5.15 Water Resources

5.15.1 Introduction

The Hidden Hills Solar Electric Generating System (HHSEGS) will be located on privately owned land in Inyo County, California, adjacent to the Nevada border. It will comprise two solar fields and associated facilities: the northern solar plant (Solar Plant 1) and the southern solar plant (Solar Plant 2). Each solar plant will generate 270 megawatts (MW) gross (250 MW net), for a total net output of 500 MW. Solar Plant 1 will occupy approximately 1,483 acres (or 2.3 square miles), and Solar Plant 2 will occupy approximately 1,510 acres (or 2.4 square miles). A 103-acre common area will be established on the southeastern corner of the site to accommodate an administration, warehouse, and maintenance complex, and an onsite switchyard. A temporary construction laydown and parking area on the west side of the site will occupy approximately 180 acres.

Each solar plant will use heliostats—elevated mirrors guided by a tracking system mounted on a pylon—to focus the sun's rays on a solar receiver steam generator (SRSG) atop a tower near the center of each solar field. The solar power tower technology for the HHSEGS project design incorporates an important technology advancement, the 750-foot-tall solar power tower. One principle advantage of the HHSEGS solar power tower design is that it results in more efficient land use and greater power generation. The new, higher, 750-foot solar power tower allows the heliostat rows to be placed closer together, with the mirrors at a steeper angle. This substantially reduces mirror shading and allows more heliostats to be placed per acre. More megawatts can be generated per acre and the design is more efficient overall.

In each solar plant, one Rankine-cycle steam turbine will receive steam from the SRSG (or solar boiler) to generate electricity. The solar field and power generation equipment will start each morning after sunrise and, unless augmented, will shut down when insolation drops below the level required to keep the turbine online. Each solar plant will include a natural-gas-fired auxiliary boiler, used to augment the solar operation when solar energy diminishes or during transient cloudy conditions, as well as a startup boiler, used during the morning startup cycle, and a nighttime preservation boiler, used to maintain system temperatures overnight. On an annual basis heat input from natural gas will be limited by fuel use and other conditions to less than 10 percent of the heat input from the sun.

To save water in the site's desert environment, each solar plant will use a dry-cooling condenser. Cooling will be provided by air-cooled condensers, supplemented by a partial dry-cooling system for auxiliary equipment cooling. Raw water will be drawn daily from onsite wells located in each power block and at the administration complex. Groundwater will be treated in an onsite treatment system for use as boiler make-up water and to wash the heliostats.

Two distinct transmission options are being considered because of a unique situation concerning Valley Electric Association (VEA). Under the first option, the project would interconnect via a 230-kilovolt (kV) transmission line to a new VEA-owned substation (Tap Substation) at the intersection of Tecopa Road[1] and Nevada State Route (SR) 160 (the

[1] The road is also called Tecopa Highway and Old Spanish Trail Highway. The names are generally used interchangeably.

Tecopa/SR 160 Option). The other option is a 500-kV transmission line that interconnects to the electric grid at the Eldorado Substation (the Eldorado Option), in Boulder City, Nevada.

A 12- to 16-inch-diameter natural gas pipeline will be required for the project. It will exit the HHSEGS site at the California-Nevada border and travel on the Nevada side southeast along the state line, then northeast along Tecopa Road until it crosses under SR 160. From this location a 36-inch line will turn southeast and continue approximately 26 miles, following the proposed Eldorado Option transmission line corridor, to intersect with the Kern River Gas Transmission (KRGT) pipeline. A tap station will be constructed at that point to connect it to the KRGT line. The total length of the natural gas pipeline will be approximately 35.3 miles.

The transmission and natural gas pipeline alignments will be located in Nevada, primarily on federal land managed by the U.S. Bureau of Land Management (BLM), except for small segments of the transmission line (both options) in the vicinity of the Eldorado Substation, which is located within the city limits of Boulder City, Nevada. A detailed environmental impact analysis of the transmission and natural gas pipeline alignments will be prepared by BLM.

This section is organized as follows: Section 5.15.2 describes the water resources laws, ordinances, regulations, and standards (LORS) that may apply to the project. A discussion of existing water resources in the project area (affected environment) is included in Section 5.15.3. The environmental analysis to determine potential impacts and potential cumulative impacts to water resources due to construction and operation of the project are provided in Sections 5.15.4 and 5.15.5, respectively. Mitigation measures proposed for the project are provided in Section 5.15.6. Agencies and agency contacts are included in Section 5.15.7. Lastly, permits and schedules and the references cited in the preparation of this section are listed in Sections 5.15.8 and 5.15.9, respectively. Waters of the U.S. including wetlands and jurisdictional washes are addressed in Section 5.2, Biological Resources.

5.15.2 Laws, Ordinances, Regulations, and Standards

Federal, state, and local LORS applicable to water resources and conformance are discussed in this section and summarized in Table 5.15-1.

TABLE 5.15-1
Laws, Ordinances, Regulations, and Standards Applicable to Water Resources

LORS	Requirements/ Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
Federal Clean Water Act (CWA) of 1977 (as amended)	Prohibits discharge of pollutants to receiving waters unless the discharge is in compliance with an NPDES permit. Applies to all discharges, including industrial wastewater and stormwater runoff, during both construction and operation. Specific applicability may be limited due to presumed absence of Waters of the United States.	Lahontan RWQCB	5.15.2.1.1 5.15.2.2.1 5.15.4.1.2 5.15.4.2.2

TABLE 5.15-1
Laws, Ordinances, Regulations, and Standards Applicable to Water Resources

LORS	Requirements/ Applicability	Administering Agency	AFC Section Explaining Conformance
CWA Section 401	Section 401 of the CWA requires that any federal activity that may result in a discharge into a water body must be certified by the Regional Water Quality Control Board (RWQCB). Applies to all discharges, but specific applicability may be limited to to presumed absence of Waters of the United States.	Lahontan RWQCB	5.15.2.1.2 5.15.2.2.1
State			
Federal CWA (implemented by State of California)	Implements and enforces the federal NPDES permit program (see above).	Lahontan RWQCB	5.15.2.2.1 5.15.4.1.2 5.15.4.2.2
Porter-Cologne Water Quality Control Act (PCWQCA)	PCWQCA requires the State Water Resources Control Board (SWRCB) and RWQCBs to adopt water quality criteria to protect state waters. These standards are typically applied to projects through Waste Discharge Requirement (WDR) permits as necessary. Establishes beneficial water uses for both surface waters and groundwaters. Applicable to all discharges of water.	Lahontan RWQCB	5.15.2.2.1 5.15.4.1.2 5.15.4.2.2
California Water Code Section 13751	Requires completion report to be filed with the State for well construction, alternation, or destruction. Applicable to planned site well construction and destruction activities.	California Department of Water Resources	5.15.2.2.1
SWRCB Resolution No. 75-58; California Water Code Sections 461, 13550, and 13551	Discourages use of fresh water for power plant cooling purposes unless alternatives would cause an adverse environmental impact or be economically or otherwise infeasible. Not applicable because no fresh water would be used for cooling.	SWRCB	5.15.2.2.1
Local			
Inyo County Code Title 15 CEQA Procedures	Grading would be subject to a permit when conditions exist as specified in county code. The Public Works Department issues grading permits. Applicable to all site grading work.	County of Inyo-Public Works Department	5.15.2.3.1
Inyo County Code Title 14, Chapter 14.28 Water Wells, Section 14.28.030 Permit Required	Regulates construction, repair, modification and destruction of wells and requires a permit from the county environmental health department. Applicable to planned site well construction and destruction activities.	County of Inyo-Environmental Health Department	5.15.2.3.2
Inyo County General Plan	The General Plan includes water resources related goals and implementation measures to protect water resources from overutilization, degradation, and export. Applies to project use of groundwater.	County of Inyo-Water Department	5.15.2.3.3 5.15.4.2.3

5.15.2.1 Federal LORS

5.15.2.1.1 Federal Clean Water Act of 1977 (as amended)

The CWA authorizes the U.S. Environmental Protection Agency (EPA) to regulate discharges of wastewater and stormwater into surface waters by issuing National Pollutant Discharge Elimination System (NPDES) permits and setting pretreatment standards. In California, the State Water Resources Control Board (SWRCB), acting through its Regional Water Quality Control Boards (RWQCB), implements these permits consistent with a Memorandum of Understanding with the EPA. For this reason, relevant NPDES permits are discussed below under State LORS.

5.15.2.1.2 CWA Section 401

Under federal CWA section 401 every applicant for a federal permit or license for any activity that may result in a discharge to a water body must obtain State Water Quality Certification (Certification) that the proposed activity will comply with state water quality standards.

5.15.2.2 State LORS

5.15.2.2.1 California

Federal Clean Water Act

As described above, the SWRCB, acting through its RWQCBs, implements the CWA permits consistent with a Memorandum of Understanding with the EPA. The relevant NPDES permits are discussed below.

SWRCB Construction and Land Disturbing Activities General Permit Order No. 2010-0014-DWQ

The SWRCB implements regulations under the federal CWA requiring stormwater discharges associated with construction and land disturbance activities to be regulated by an NPDES permit. The SWRCB is the permitting authority in California and has adopted Order 2010-0014-DWQ, a statewide General Permit for Stormwater Discharges Associated with Construction Activity (General Construction Permit) that applies to projects resulting in one or more acres of soil disturbance. HHSEGS would result in disturbance of more than one acre of soil; therefore, the project will need to comply with the General Construction Permit. This includes the preparation of a Stormwater Pollution Prevention Plan (SWPPP) that would specify site management activities to be implemented during site development. These management activities will include construction stormwater best management practices (BMPs), dewatering runoff controls, and construction equipment decontamination. The Lahontan RWQCB requires that a Notice of Intent be filed prior to construction activities and that the SWPPP be maintained onsite during construction. A copy of the draft construction SWPPP is provided in Appendix 5.15A.

Industrial Activities Storm Water General Permit, Order No. 97-03-DWQ

The SWRCB also implements regulations under the federal CWA requiring stormwater discharges associated with specific industrial activities to be regulated by an NPDES permit (SWRCB, 1997). The SWRCB has issued Order 97-03-DWQ, a statewide General Permit and WDRs for discharges of stormwater associated with industrial activities (such as HHSEGS), excluding construction activities. To comply with Order 97-03-DWQ, the project would implement a SWPPP including good housekeeping practices and BMPs during project operation. The Lahontan RWQCB requires a Notice of Intent to be filed for industrial

activities to be covered under the statewide General Permit. SWRCB Order No. 97-03-DWQ is expired and its replacement is undergoing public review in 2011.

State Water Resources Control Board Discharges to Land with a Low Threat to Water Quality, Order No. 2003-003-DWQ

The general permit applies to the discharge of water to land that has a low threat to water quality. Categories of low threat discharges include piping and hydrostatic test water. These activities may be covered under the Construction General Permit Order No. 2010-0014-DWQ. The Lahontan RWQCB requires a Notice of Intent to be filed for dewatering activities if not covered by the Construction Stormwater Permit.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act established the SWRCB and divided the state into nine regional basins, each with a RWQCB. The SWRCB is the primary state agency responsible for protecting the quality of the state's surface and groundwater supplies, and enforcing the CWA and state water quality laws and regulations. Administration is delegated to the nine RWQCBs; the Lahontan RWQCB regulates water quality in Inyo County.

The Porter-Cologne Water Quality Control Act authorizes the SWRCB to draft state policies regarding water quality. It requires that the SWRCB, or the appropriate RWQCB, adopt water quality control plans (or Basin Plans) for the protection of water quality. A Basin Plan contains the following:

- Beneficial uses of water to be protected
- Water quality objectives for the reasonable protection of the beneficial uses
- A program of implementation for achieving the water quality objectives

The Lahontan RWQCB adopted its most recent version of the Basin Plan in 1995 with amendments (Lahontan RWQCB, 1995).

California Water Code Section 13751

California Water Code Section 13751 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 Department of Water Resources. Reports must be filled within 60 days of well completion.

SWRCB Resolution No. 75-58; California Water Code Sections 461, 13550, and 13551

SWRCB Resolution No. 75-58 provides statewide water quality principles for adoption of discharge requirements and implementation actions for power plants that depend on inland waters for cooling. This policy also provides guidance in the planning of new power plants to encourage the use of wastewater for cooling if available, thus minimizing the use of potable water. In addition, California Water Code Sections 461, 13550, and 13551 encourage the conservation of potable water resources and the maximum reuse of wastewater to conserve potable water, particularly in areas where recycled water of adequate quality is available at a reasonable cost.

5.15.2.3 Local LORS

5.15.2.3.1 Inyo County Code, Title 15 CEQA Procedures

As specified in municipal code, grading would be subject to permits when the slope of the land exceeds 10 percent, when the grading will affect wetlands or waters of the United States as defined by Section 404 of the CWA, when the grading is proposed in an area that has been identified by the county as special-status species habitat, when the grading is proposed in an area that might have historic or archaeological resources, or based on acreage and slope parameters.

In addition, a permit is required for grading on 5 or more acres. Cut and excavation limits also trigger a permit based on the following parameters:

- 0-10% slope 1,000 cu yd
- 11-29% slope 600 cu yd
- ≥30% slope grading plan required.

More information regarding county grading requirements is provided in Section 5.11, Soils.

5.15.2.3.2 Inyo County Code Title 14, Chapter 14.28 Water Wells, Section 14.28.030 Permit

Inyo County Code regulates construction, repair, modification and destruction of wells and such activities require a permit from the Inyo County Department of Environmental Health Services.

5.15.2.3.3 Inyo County General Plan

The General Plan seeks to implement sustainable groundwater withdrawal. Implementation measures address protection of groundwater resources including supply and water quality for existing and future development. The Inyo County Water Department regulates water use, including groundwater withdrawal.

5.15.3 Affected Environment

5.15.3.1 Hydrologic Setting

5.15.3.1.1 Precipitation

The Pahrump Valley is characterized by very hot summers and arid conditions. Precipitation occurs sporadically from winter rains or summer thundershowers (Nye County, 2007). In the Pahrump area, the average annual temperature is 78.6°F with monthly temperatures ranging from 57.5°F in January to 102.2°F in July. Pahrump Valley is located in a region that receives less than 6-inches of precipitation annually, based on average annual precipitation data for a 29-year period within Nye County and vicinity (Cardno ENTRIX, 2011a). Even though the valley receives a relatively small amount of annual precipitation, it is bounded by areas that receive significantly higher rates of annual precipitation. These areas receiving greater quantities of precipitation are located in the higher elevations of the adjacent Spring Mountains. The average annual precipitation in the Spring Mountains ranges from 28 to 32 inches per year.

The average monthly precipitation measured between 1996 and 2008 is shown in Table 5.15-2. Most of the precipitation in the region falls during January through March and July through September. Point precipitation frequency estimates reported in the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Nevada include the following:

rainfall quantity for a 100-year 24-hour event is 2.81 inches, and for a 6-hour event is 2.33 inches; rainfall quantity for a 10-year, 24-hour event is 1.79 inches, and for a 6-hour event is 1.33 inches. Consistent with methods confirmed by Inyo County (Appendix 5.15B), rainfall/runoff calculations are provided in Appendix 5.15C (VTN, 2011a).

TABLE 5.15-2
Average Monthly Rainfall (in inches) near the HHSEGS Site (July 1996 to December 2008)

Precipitation	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Monthly	5.18	0.73	0.83	0.82	0.31	0.29	0.09	0.39	0.40	0.31	0.19	0.36	0.46
Maximum Daily	3.87	3.87	3.32	2.94	2.34	1.42	0.46	3.10	3.11	1.82	0.77	2.08	1.86
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5.15.3.1.2 Surface Water

The project area lies in the Pahrump Valley, a region with mostly very gently to moderately sloping alluvial fans, nearly level basin floor, and dry lake beds. There are large playas on the lake beds. The Pahrump Valley is oriented in a northwest-to-southeast direction. Major surface water features within the Pahrump Valley include Stewart (dry) Lake (approximately 6 square miles) located in the northwest portion of the valley, Pahrump (dry) Lake (approximately 10 square miles) located in the central part of the valley (Nevada), and ephemeral washes, as shown on Figures 5.15-1 and 5.15-2 (all figures are at the end of this section). The project area is bounded by Resting Springs and Nopah mountain ranges on the west and northwest and by the Kingston Range on the south. The bordering mountains within California vary in elevation from approximately 6,400 feet in the Nopah Range to 7,300 feet in the Kingston Range. In bordering Nevada, the Spring Mountains are approximately 11,910 feet above mean sea level and provide the main source of groundwater recharge to the basin (DWR, 2004).

Surface water hydrology is described in detail in Appendix 5.15C (VTN, 2011a). The tributary watershed for the project site includes areas that extend to the northeast, southeast, and south of the project site location. The northeast watershed tributary areas are within the state of Nevada (Clark and Nye counties). This area lies within the mountainous zones of the Spring Mountains, and the flatter area lies within the Pahrump Valley. The area located to the southeast and south of the project site is within Inyo County, California, largely within the Pahrump Valley with areas extending into the San Bernardino Mountains to the south of the project site. The entire watershed drains into the Pahrump Valley low point to the south of the project site, draining to the northwest and eventually into the dry lake bed northwest of the project site (VTN, 2011a).

The surrounding watershed has two main watercourses: Stump Springs and Lovell Wash. The Stump Springs watercourse is located northeast of the site originating within the Spring Mountains. The Stump Springs watercourse is fed by several upstream tributary springs that include: Trout Springs, Cool Springs, Yount Springs, Lost Cabin Springs, and others. All of these watercourses converge at Stump Springs approximately 1.9 miles upstream of the California and Nevada state line. The Lovell Wash is located southeast of Stump Springs originating in the Spring Mountains. Stumps Springs and Lovell Wash are located southeast

of the project site. The two watercourses converge south of the site and are routed within the Pahrump Valley to the dry lake bed located to the northwest of the site (VTN, 2011a).

Several small desert washes cross the state border downslope from Nevada to California in the project area associated with alluvial fans originating in the Spring Mountains. The slope gradient diminishes from east to west and ephemeral drainages quickly fade away (URS, 2011). Many of the washes interconnect with other nearby washes either by natural means or by following roadways that form a grid in the project area. Quick infiltration of surface waters occurs due to the well-drained sandy soils (Corbilt class) throughout the site.

The ephemeral washes located on or near the project site are not listed on the 303(d) list of impaired water bodies. The beneficial uses for surface waters in the Pahrump Hydrologic Unit are listed for minor surface waters and minor wetlands. The beneficial uses described for "minor surface waters" include the following: municipal and domestic supply; agricultural supply; groundwater recharge; water contact recreation; noncontact water recreation; commercial and sport fishing; warm freshwater habitat; wildlife habitat; and rare, threatened or endangered species (Lahontan RWQCB, 1995). The beneficial uses of "minor wetlands" include the following: municipal and domestic supply; agricultural supply; groundwater recharge; freshwater replenishment; water contact recreation; noncontact water recreation; commercial and sportfishing; warm freshwater habitat; cold freshwater habitat; wildlife habitat; rare, threatened or endangered species; water quality enhancement; and flood peak attenuation/flood water storage (Lahontan RWQCB, 1995).

5.15.3.1.3 Groundwater

The HHSEGS facilities will depend on groundwater as the sole water source because it is the only viable source of water in the vicinity. The project will potentially include up to six wells; two at each of two power blocks and two at the administration complex. Each facility will include a main well and a back-up well. Based on the proposed system design, a supply of 140 acre-feet per year (ac-ft/yr) is needed to meet the site's water demand.

An evaluation of the hydrogeology and water resources related to the proposed facility was prepared based on available information (Cardno ENTRIX, 2011a). The report compiles available hydrologic information and provides and evaluation of whether local groundwater is a viable water source for the project. The hydrogeology of the project site was evaluated, and the report provides a discussion of the overall water balance of the Pahrump Valley Groundwater Basin. The report is provided as Appendix 5.15D (Cardno ENTRIX, 2011a) and includes further information pertaining to groundwater resources in the project area.

The Pahrump Valley groundwater basin is located primarily within the state of Nevada but includes a small portion within California. The Nevada Division of Water Resources (NVDWR) regulates the appropriation of water rights in Nevada. The project site is located in California, which does not regulate the acquisition and exercise of groundwater rights. California law recognizes both overlying and appropriative rights to groundwater. Additional information is described in Appendix 5.15D (Cardno ENTRIX, 2011a).

Hydrogeologic Setting

The Pahrump Valley Groundwater Basin is bounded by non water-bearing rocks of the Resting Springs and Nopah mountain ranges on the west and northwest, and by the

Kingston Range on the south. Quaternary alluvium forms the primary water-bearing unit within the basin with unconsolidated younger alluvial fan material underlain by semi-consolidated older alluvium (DWR, 2004).

The Pahrump Valley Groundwater Basin underlies a northwest-trending valley in southeastern Inyo County (DWR, 2004). The Pahrump Valley is approximately 30 miles wide by 42 miles long and covers approximately 93,100 acres (145 square miles). The valley is located along the Pahrump Valley Fault Zone and was formed as a "pull-apart" basin (Cardno ENTRIX, 2011a). Groundwater is confined near the margins of two dry lakes, Stewart Lake and Pahrump Lake, and along the base of the alluvial deposits emanating from the Spring Mountains in the Nevada portion of the basin (DWR, 2004). The Pahrump Valley is a drained closed basin with no surface water outflow from the valley (Cardno ENTRIX, 2011a). The valley floor is composed of basin fill and alluvial sediments. The sediments in the central portion of the basin are finer grained Quaternary playa and Quaternary and Tertiary lacustrine associated fine-grain deposits with coarser Quaternary and Tertiary unconsolidated sediments comprising the alluvial deposits located at the base of the surrounding mountains (Cardno ENTRIX, 2011a). The basin fill and alluvial sediments encompassing the valley floor range from 200 meters (650 feet) to over 3,000 meters (9,800 feet) thick (Cardno ENTRIX, 2011a). The Basin Fill/Alluvial aquifer is the main source of groundwater supply for the Pahrump Valley. The Pahrump Valley Groundwater Basin is shown in Figure 5.15-3.

The Pahrump Valley has two aquifer systems: a Lower Carbonate aquifer and the Basin Fill aquifer. The Lower Carbonate aquifer originates in the nearby mountain ranges and dips steeply into the subsurface under the valley fill near the edges of the valley. The overlying basin fill aquifer underlies the broad, flat floodplain that comprises the central portion of the valley between the adjacent mountain ranges. The Lower Carbonate aquifer has only been tapped by a small number of wells due to the associated expense and the technical difficulties in constructing wells to the necessary depths. Conversely, the majority of the wells in the area tap the Basin Fill aquifer that is accessible to wells several hundred feet in depth. The Basin Fill aquifer is the target groundwater supply source for the project. In the project vicinity, production wells of approximately 300 to 400 feet in depth would be required to obtain the target yields for the project (Cardno ENTRIX, 2011a).

Groundwater Flow and Gradient

The general groundwater gradient in the Pahrump Valley is from the Spring Mountains in the northeast toward the Nopah Range in the southwest. Aquifer transmissivities towards the center of the basin have been reported to be in the range of less than 1,000 square feet per day (Broadbent, 2003). HHSEGS is located west of the Pahrump Valley Fault Zone (PVFZ) located along the California–Nevada state line. Studies conducted by Buqo in 2006 evaluated groundwater gradients in the valley (Cardno ENTRIX, 2011a). The hydraulic gradient in the PVFZ was found to be lower relative to the overall gradient of the valley and indicated that the fault may act as a hydraulic flow barrier. The potential for localized sub-basin recharge from the Nopah Range and the presence of coarser clastic sediments at the base of the Nopah Range could influence the local hydrogeologic conditions at the project site (Cardno ENTRIX, 2011a).

Limited information on groundwater resources near the project site is available. An aquifer performance test (APT) conducted in 1966 estimated the average transmissivity of the

aquifer to be 7,225 gallons per day per foot (gpd/ft) and estimated a storage coefficient of 0.064. Another APT located within or very near the project site conducted in 2003 by Broadbent and Associates estimated the transmissivity of the aquifer to be 4,675 gpd/ft. The pumping test was limited in duration and lacked properly located monitoring wells, resulting in no information regarding a reliable storage coefficient or leakance value (Cardno ENTRIX, 2011a).

Groundwater Discharge/Outflows

There is essentially no surface water discharge from the basin and the primary groundwater discharge mechanisms in the basin include evaporation, groundwater pumping, and evapotranspiration by plants. In the project area, an upward gradient from the Lower Carbonate aquifer system limits the flow of groundwater out of the Basin Fill aquifer into nearby downgradient basins (Cardno ENTRIX, 2011a).

Table 5.15-3 summarizes the average pumping quantities from the Pahrump Valley groundwater basin over the 7-year period from 2004 through 2010. (Cardno ENTRIX, 2011a). Historically, groundwater pumping quantities for domestic uses was estimated by Nevada Division of Water Resources (NVDWR) assuming a demand of 1 ac-ft/yr/dwelling. In 2009, NVDWR modified the assumed demand rate reducing it to 0.5 ac-ft/year. This new estimate resulted in a reduction in the yearly domestic withdrawals from the basin by approximately 5,000 ac-ft.

TABLE 5.15-3
Groundwater Pumpage Inventory
Pahrump Valley, No. 162

Volume/ac-ft/yr	2004	2005	2006	2007	2008	2009	2010
Irrigation	6,369	4,583	3,506	4,580	4,543	3,582	2,885
Golf Course	1,183	1,183	1,183	1,183	1,183	1,183	—
Utilities	3,078	3,335	4,243	5,323	4,179	3,773	3,625
Commercial/Other	1,427	1,507	1,618	1,439	1,387	1,381	1,316
Quasi-municipal	620	6,68	748	1,347	2,073	531	462
Domestic	9,907	10,477	10,826	10,966	11,002	5,559	5,550
No Permits or Certificates	—	—	—	—	—	82	208
TOTAL	**22,584**	**21,753**	**22,124**	**24,838**	**24,367**	**16,091**	**15,229**

Source: Cardno ENTRIX, 2011a- Appendix 5.15D

Potential evaporation rates in the Pahrump Valley exceed the available precipitation throughout the year (precipitation averages less than 1 inch per month in most months, versus an average monthly potential evapotranspiration rate ranging from 1 inch to over 15 inches throughout the year). This imbalance between potential evapotranspiration and available precipitation results in an extremely limited potential for recharge to the groundwater system via deep percolation of precipitation (Cardno ENTRIX, 2011a). Evapotranspiration from native deep-rooted plant species in the basin has been estimated at an annual rate of up to 12,500 ac-ft/yr (Cardno ENTRIX, 2011a). In addition, transpiration

from irrigated agricultural and landscaping contributes to further losses from the system. Agricultural and landscaping irrigation is supplied from groundwater and, for the purposes of developing water budget estimates, the transpiration losses are included in the withdrawal quantities supplied by the groundwater system (minus return flow to the aquifer).

The impacts of spring discharge to the overall water balance is negligible due to the lack of surface water outflow from the basin and the fact that spring flow from former springs (Manse and Bennetts springs) has ceased mainly due to groundwater pumping resulting in declining groundwater levels throughout the basin (Cardno ENTRIX, 2011a).

The Pahrump Valley basin lies at higher elevations than adjacent groundwater basins, and groundwater moves from the upgradient Pahrump Valley into lower elevation basin through the groundwater system. This groundwater flow occurs mainly through the deeper carbonate aquifer (Cardno ENTRIX, 2011a). Subsurface discharge from the Pahrump Basin is approximately 12,000 ac-ft/yr.

Groundwater Recharge/Inflows

The primary sources of recharge to the groundwater basin are deep percolation of precipitation in the surrounding mountains, and deep percolation of applied water. Runoff associated with intense short-duration storms within the valley is sporadic and precipitation that is not consumed by vegetation does not contribute substantially to the recharge within the basin. Several studies on the recharge to the basin estimated an average value of 22,312 ac-ft/yr (Cardno ENTRIX, 2011a).

Groundwater Storage Changes

Groundwater level records within the California portion of the basin intermittently span a period from 1952 through 1984. In the southern part of the basin on the California side, records indicate that groundwater levels declined by nearly 60 feet at one well during the period from 1952 through 1975. Another well shows water levels declined by 0.6 foot from 1956 through 1972. Along the southeast margin of the basin, water levels declined in one well by approximately 2.3 feet (1959 through 1977) and by approximately 5.1 feet in a different well (1959 through 1984). Depth to water ranged from about 98 to 123 feet below ground surface. In the northern portion of the basin near Stewart Lake, water levels declined by about 2.7 feet at one location (1960 through 1976) and by about 2.1 feet at another location (1976 though 1984). Depth to water ranged between 20 to 40 feet below ground surface. Near Pahrump Lake in the central part of the basin, records show that water levels remained fairly unchanged from 1959 through 1976 at about 55 feet below ground surface (DWR, 2004).

Based on information related to regional groundwater levels analyzed by Cardno ENTRIX (2011a), the pre-development water level at the project site was approximately 100 to 200 feet below land surface. The water level onsite was measured at approximately 108 feet below land surface in the existing Orchard Well at the project site in 2011 (Cardno ENTRIX, 2011a). Water level changes in monitoring wells located in various parts of the Pahrump Valley are further described in the report. Declining water levels were recorded in all monitoring wells for the period of record with the exception of wells located at the eastern edge of the valley. The stability of groundwater levels on the eastern edge of the valley likely reflects the presence of recharge sources in the nearby Spring Mountains. Projections

of water level declines in the basin (Cardno ENTRIX, 2011a) show that the water levels at the California – Nevada border are projected to fall to levels deeper than 130 feet below ground surface by 2030. This projection corresponds to a water level decline of approximately 20 feet at the project site. However, the project site lies in a portion of the Pahrump Basin with moderately low water usage and may be separated from the main portion of the basin by a series of faults indicating that impacts from site pumping may be minimal in the surrounding area (Cardno ENTRIX, 2011a).

Additional information on historical basin pumpage is provided in Appendix 5.15D (Cardno ENTRIX, 2011a). The perennial basin yield of 19,000 ac-ft/yr is discussed in the attached report (based on U.S. Geological Surcey [USGS studies]). Beginning in the 1950s, basin perennial yields were exceeded and continued until the late 1980s. Pumpage then declined from the late 1970s to close to the basin yield, increased above the basin perennial yield through the 1980s, and has since declined to near the basin perennial yield in the 2000s due to reduced agricultural demand. However, as discussed previously, groundwater levels are still declining in the basin, and are projected to continue to decline in the future. Figure 5.15-4 shows recent (2006) groundwater levels in the basin.

Groundwater Quality

The overall quality of the groundwater in the Pahrump Basin is suitable for all beneficial uses. The character varies from calcium-magnesium bicarbonate to magnesium-calcium bicarbonate. TDS concentrations range between 145 to 540 milligrams per liter (mg/L) with an average concentration of about 340 mg/L. Fluoride content ranges from 0.1 to 0.8 mg/L, averaging about 0.4 mg/L. Boron content averages about 0.1 mg/L (DWR, 2004).

Groundwater samples were taken at the existing Orchard WCHCell on the HHSEGS site. Therefore, the analytical data represents the water quality anticipated at the project wells (see Table 5.14-4).

TABLE 5.15-4R
Groundwater Quality Data for Orchard Well at HHSEGS Site

	Units	Orchard Well
Alkalinity Bicarbonate (CaCO3)	mg/L	134
Alkalinity, Carbonate (CaCO3)	mg/L	<20
Alkalinity (Total)	mg/L	134
Aluminum	mg/L	<0.100
Arsenic (Total)	mg/L	<0.030
Barium (Total)	mg/L	0.028
Beryllium	mg/L	<0.003
Bicarbonate	mg/L	134
Cadmium	mg/L	<0.003
Calcium (Total)	mg/L	53
Chloride	mg/L	7.4
Chromium (Total)	mg/L	<0.005

TABLE 5.15-4R
Groundwater Quality Data for Orchard Well at HHSEGS Site

	Units	Orchard Well
Conductivity	µS/cm	557
Copper	mg/L	<0.005
Fluoride (Total)	mg/L	0.54
Hardness ($CaCO_3$)	mg/L	246
Iron (Total)	mg/L	<0.10
Lead	mg/L	<0.015
Magnesium	mg/L	27
Manganese	mg/L	<0.005
Nitrate/Nitrite	mg/L	7.3
pH	Std Units	8.0
Silica	mg/L	10
Silver	mg/L	<0.010
Sodium	mg/L	21
Sulfate	mg/L	110
Total Dissolved Solids (TDS)	mg/L	361
Total Organic Carbon (TOC)	mg/L	<1.0
Total Suspended Solids (TSS)	mg/L	<1.0
Zinc	mg/L	0.069

Source: Orchard Well Groundwater Sampling Laboratory Data

~~µg/L = micrograms per liter~~
mg/L = milligrams per liter
S/cm = microsiemens per centimeter
~~ND = None Detected~~
~~pCi/L = picocuries per liter~~

The beneficial uses of Pahrump Valley Groundwater Basin include municipal and domestic supply, agricultural supply, and freshwater replenishment (Lahontan RWQCB, 1995).

5.15.3.1.4 Flooding Potential

The project site is located in an area affected by two Federal Emergency Management Agency (FEMA) established Special Flood Hazard Zones. Both zones are classified as Zone A, which is defined as an area subject to a 1-percent annual chance of flooding with no base flood elevation determined. During major storm events, localized flooding may occur and ephemeral washes can overflow for a period of a few hours to up to a 24-hour period. Two unnamed dry lake beds exist downgradient to the project site that receive tributary watershed flows (VTN, 2011a). Flood zones are presently being re-analyzed by FEMA and are anticipated to be placed into effect by September 2011.

5.15.3.2 Stormwater Runoff and Drainage

5.15.3.2.1 Stormwater Runoff Prior to Construction

HHSEGS will be located on undeveloped land in the Pahrump Valley. Stormwater runoff at the site is predominantly sheet flow from west to east, eventually discharging into an unnamed dry lakebed northwest of the project site. Stormwater runoff also flows in the ephemeral washes located on the project site, draining from west to east, eventually discharging into the same dry lakebed located in Inyo County. Existing conditions are further described in Appendix 5.15C (VTN, 2011a).

Protection of soil resources during construction activities will be an important factor in the design of the erosion and sedimentation controls. To minimize wind and water erosion, open spaces will be preserved and left undisturbed maintaining existing vegetation (to the extent possible with respect to site topography and access requirements). Areas compacted during construction activities will be restored, as appropriate, to approximate preconstruction compaction levels to minimize the opportunity for any increase in surface runoff.

If needed, stone filters and check dams will be strategically placed throughout the project site to provide areas for sediment deposition and to promote the sheet flow of stormwater prior to leaving the project site boundary. Where available, native materials (rock and gravel) will be used for the construction of the stone filter and check dams. Diversion berms will be used to redirect stormwater around critical facilities, as required.

Periodic maintenance will be conducted as required after major storm events. Stone filters and check dams are not intended to alter drainage patterns but to minimize soil erosion and promote sheet flow.

5.15.3.2.2 Stormwater Runoff after Construction

Solar field development will maintain sheet flow where possible, with water exiting the site in existing natural contours and flows. The majority of the project site is expected to maintain the original grades and natural drainage features and, therefore, will require no added storm drainage control. In limited areas, such as the power blocks, switchyard, heliostat assembly buildings and administrative areas, the stormwater management system will include diversion channels, bypass channels, or swales to direct run-on flow from upslope areas and runoff flow through and around each facility. Diversion channels will be designed so that a minimum ground surface slope of 0.5 percent will be provided to allow positive, puddle-free drainage. To reduce erosion, storm drainage channels may be lined with a non-erodible material such as compacted rip-rap, geo-synthetic matting, or engineered vegetation. The design will be developed for sheet flow for all storm events less than or equal to a 100-year, 24-hour storm event.

All surface runoff during and after construction will be controlled in accordance with the requirements of the Drainage, Erosion, and Sedimentation Control Program (DESCP), and all other applicable LORS.

Paved access roads will be designed to allow stormwater to flow unimpeded across the roadways in order to maintain the existing sheet flow pattern. The perimeter road being constructed along the western property line will be built up within the middle two-thirds in order to act as a retention berm to contain increased flows from the postconstruction,

10-year 24-hour storm event. A culvert will be added at the low point of the bermed area to aid in draining the retention area within 24 hours after a storm event. Overall the project is being designed to maintain, to the extent possible, the existing sheet flow patterns on the site.

5.15.3.3 Water Supply, Use, and Wastewater Discharges and Disposal

5.15.3.3.1 Water Supply

Up to six onsite groundwater supply wells will be drilled and developed to provide raw water for the HHSEGS project; two new wells per power block (primary and backup) and two wells at the administration building. These wells will supply both solar plants and will be used for make-up water, mirror-wash water (each solar plant will include a water treatment and deionizing facility in the power block structure), and for domestic uses. The combined 500-MW nominal capacity of the plants will require up to 140 ac-ft/yr of water .

5.15.3.3.2 Water Use

As described above, the project is expected to use up to 140 ac-ft/yr for potable and process water needs. Construction activities are expected to require approximately 288 acre-feet of water per year over the 29-month construction period.

Make-up water for the steam system will be treated by means of a mixed-bed ion-exchange system to produce feedwater-quality water for use in the boiler system. The ion exchange resins will be sent offsite for regeneration. Water will be distributed to the solar plants via underground pipeline, which will be installed in utility corridors leading to the power blocks from the two supply wells. Each power block will contain a 250,000-gallon raw water tank. A portion of the raw water stored in the tank (about 100,000 gallons) will be designated for plant use, while the majority will be reserved for fire water.

For each solar plant, approximately 57 gallons per minute (gpm) will be used for plant operations and of that approximately 18 gpm will be deionized for mirror wash water and held in storage tanks. Approximately 1 gpm will be delivered to the administrative complex for potable water purposes. Water from the deionized water tank will be used for steam boiler operations during the day, with about 75 percent captured and re-used within the facilities from the waste to recycle processes. Within each of the two power blocks, approximately 64 gpm will be needed from the deionized water tank when the steam boilers are in operation. A more detailed description of water use, including water treatment, is provided in Section 2.2.5, Project Description.

5.15.3.3.3 Wastewater Discharges and Disposal

Wastewater generated at the project site will be from two sources: heliostat wash water and effluent from operations and maintenance facilities.

- Heliostat washing will require up to 52,834 gallons of water per day. Heliostat wash water will not be collected for disposal—it is expected that the wash water will evaporate at or near the ground surface.
- The power block sites will have an operations and maintenance facility including wastewater disposal for associated domestic facilities (e.g., toilets, sinks, showers) that will discharge to an onsite septic system. The septic tank will be pumped out as needed by a qualified sanitary service provider.

5.15.4 Environmental Analysis

This section provides a discussion of the construction and operational impacts of the project. The following significance criteria are derived from the CEQA Appendix G checklist. The project is considered to have a potentially significant effect if it would adversely affect these criteria. The sections where these criteria are addressed are indicated after the significance criteria.

- Violate any water quality standards or waste discharge requirements. [Sections 5.15.4.1.2 and 5.15.4.2.2]
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted). [Section 5.15.2.3]
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or offsite or in flooding on- or offsite. [Sections 5.15.4.1.1 and 5.15.4.2.1]
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite. [Sections 5.15.4.1.1 and 5.15.4.2.1]
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. [Sections 5.15.4.1.1 and 5.15.4.2.1]
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map. [Not applicable, no housing is planned as part of the project.]
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows. [Section 5.15.4.2.4]
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam. [Not applicable. There are no dams or levees in the project vicinity.]
- Cause inundation by seiche, tsunami, or mudflow. [Not applicable. The project is not near water bodies, so there is no possibility of a seiche or tsunami. The project site has less than a 1 percent slope, so is not subject to a mudflow.]

5.15.4.1 Construction Impacts

5.15.4.1.1 Drainage

During construction, portions of the project site, including portions along the ephemeral washes on the site, will be graded. Grading is not intended to level the site, but rather to prepare the site for installation of the heliostats and ease future maintenance activities

(washing the heliostats). As such, the existing depressions for the drainages will remain and natural drainage waters are expected to continue to occupy these ephemeral washes. Any grading required will be designed to promote sheet flow where possible. Areas disturbed by grading and other ground disturbance will be protected from erosion by implementation of appropriate BMPs that will be identified in the project's Construction SWPPP (see Appendix 5.15A). Site grading and development will maintain the overall drainage patterns on site and impacts to existing drainage patterns during construction are less than significant.

5.15.4.1.2 Water Quality

Water quality impacts are anticipated to be related to short-term construction activities and consist primarily of an increased potential for erosion. Additionally, stormwater runoff during construction activities could result in the transport of construction-related contaminants, such as oils and lubricants from equipment or from the improper storage and use of materials. Following approved grading and drainage plans, adhering to proper material handling procedures, and complying with the construction SWPPP will ensure that construction-related water quality impacts are less than significant. The construction SWPPP will require stormwater BMPs, dewatering runoff controls, and construction equipment decontamination. A draft construction SWPPP is provided in Appendix 5.15A.

Through compliance with the General Construction Permit, all potential pollutants generated during construction will be sufficiently mitigated such that the beneficial uses of downstream receiving waters will be protected and water quality standards will not be violated. Therefore, water quality impacts are not significant.

5.15.4.2 Operational Impacts

5.15.4.2.1 Drainage

The project site is currently undeveloped with no impervious surfaces. It has been partially disturbed as part of a previously approved residential development. Although the residential development was never completed, gravel/dirt roads were installed in a grid pattern that remains to the present date. Impacts from development are analyzed in Appendix 5.15E (VTN, 2011b). Development of the project would result in impervious surfaces for the area of the power blocks, administration building, and related facilities. Once developed, the project will result in approximately 450 acres of noncontiguous impervious surfaces, or 14.5 percent of the project site (VTN, 2011b). Solar field development will maintain unobstructed sheet flow, with water exiting the site in existing natural contours and flowpaths. Relatively small rock filters and local diversion berms through the heliostat fields may be installed as required to discourage water from concentrating and maintain sheet flow. An onsite retention basin would be created along the western site boundary by elevating the western perimeter roadway. The berm created by the elevated roadway would mitigate the increase in peak flows from project development. Postconstruction runoff from the 24-hour, 100-year storm would be slightly less than preconstruction runoff (10,758 cubic feet per second [cfs], compared to 10,790 cfs) (VTN, 2011b).

Overall, the project is being designed to maintain, to the extent possible, the existing drainage and sheet flow patterns on the site. The increase in the amount of impervious surface and the routing of flows around the power block is not expected to significantly

change the amount or timing of runoff from the project site. It is also not expected to change the overall drainage pattern of the site in a manner that would result in substantial erosion, siltation, or flooding on- or offsite. Impacts to drainage patterns are less than significant.

5.15.4.2.2 Water Quality

Operation of the project has the potential to impact water quality primarily through improper storage and use of materials. Adhering to proper material storage and handling procedures and complying with the industrial SWPPP will ensure that operational impacts to water resources are less than significant. The industrial SWPPP will require a suite of good housekeeping requirements including steps to identify and mitigate pollutants and conditions of concern. BMPs will be selected to address material loading and storage areas, spill and leak prevention, waste handling, and employee training. Inspections, monitoring, and sampling also will be conducted per the permit requirements.

Through compliance with the General Industrial Permit, all potential pollutants generated during the industrial phase will be sufficiently mitigated such that groundwater will be protected and water quality standards will not be violated. Therefore, surface water and groundwater quality impacts during the operations phase will not be significant.

5.15.4.2.3 Groundwater

The project includes the installation of six new onsite groundwater production wells for project water supply. Two, 100 percent redundant wells will be located in the power block of each solar plant. In addition, two wells will supply the common area and other cleaning and maintenance activities. Total water consumption is estimated at 140 ac-ft/yr. This level of pumping is expected to continue for the 25- to 30-year operating life of the project. All pumped water will be consumptively used and no groundwater return flows are expected.

Based on available information on the overall Pahrump Basin's perennial yield (Cardno ENTRIX, 2011a), the current basin-wide pumping estimates are lower than the latest perennial yield estimate. In consideration of the large quantity of authorized but unexercised groundwater pumping appropriations as reported by the Nevada State Engineer's Office and as identified from local planning projections, there is a potential for increased groundwater pumping in the Nevada portion of the basin (where the vast majority of the current pumping occurs) that could eventually exceed the basin's estimated perennial yield.

Local Drawdown Impacts

Analytical groundwater models have been developed for the project and are included in Appendix 5.15F for construction impacts (Cardno ENTRIX, 2011b) and Appendix 5.15G for operations impacts (Cardno ENTRIX, 2011c). The project's groundwater pumping will result in groundwater level declines over time. Three scenarios were considered in the operations-phase analytical groundwater model, based on three different values of aquifer transmissivity.[2] Results for the three scenarios are summarized in Table 5.15-5. Results of the modeling scenarios indicate the estimated drawdown in the aquifer based on 25 to 30 years of continuous project withdrawals range from approximately 5 feet to 15 feet near

[2] Transmissivity – the rate at which groundwater flows through an aquifer – is an important hydrogeological value for estimating drawdown effects. Low transmissivity indicates localized but deep drawdown effects. High transmissivity indicates more widespread but shallow drawdown. Scenario 1 (Transmissivity = 7,225 gpd/ft) is based on reported values. Scenarios 2 and 3 are based on half and twice the reported value, respectively, to account for uncertainly.

the production wells. See Appendix 5.15G for more information on these declines and the analysis method used to determine the declines.

TABLE 5.15-5
Summary of Groundwater Modeling Parameters for Drawdown
Based on 25 years of pumping

Scenario	Transmissivity (gpd/ft)	Maximum Drawdown (ft)	Extent of 1-foot drawdown in miles
Scenario 1	7,225	7.9	6.9
Scenario 2	3,612	14.9	6.4
Scenario 3	14,450	5.2	6.1

Source: Cardno ENTRIX, 2011c

Short-term impacts also would occur from pumping water to be used for construction (up to 288 ac-ft/yr during construction). Using similar methods as described above for operations, estimated drawdown during construction at the nearby domestic wells ranges from approximately 2 feet to 7 feet. See Appendix 5.15F for more information on these declines.

Several active domestic production wells exist on properties directly adjacent to the project site, as depicted in the figures included in Appendix 5.15F and Appendix 5.15G (Cardno ENTRIX 2011b, Cardno ENTRIX 2011c). According to the modeling results, these wells will likely be affected by the predicted drawdown created by the new project production wells. Domestic wells could be affected by the lowered groundwater levels such that production rates decrease and pumping costs increase. Possible mitigations, if impacts were to occur, would be to lower the pump intakes, deepen the wells, or build new, deeper wells.

Regional Drawdown Impacts

As described above, HHSEGS is located west of the PVFZ, and studies conducted by Buqo in 2006 indicate that the hydraulic gradient in the PVFZ was found to be lower relative to the overall gradient of the valley. This indicates that the PVFZ may act as a hydraulic flow barrier, which could isolate impacts to the greater Pahrump Valley aquifer from onsite pumping (Cardno ENTRIX, 2011a). If the groundwater basin in the project area is indeed disconnected from the larger basin, then impacts from site pumping may not extend out to areas of greater groundwater production to the north. Because the discontinuity cannot be demonstrated, however, this analysis assumes that local drawdown may have regional impacts.

Past groundwater pumping (primarily from the Basin Fill aquifer) has exceeded the perennial yield of the basin. Current pumping appears to be below the current estimates of basin perennial yield estimated by the USGS; however, groundwater levels continue to decline (Cardno ENTRIX, 2011a). The proposed pumping will reduce basin supplies by 140 ac-ft/yr.

Because the project life is short (25 to 30 years) with respect to the response time for the groundwater system, regional drawdown impacts would be small and not likely measurable. To a small degree, however, project pumping would worsen groundwater losses.

Groundwater Recharge

As described above, groundwater recharge to the Pahrump Valley basin occurs from precipitation on the surrounding mountains. Once developed, the project would result in 450 acres of discontinuous impervious surfaces, which comprises 14.5 percent of the project site. Solar field development will maintain unobstructed sheet flow, with water exiting the site in existing natural contours and flows. In addition, recharge from precipitation on the valley floor is negligible. Therefore, the project would not interfere substantially with groundwater recharge and impacts are less than significant.

Groundwater Quality

Because the project will use only a small amount of water and none of it will be returned to the groundwater basin, the project is unlikely to affect groundwater quality. No changes in the existing physical or chemical conditions of groundwater resources are expected as a result of the project and no impacts to groundwater quality would occur.

5.15.4.2.4 Flooding Potential

Worst case postconstruction flooding conditions were evaluated in Appendix 5.15E (VTN, 2011b). Sufficient elevation difference exists between the project boundary and the maximum water surface elevation in the dry lake bed that receives tributary watershed flows, such that no flooding impacts from the project are anticipated. Also, a second dry lake bed by Stewart Valley is at a lower elevation, provides additional storage, and adequate capacity to receive tributary flows that might exceed the storage capacity of the first receiving dry lake bed during a 100-year, 24-hour storm condition.

The project would not expose people or structures to significant risk of loss, injury, or death resulting from a levee or dam failure because there are no levees or dams in the project vicinity. Similarly, the project is not located near the Pacific Ocean, a large water body, or on steep slopes and any potential inundation from seiche, tsunami, or mudflow is remote.

5.15.5 Cumulative Effects

A cumulative effect refers to a proposed project's incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Public Resources Code § 21083; Californiaa Code of Regulations, Title 14, §§ 15064(h), 15065(c), 15130, and 15355). Cumulative projects are described in Section 5.6.7 and include projects within 20 miles of the project site.

Standard mitigation measures exist to reduce impacts to water resources to a less-than-significant level, and it is anticipated that impacts to water resources from the cumulative projects, if any, would be mitigated to a less-than-significant level. The project is unlikely, therefore, to have impacts that would combine cumulatively with other closely related past, present, and reasonably foreseeable future projects.

Cumulative impacts to water resources could occur through stormwater runoff impacts to surface waters or through the use of groundwater. The project will not cause or contribute to cumulative impacts on surface water resources. Good engineering practices and BMPs will be used in the project design and operation. Stormwater discharge will adhere to a SWPPP and to state water quality standards. No significant impacts to surface water quality are expected during construction or operation of the project. Drainage volumes and peak

flow rates from the site will be similar to existing conditions. Additionally, it is expected that the cumulative projects would employ good engineering practices and comply with all applicable federal, state, and local surface water LORS, including stormwater management. The project is unlikely, therefore, to have impacts to surface waters that would combine cumulatively with other closely related past, present, and reasonably foreseeable future projects.

The projects listed in Section 5.6.7 may require water for construction activities, but are not likely to result in a long-term groundwater supply needs or impacts to groundwater. All of the cumulative projects are not expected to affect overall groundwater recharge in the Pahrump Valley. It is anticipated that the cumulative projects would comply with all applicable federal, state, and local LORS with regard to stormwater management and waste discharge requirements, and impacts to groundwater quality that could result from the recharge of potentially contaminated waters would be mitigated or avoided. Because the project would result in less-than-significant impacts to groundwater resources, and because the cumulative projects are likely to result in less-than-significant impacts or potential benefits to groundwater resources, the project is unlikely to have impacts that would combine cumulatively with other closely related past, present, and reasonably foreseeable future projects.

5.15.6 Mitigation Measures

This section presents mitigation measures proposed to reduce impacts to water resources. The mitigation measures proposed are prescribed by stormwater and erosion control management programs mandated under the NPDES permitting system. These programs have been in place for a number of years and the prescribed measures have proven effective. Under the General NPDES Permits for Construction and Industrial Stormwater, for example, various specific measures are prescribed, and a program of monitoring is required. Compliance with these programs should ensure that all residual impacts associated with HHSEGS are mitigated to a less-than-significant level.

- Implement BMPs designed to minimize soil erosion and sediment transport during construction. Implement and maintain appropriate erosion and sediment controls for all areas prone to erosion in accordance with the draft construction SWPPP included in Appendix 5.15A. Implement and maintain BMPs for material management in accordance with the draft construction SWPPP.
- Conduct operations at the plant site in accordance with the California Statewide General Industrial Permit. Implement a suite of good housekeeping requirements including steps to identify and mitigate pollutants and conditions of concern. Select BMPs to address material loading and storage areas, spill and leak prevention, waste handling, and employee training. Conduct inspections, monitoring, and sampling per the permit requirements.

Notwithstanding the small amount of water used by the project, the Applicant recognizes that groundwater elevations are declining in many areas of the Pahrump Valley groundwater basin. To address the potential impacts of the project on groundwater supplies, the Applicant proposes the following measures. It is possible that neither local nor regional groundwater impacts would occur. Some amount of local groundwater drawdown

would occur, but effects on nearby domestic wells may be negligible depending on aquifer characteristics (e.g., transmissivity). Similarly, regional drawdown may occur throughout the Pahrump Valley groundwater basin, but the project area may be discontinuous (or partially discontinuous) from the larger basin such that regional drawdown would be limited.

- For existing domestic well pumpers in the vicinity of the project who agree to pre-operational groundwater monitoring, the Applicant will implement a retrofit program (e.g., lowering the pump intakes, deepening the wells, or building new wells) if the monitored well experiences lowered groundwater levels such that production rates decrease and pumping costs increase.
- If project groundwater pumping effects occur across the Pahrump Valley Fault Zone, the Applicant will work with water service providers and domestic well users in Nevada to develop water conservation and efficiency measures to offset pumping.

5.15.7 Involved Agencies and Agency Contacts

Agencies and agency contacts for water resources are listed in Table 5.15-6.

TABLE 5.15-6
Agency Contacts for Water Resources

Issue	Agency	Contact
To comply with NPDES permit requirements, a Notice of Intent must be filed prior to construction activities. A construction SWPPP also must be prepared.	Lahontan RWQCB	Mike Plaziak, Supervising Engineering Geologist Lahontan RWQCB 14440 Civic Drive, Suite 200 Victorville, CA 92932 (760) 241-7404 mplaziak@waterboards.ca.gov
To comply with NPDES permit requirements, a Notice of Intent must be filed prior to operational activities. An operational SWPPP also must be prepared.	Lahontan RWQCB	Mike Plaziak, Supervising Engineering Geologist Lahontan RWQCB 14440 Civic Drive, Suite 200 Victorville, CA 92932 (760) 241-7404 mplaziak@waterboards.ca.gov
Grading Permits	Inyo County Planning Department	Tanda Gretz, Senior Planner Inyo County Planning Department P.O. Drawer L Independence, CA 93526 (760) 878-0263 tgretz@inyocounty.us
Groundwater well permits	Inyo County Environmental Health Services	Marvin Moskowitz, Director Inyo County Environmental Health 207 W. South Street Bishop, CA 93514 (760) 878-0238 168 North Edwards Street Independence, CA 92526 (760) 878-0238 mmoskowitz@inyocounty.us

TABLE 5.15-6
Agency Contacts for Water Resources

Issue	Agency	Contact
Comply with county Code regarding desert groundwater management	Inyo County Water Department	Bob Harrington, Director Randy Jackson, Sr. Hydrologist Inyo County Water Department 135 South Jackson St. Independence, CA 93526 (760) 878-0001 bharrington@inyocounty.us rjackson@inyocounty.us

5.15.8 Permits Required and Permit Schedule

Agency contacts and required permits are listed in Table 5.15-7.

TABLE 5.15-7
Permits Required and Permit Schedule for Water Resources

Permit	Agency Contact	Schedule
Statewide General Permit for Construction Activities	Mike Plaziak, Supervising Engineering Geologist Lahontan RWQCB 14440 Civic Drive, Suite 200 Victorville, CA 92932 (760) 241-7404 mplaziak@waterboards.ca.gov	One day to submit the Notice of Intent. SWPPP must be onsite prior to commencement of construction activities.
Statewide General Permit for Industrial Activities	Mike Plaziak, Supervising Engineering Geologist Lahontan RWQCB 14440 Civic Drive, Suite 200 Victorville, CA 92932 (760) 241-7404 mplaziak@waterboards.ca.gov	One day to submit the Notice of Intent. SWPPP must be onsite prior to commencement of operational activities.
County Grading Permit	Inyo County Planning Department Post Office Drawer L 168 N. Edwards Street Independence, California 93526 (760) 878-0263	Estimated 6 months from submittal of complete application
Domestic Water Supply Permit	Marvin Moskowitz, Director Inyo County Environmental Health 207 W. South Street Bishop, CA 93514 (760) 878-0238 168 North Edwards Street Independence, CA 92526 (760) 878-0238	Estimated 3 months from submittal of complete application

TABLE 5.15-7
Permits Required and Permit Schedule for Water Resources

Permit	Agency Contact	Schedule
County Groundwater Well Permit	Marvin Moskowitz, Director Inyo County Environmental Health 168 North Edwards Street Independence, CA 92526 (760) 878-0238 207 West South Street Bishop, CA 93514 (760) 873-7866	Submit application for well permit at least 30 days prior to well installation

5.15.9 References

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