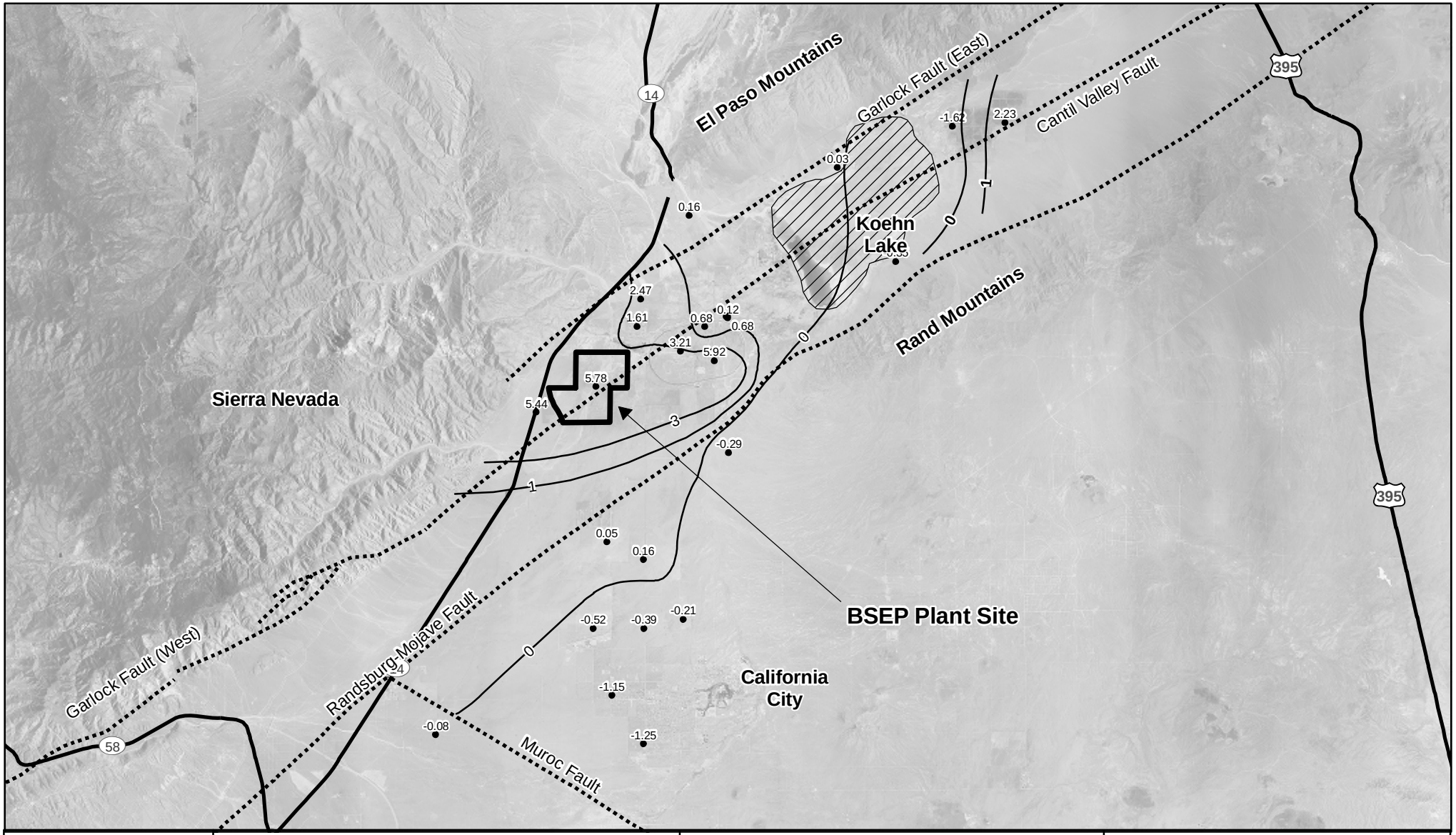

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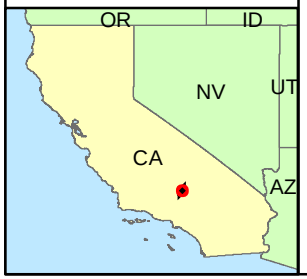

Legend

- Wells with Continuous Water Level Data (1978-2007)
- Contour Line of Equal Recovery Rate (ft/yr)
- BSEP Plant Site Boundary
- Fault

Note: Hydrographs are presented in Appendix J.1
Fault locations are approximate

0 2 4 6 8 Miles

1:253,440

BSEP

Figure 5.17-5
Groundwater Recovery Rates
Koehn Sub-basin

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008

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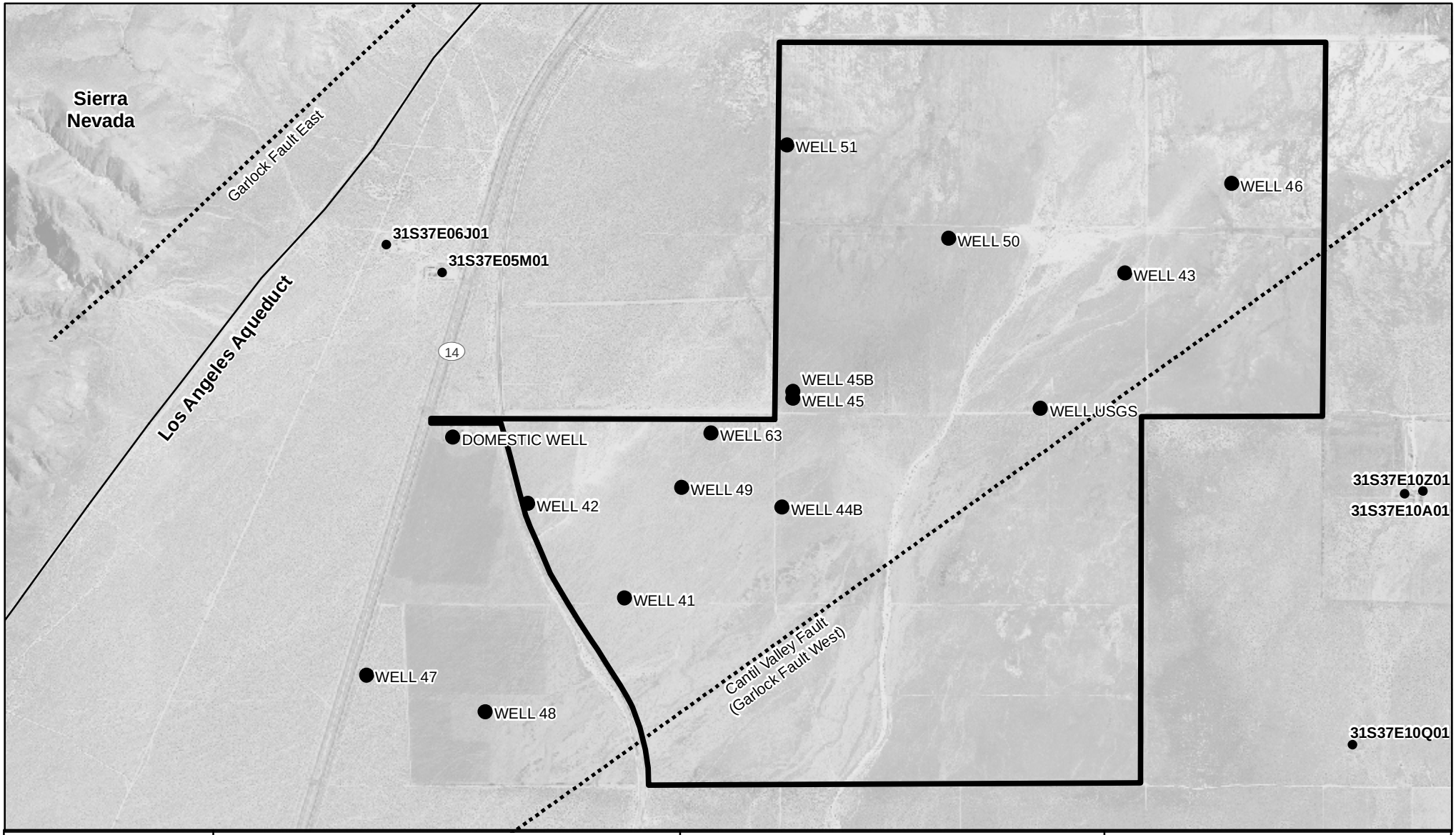

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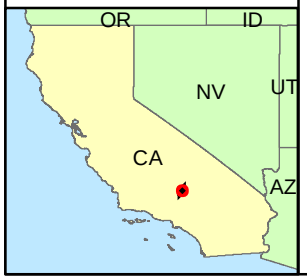


Legend

- Groundwater Supply Wells
- Water Supply Well Location
- BSEP Plant Site Boundary
- Fault
- Los Angeles Aqueduct

Note: Appendix J.1 presents well completion data
Fault locations are approximate.

0 1,000 2,000 3,000 4,000 Feet

1:24,000

N W E S

BSEP

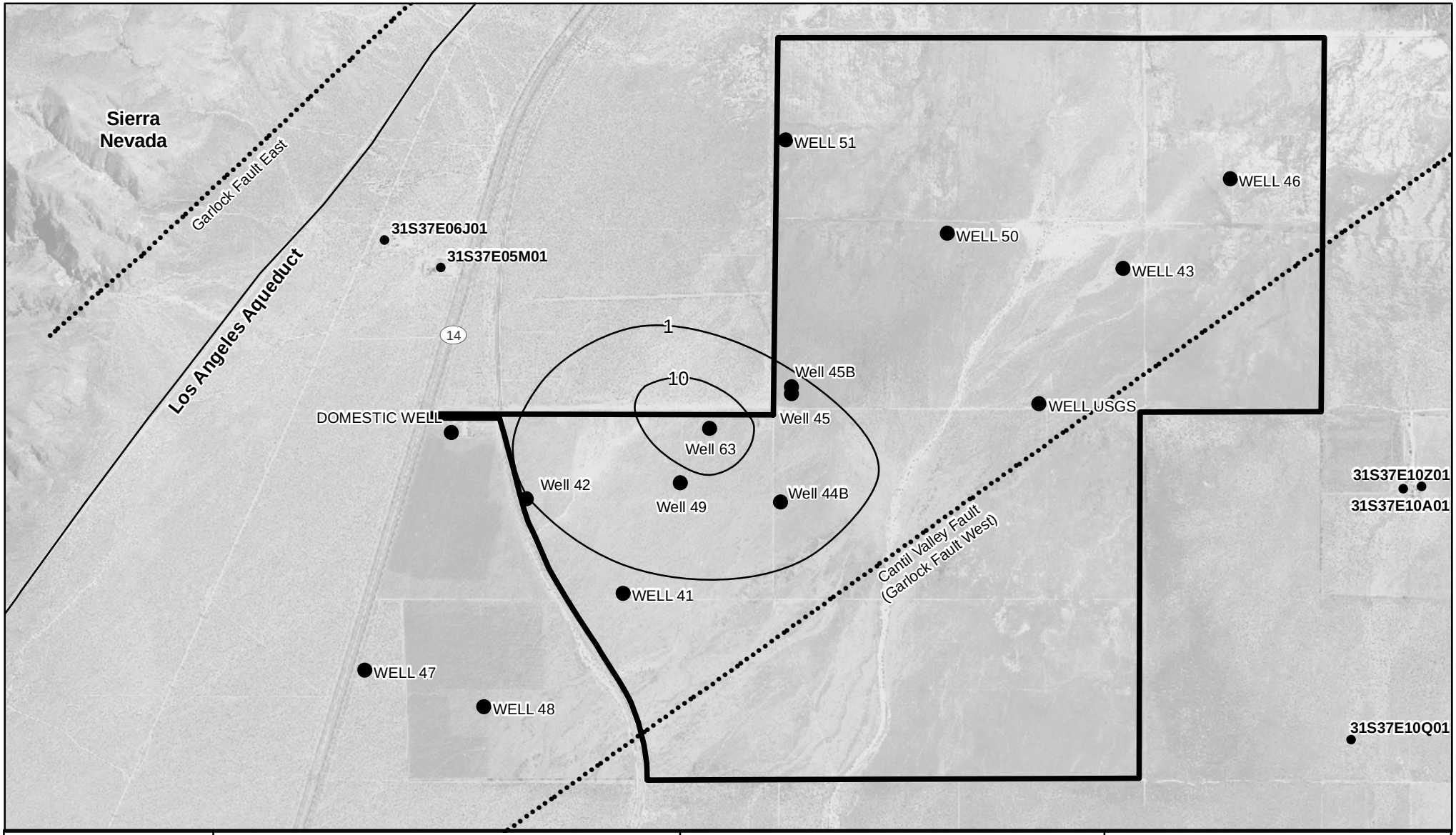
Figure 5.17-6
Site Map Showing Wells on the Project Site

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008

J:\2007 Projects\10056-FPL\014-CCSP\AFC Beacon Energy LLC GIS\March 08\Figure 5.17-6.mxd



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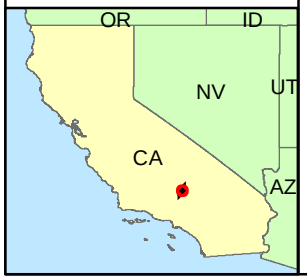


Legend

- Groundwater Supply Wells
- Water Supply Well Location
- Los Angeles Aqueduct
- Drawdown Contour (feet)
- BSEP Plant Site Boundary
- Fault

Note: Appendix J.3 presents pumping test data
Fault locations are approximate

0 1,000 2,000 3,000 4,000 Feet

1:24,000

N W E S

BSEP

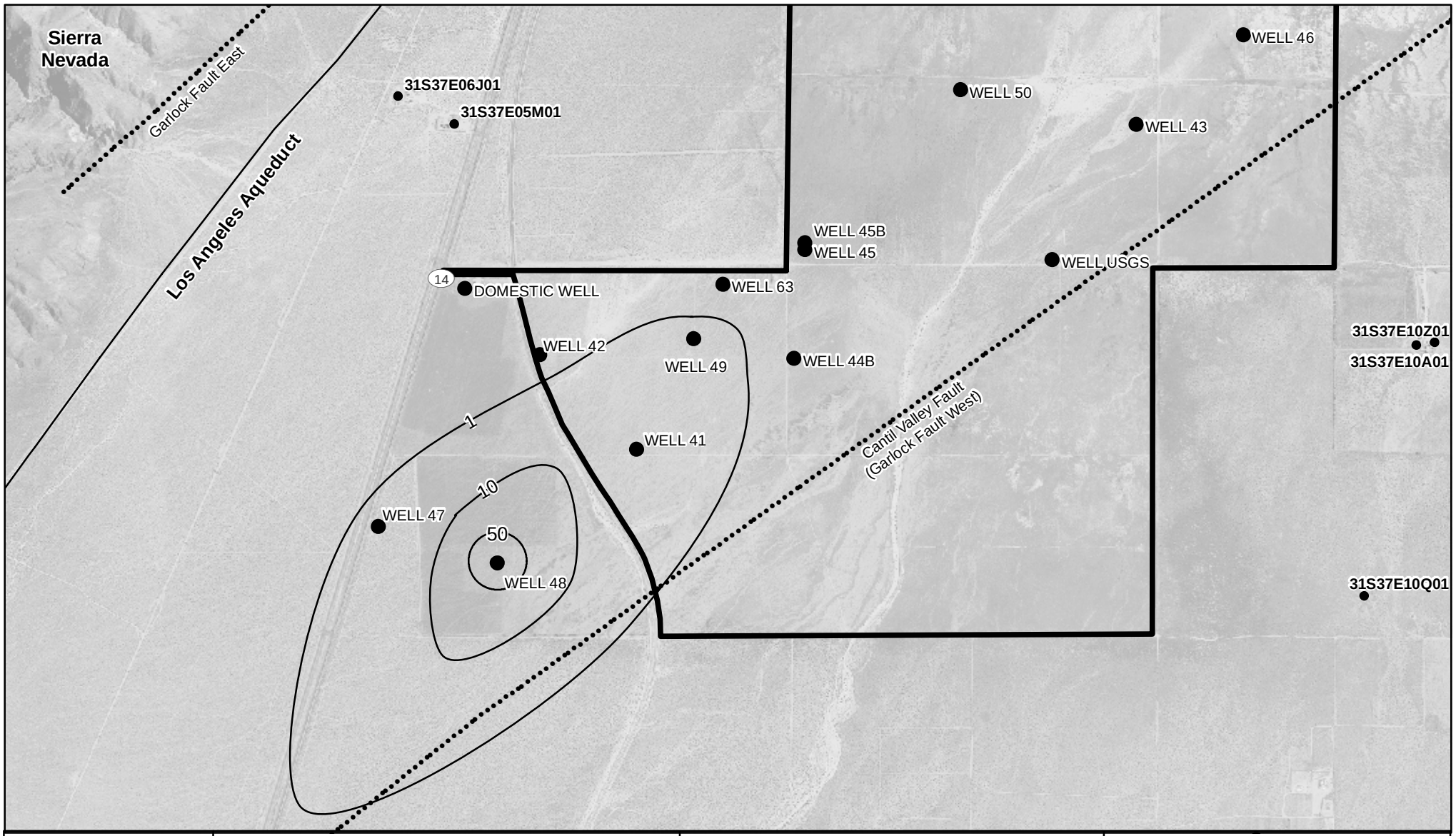
Figure 5.17-7
Cone of Depression at the End of the Well No. 63 Pumping Test

Beacon Solar

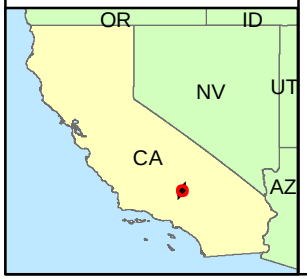
ENSR | AECOM

Project: 10056-014
Date: March 2008

J:\2007 Projects\10056-FPL\014-CCSP\AFC Beacon Energy LLC GIS\March 08\Figure 5.17-7.mxd



Map Location



Legend

- Groundwater Supply Wells
- Water Supply Well Location
- Drawdown Contour (feet)
- BSEP Plant Site Boundary
- Fault
- Los Angeles Aqueduct

Note: Appendix J.3 presents pumping test data
Fault locations are approximate

0 1,000 2,000 3,000 4,000 Feet

1:24,000

N W E S

BSEP

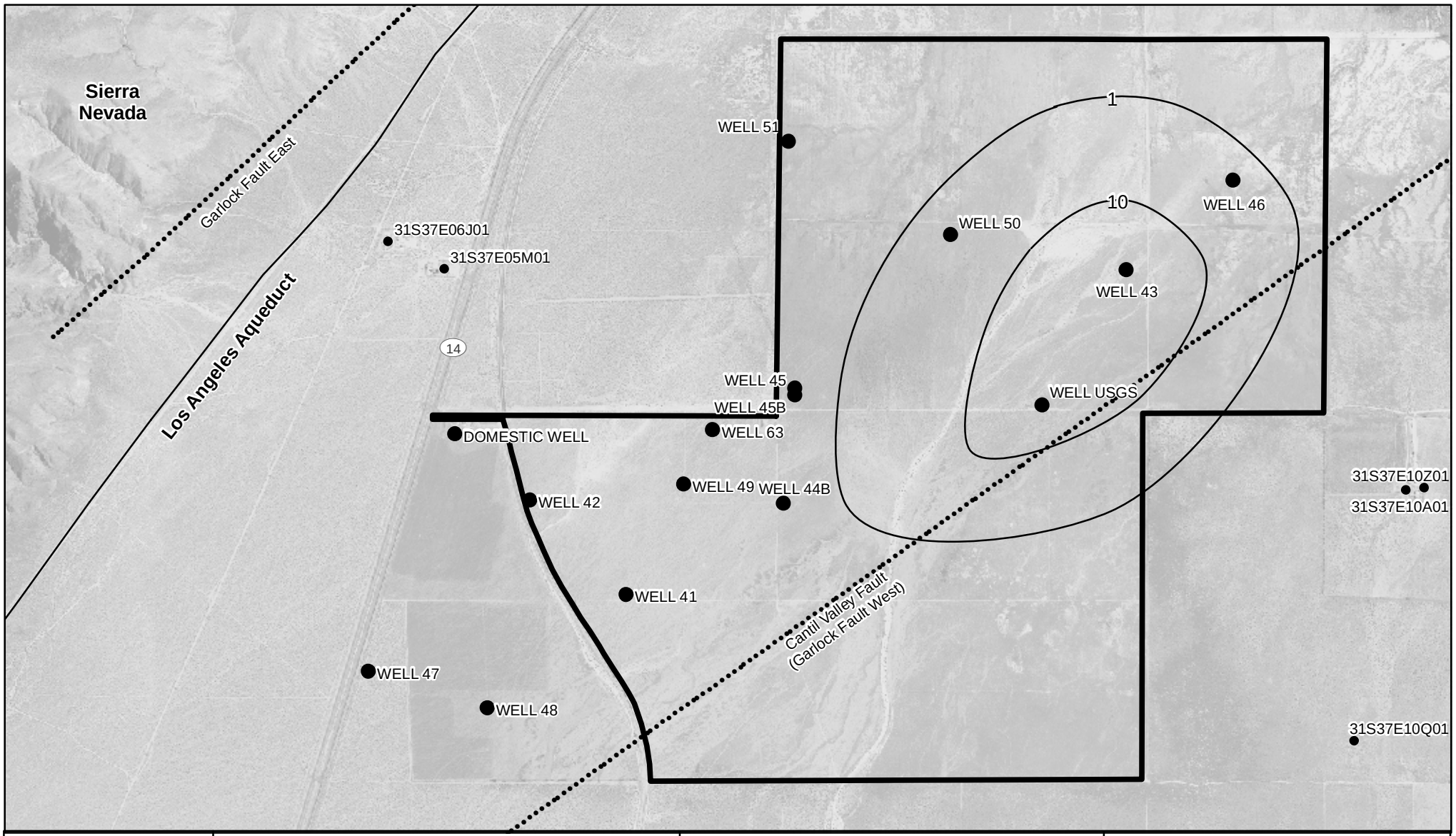
Figure 5.17-8
Cone of Depression at the End of the Well No. 48 Pumping Test

Beacon Solar

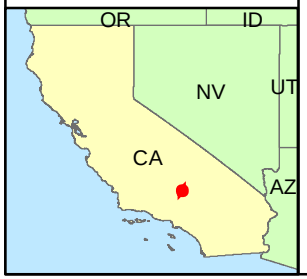
ENSR | AECOM

Project: 10056-014
Date: March 2008

J:\2007 Projects\10056-FPL\014-CCSPVAFC Beacon Energy LLC GIS\March 08\Figure 5.17-8.mxd



Map Location



Legend

- Groundwater Supply Wells
- Water Supply Well Location
- Drawdown Contour (feet)
- BSEP Plant Site Boundary
- Fault
- Los Angeles Aqueduct

Note: Appendix J.3 presents pumping test data
Fault locations are approximate

0 1,000 2,000 3,000 4,000 Feet

1:24,000

N W E S

BSEP

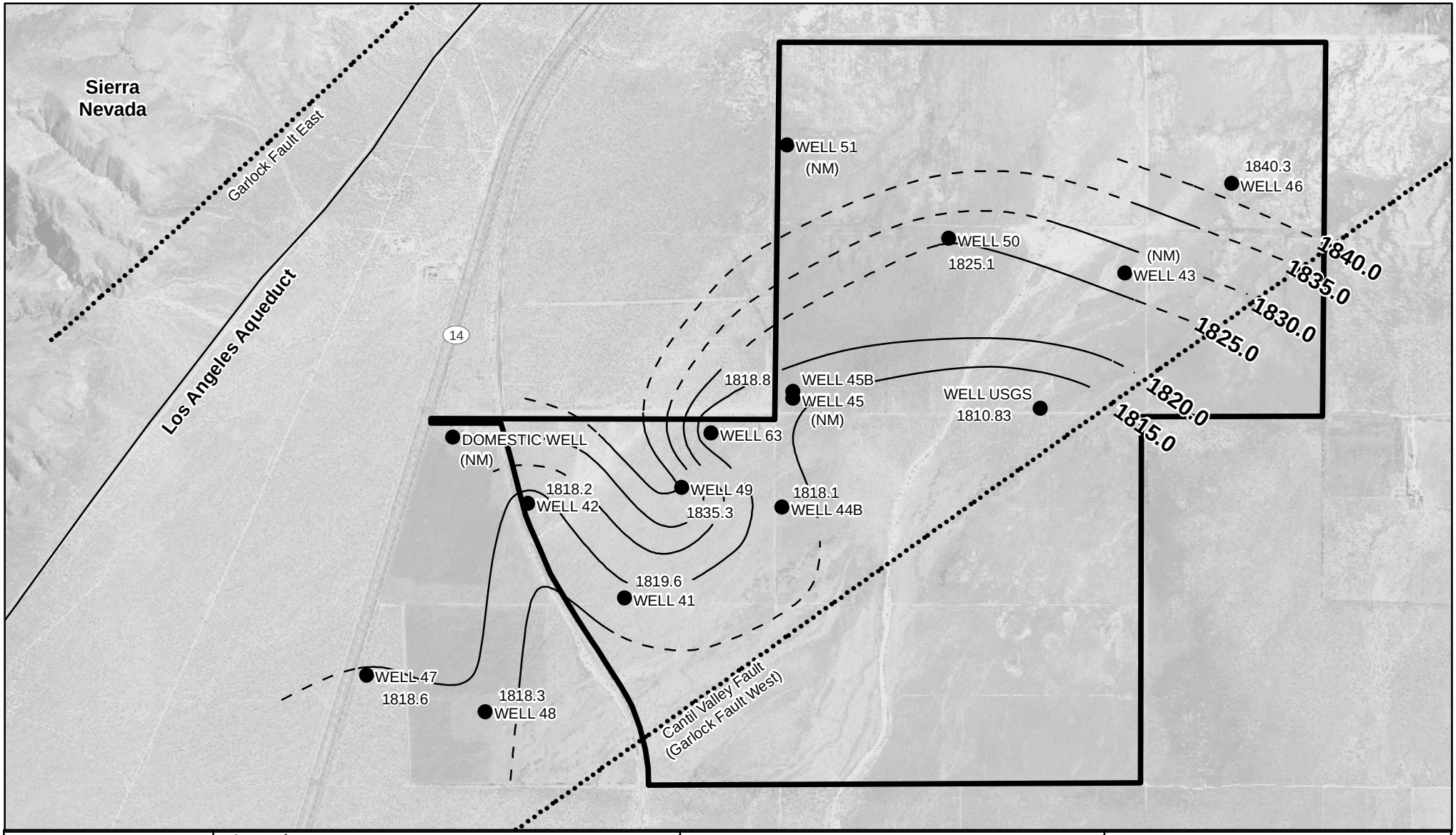
Figure 5.17-9
Cone of Depression at the End of the Well No. 43 Pumping Test

Beacon Solar

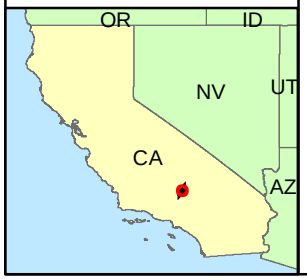
ENSR | AECOM

Project: 10056-014
Date: March 2008

J:\2007 Projects\10056-FPL\014-CCSP\AFC Beacon Energy LLC GIS\March 08\Figure 5.17-9.mxd



Map Location



Legend

- Water Supply Well Location
- Groundwater Contour (feet amsl)
- Dashed Where Inferred
- Approximate Site Boundary
- Fault
- Los Angeles Aqueduct

NM = Not Measured - Well abandoned or no access

Note: Fault locations are approximate.

0 1,000 2,000 3,000 4,000 Feet

1:24,000

N W E S

BSEP

Figure 5.17-10
Post-pumping Test Water Level Contour Map (October 2007)

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008

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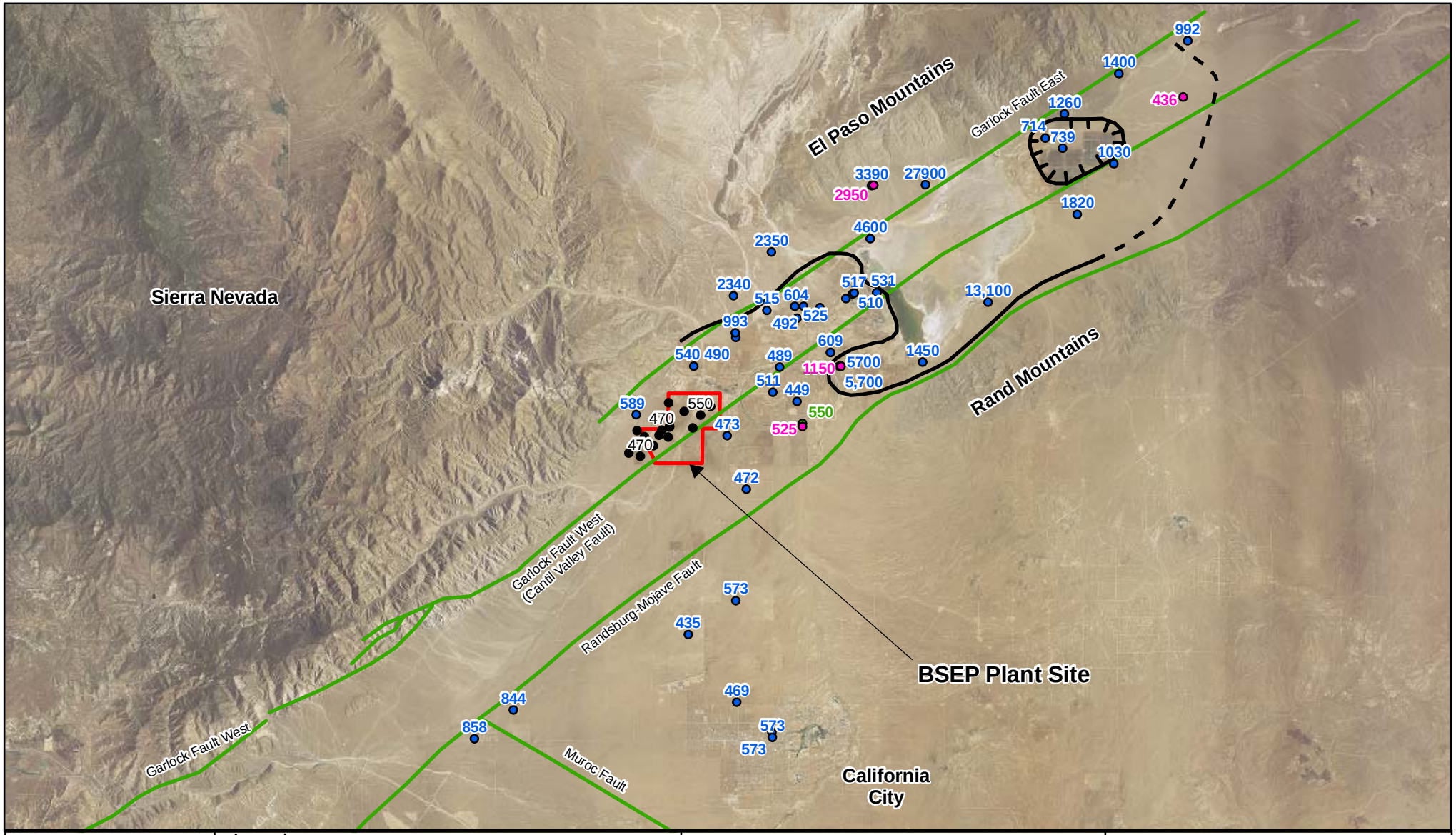
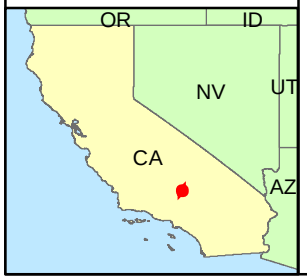


Map Location



Legend

- TDS 1953-1958
- TDS 1999-2007
- Water Supply Wells
- Honda Well
- 1,000 ppm TDS Contour (1953-1959)
- Dashed Where Inferred
- BSEP Plant Site Boundary

Note: Fault locations are approximate

0 2 4 6 8 Miles

1:253,440

N W E S

BSEP

Figure 5.17-11
TDS Concentrations
1953-1958 and 1999-2007

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008

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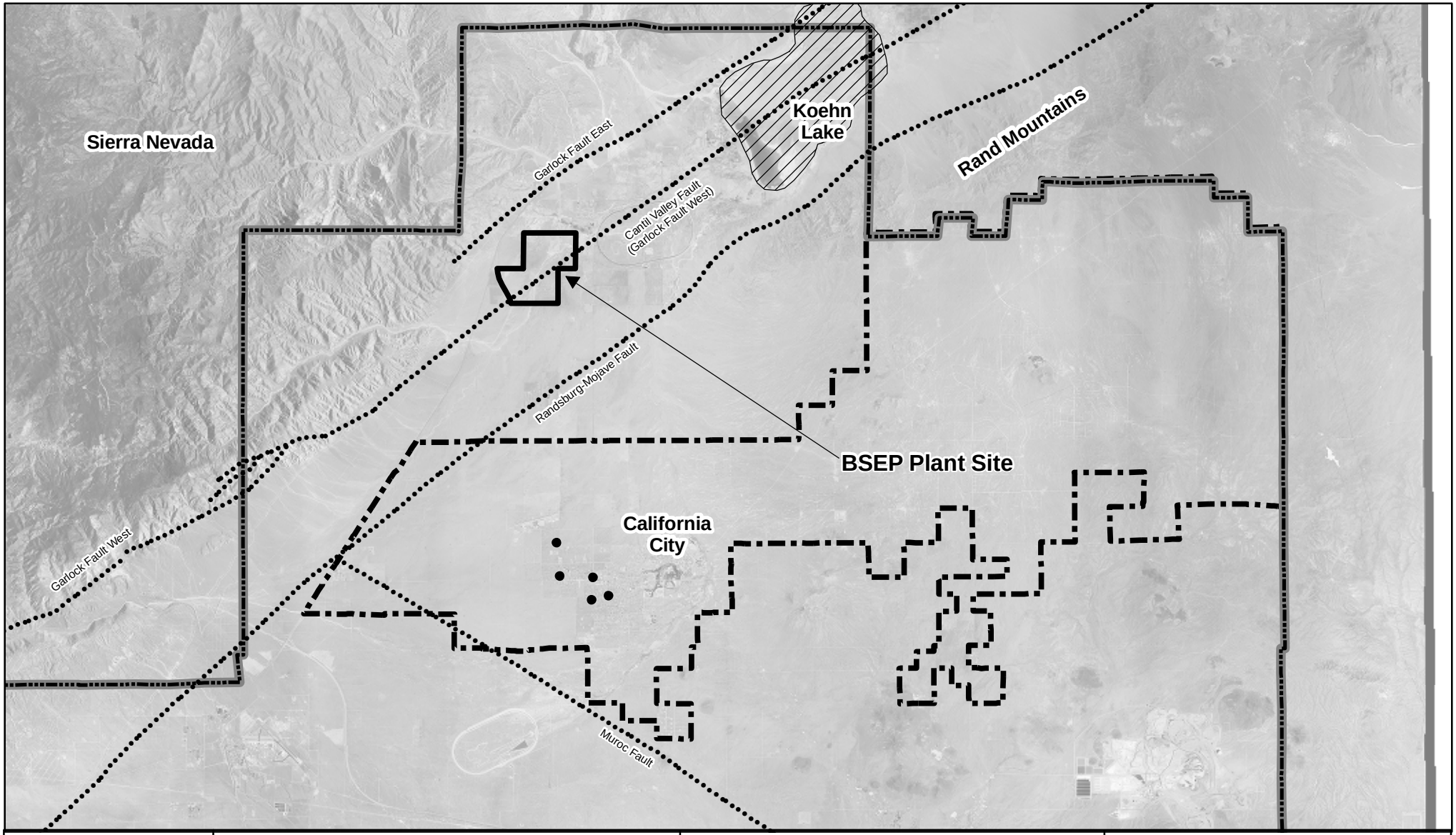

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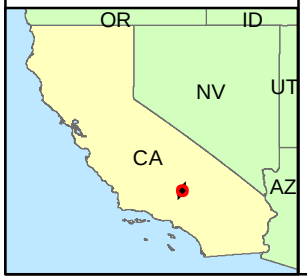

Legend

- California City Groundwater Supply Wells
- Fault
- AVEK Boundary
- California City Boundary
- BSEP Plant Site Boundary

Note: Fault locations are approximate.

0 2 4 6 8 Miles

1:253,440

N W E S

BSEP

Figure 5.17-12
AVEK and California City Boundaries

Beacon Solar

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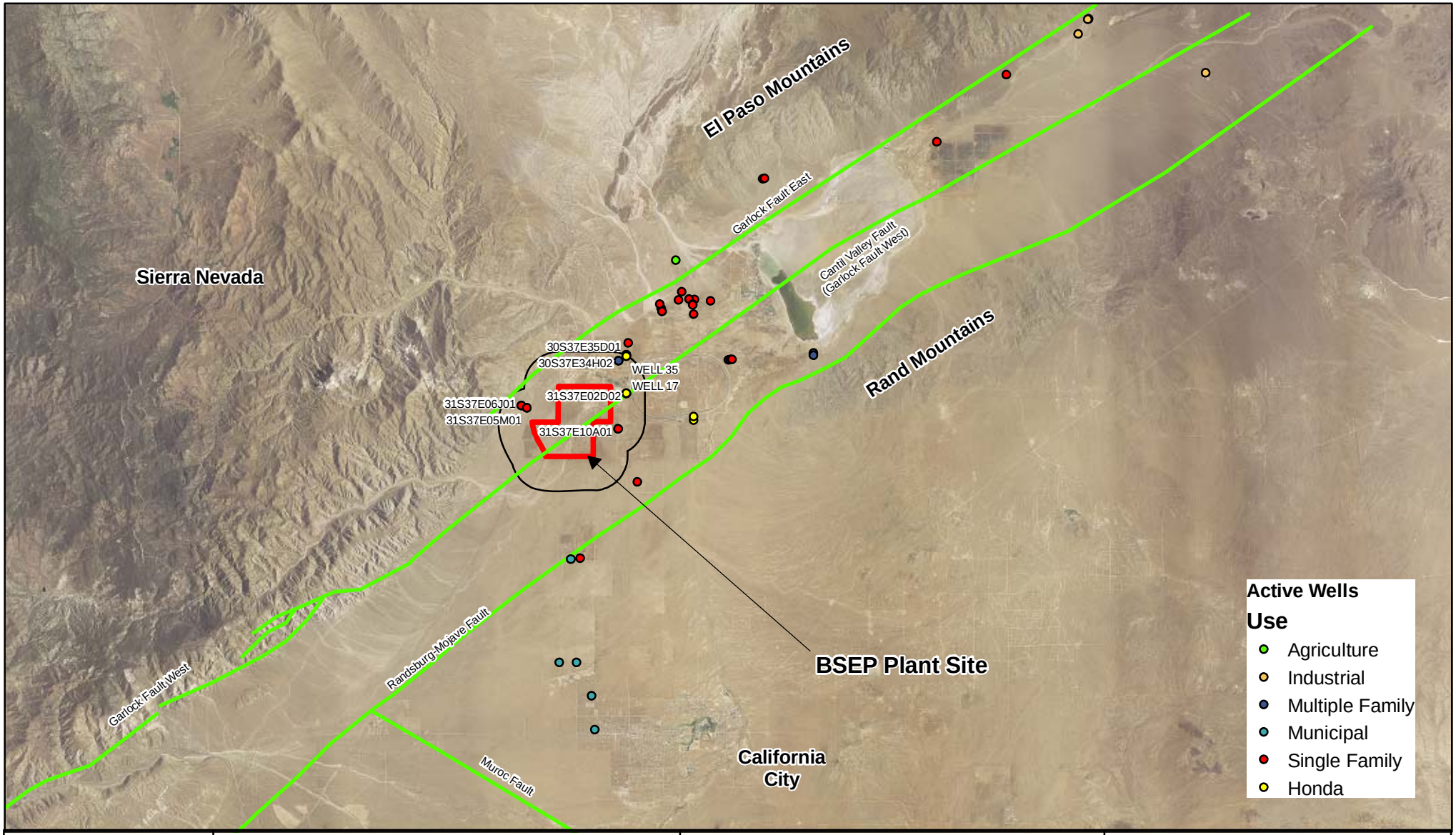

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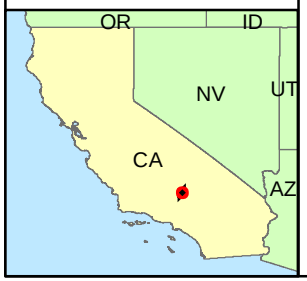

Legend

- BSEP Plant Site Boundary
- 1-Mile Buffer
- Fault

Note: Fault locations are approximate.

0 2 4 6 8 Miles

1:253,440

BSEP

Figure 5.17-13
Water Supply Wells Identified from Field Survey

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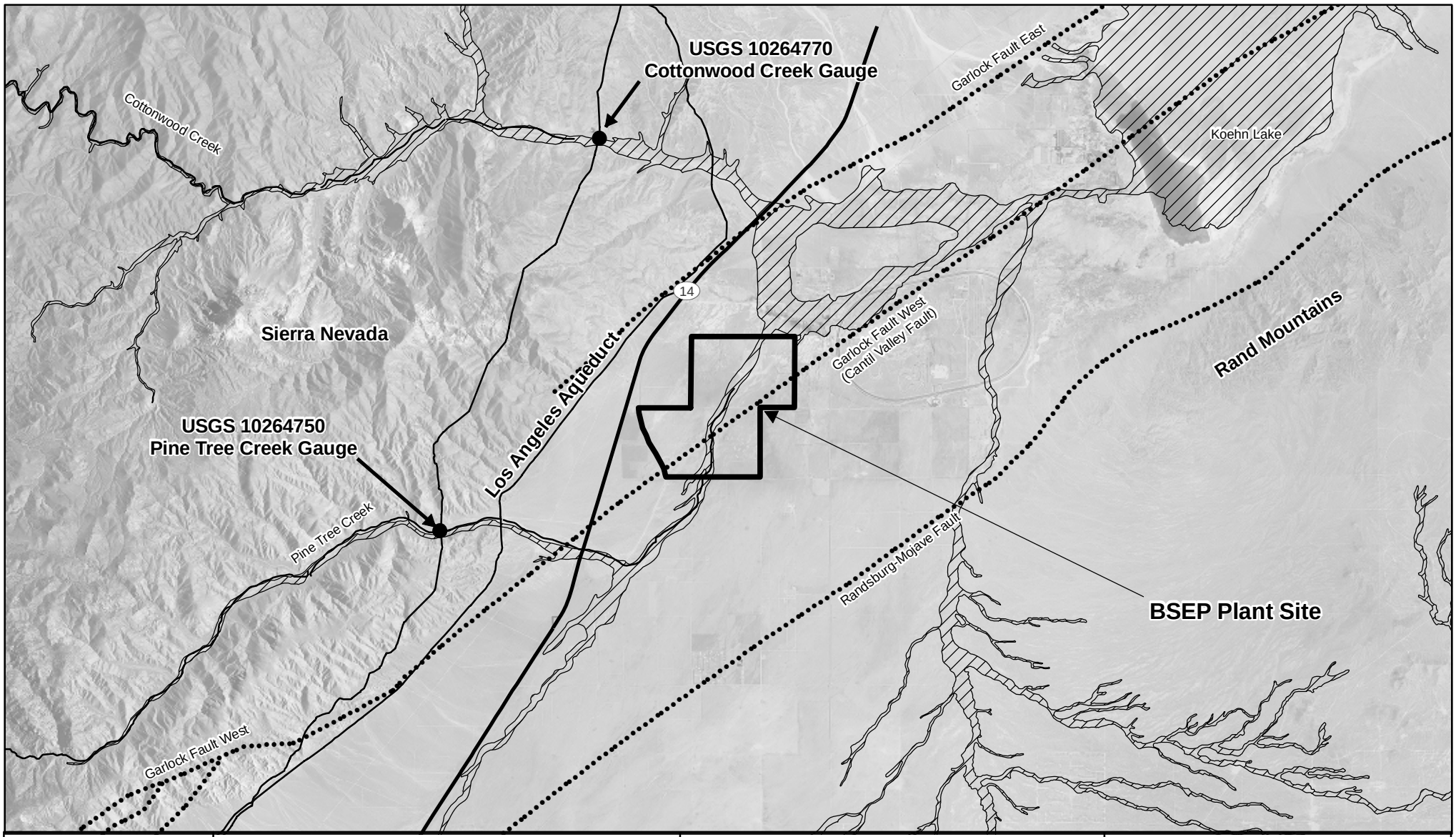

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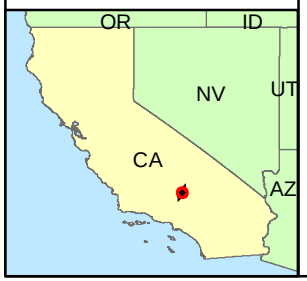

Legend

- Gauging Station
- BSEP Plant Site Boundary
- 100 Year Flood Zone
- Fault
- Los Angeles Aqueduct

Note: Fault locations are approximate

0 1 2 3 4 Miles

1:126,720

N W E S

BSEP

Figure 5.17-14
100-Year Floodplain Map

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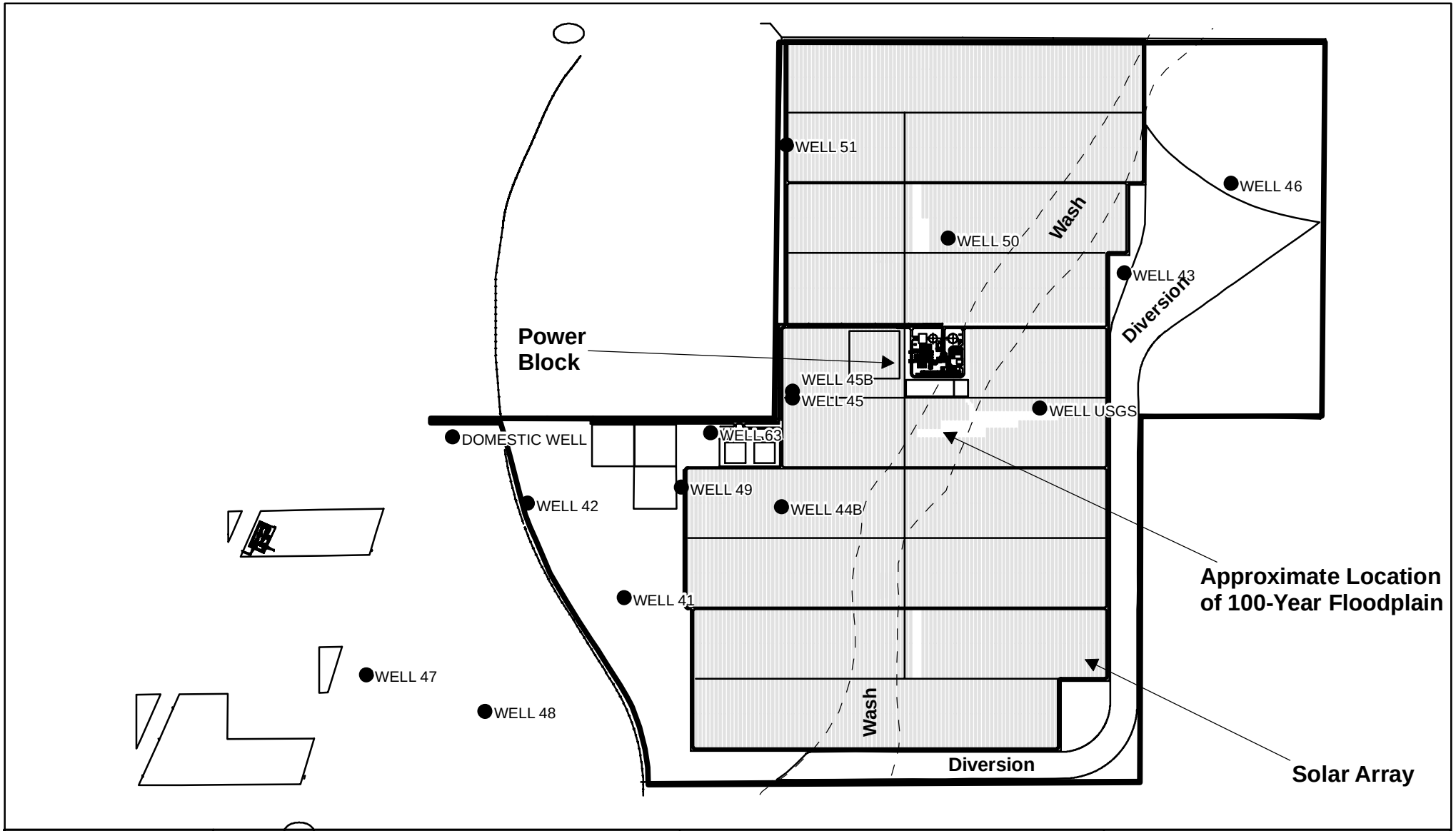

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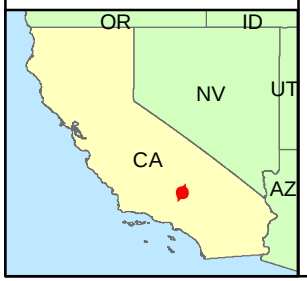

Legend

- Project Water Supply Well
- BSEP Plant Site Boundary

N W E S

0 1,000 2,000 3,000 4,000 Feet

1:24,000

BSEP

Figure 5.17-15
Project Water Supply Wells and Pinetree Creek Diversion

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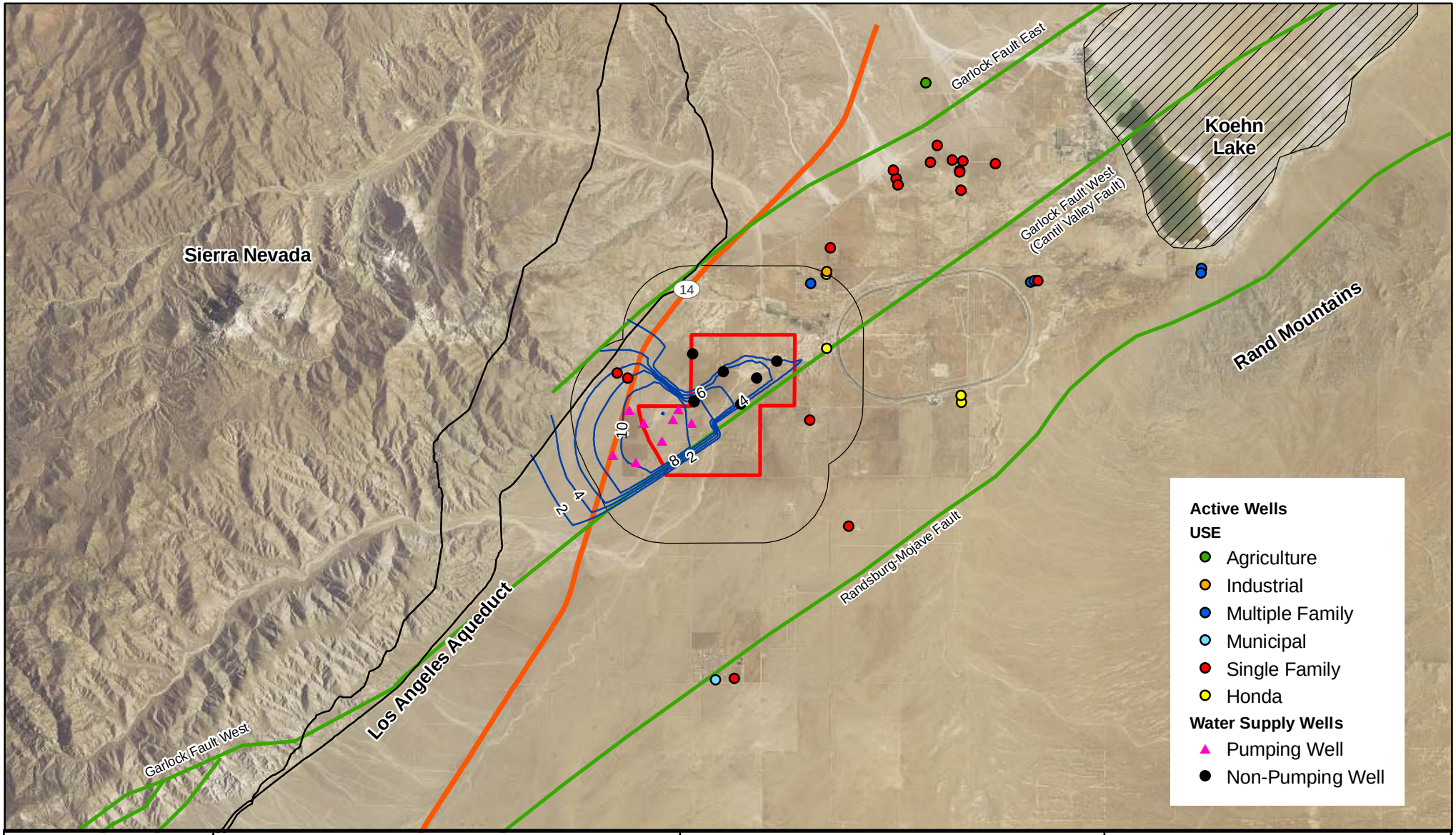

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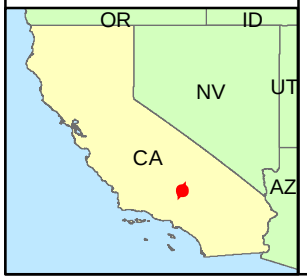

Legend

- Predicted Drawdown (feet)
- BSEP Plant Site Boundary
- 1-Mile Buffer
- Fault
- Los Angeles Aqueduct

Note: Groundwater model presented in Appendix J.2
Fault locations are approximate

0 1 2 3 4 Miles

1:126,720

N W E S

BSEP

Figure 5.17-16
Groundwater Model Predicted Drawdown
Site Grading Period

Beacon Solar

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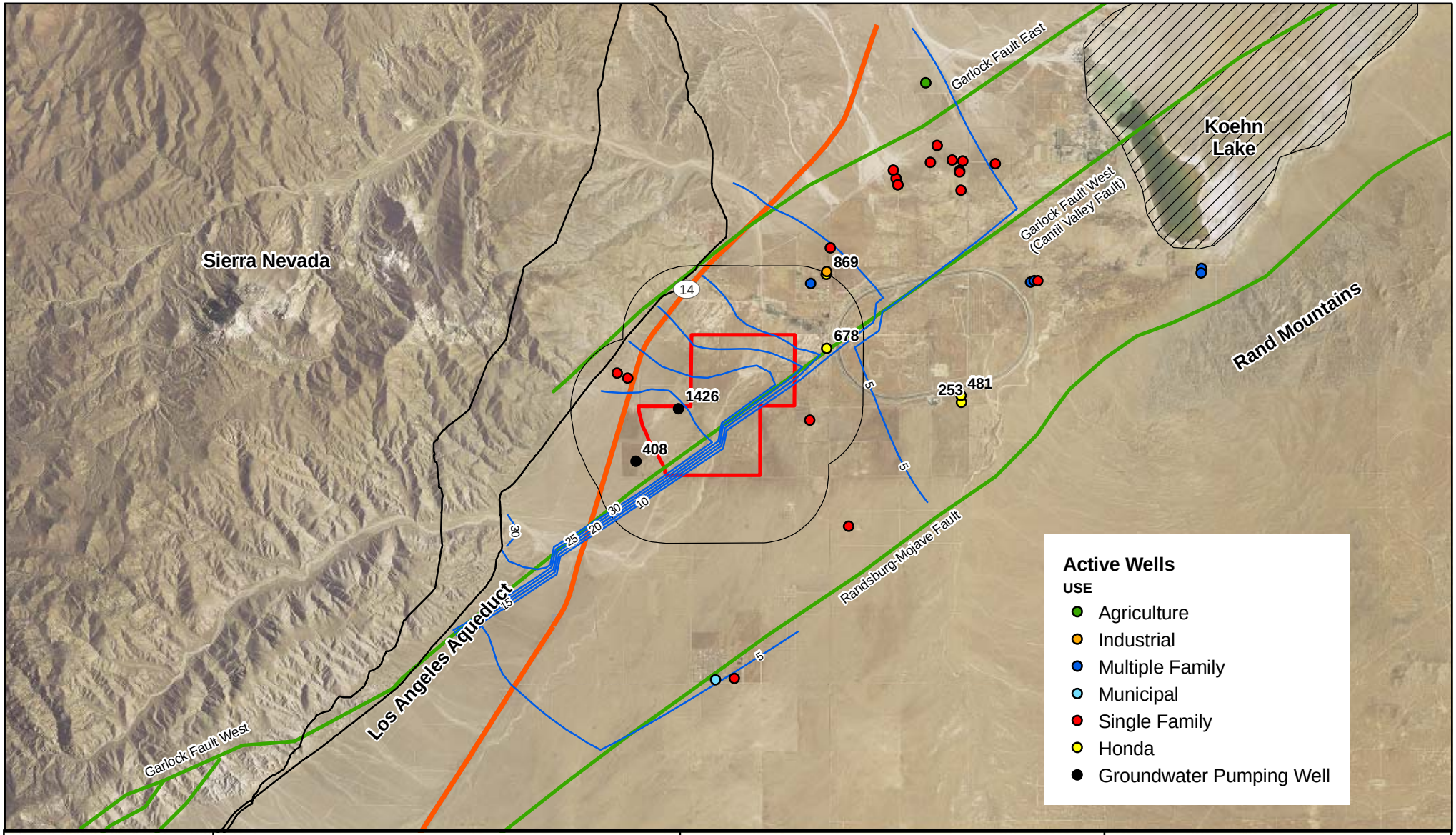

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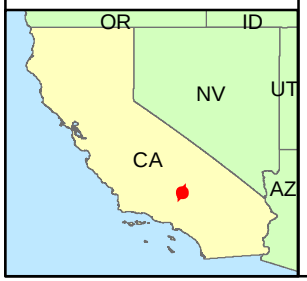

Legend

- Drawdown Contour (5-Foot Interval)
- BSEP Plant Site Boundary
- 1 Mile Buffer
- Fault
- Los Angeles Aqueduct

Note: Groundwater model presented in Appendix J.2
Fault locations are approximate

0 1 2 3 4 Miles

1:126,720

BSEP

Figure 5.17-17
Influence from Groundwater Pumping
(Well No. 48) - 30 Years

Beacon Solar

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Project: 10056-014
Date: March 2008

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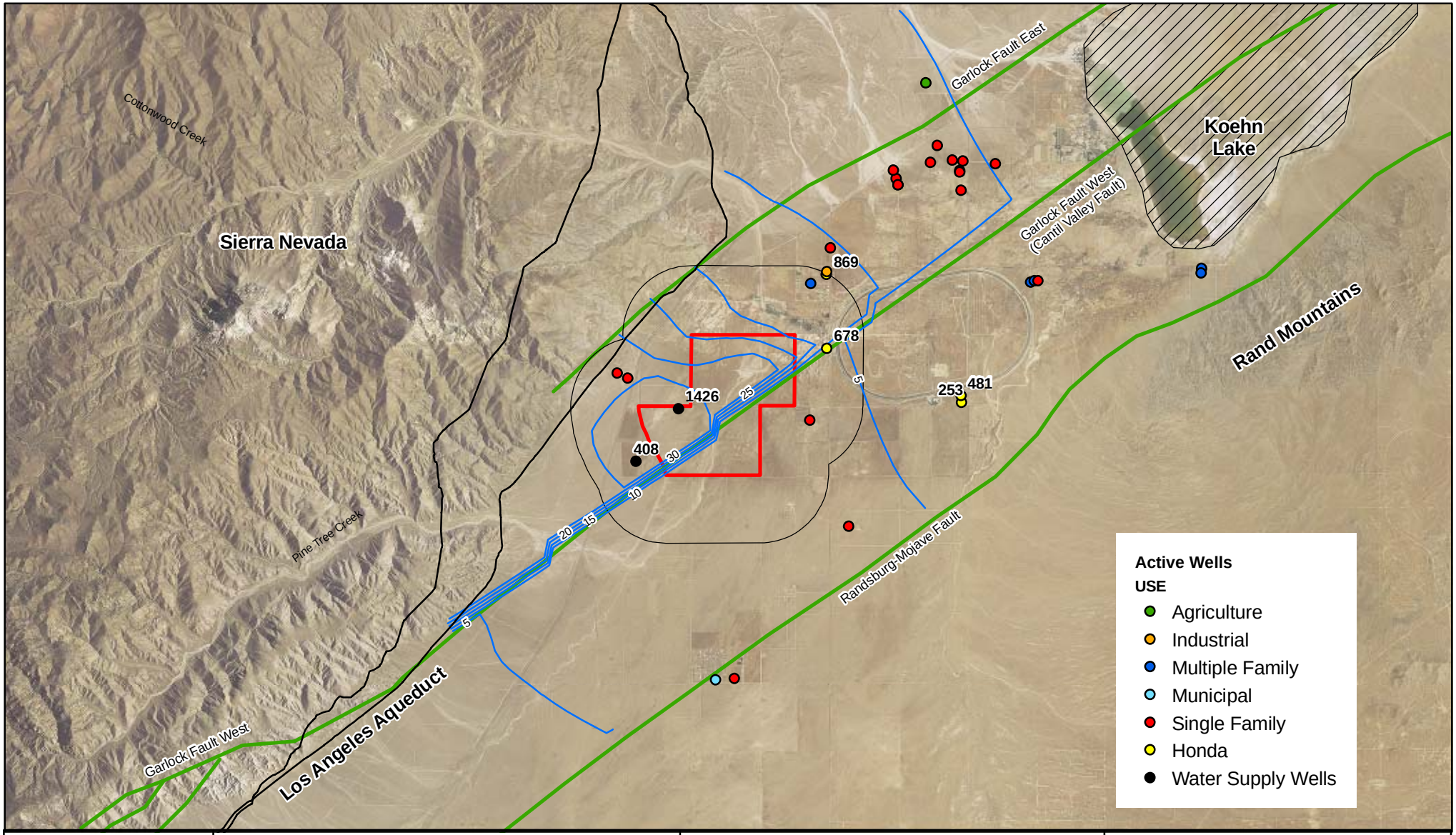
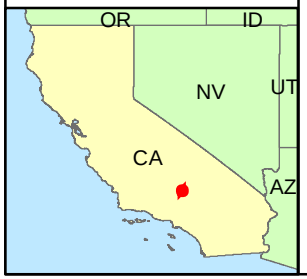


Map Location



Legend

- Drawdown Contour (5-Foot Interval)
- BSEP Plant Site Boundary
- 1 Mile Buffer
- Fault
- Los Angeles Aqueduct

Note: Groundwater model presented in Appendix J.2
Fault locations are approximate

0 1 2 3 4 Miles

1:126,720

BSEP

Figure 5.17-18
Influence from Groundwater Pumping
(Well No. 63) - 30 Years

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008

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