WorleyParsons
resources & energy

Infrastructure and Environment
2330 E. Bidwell Street, Suite 150
Folsom, CA 95630, USA
Telephone: +1 916 817-3920
Facsimile: +1 916 983-1935
www.worleyparsons.com

DOCKET
09-AFC-8
DATE 12/31/09
RECD. 01/04/10

December 31, 2009

52004617

Genesis Solar LLC

700 Universe Blvd.
Juno Beach, FL 33408
Attn: Mike Pappalardo, Environmental Manager

Re: Technical Memorandum - Groundwater Resources Cumulative Impact Analysis for Genesis Solar Power Project, Riverside County, CA

Dear Mr. Pappalardo:

As discussed, this technical memorandum presents a cumulative impact analysis on groundwater resources for the Genesis Solar Energy Project, located in the Chuckwalla Valley Groundwater Basin in eastern Riverside County, California (the Project). This analysis will be incorporated into the Groundwater Resources Investigation Report scheduled to be issued on January 8, 2010.

Scope of Analysis

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; California Code of Regulations, Title 14, § 15064(h), 15065I, 15130, and 15355). Cumulative impact analysis must be conducted over appropriate time and geographic boundaries. Because they already exist, past and present projects are inherently part of the environmental baseline. For the purposes of groundwater resources, the cumulative impact analysis for this Project begins with present conditions, which reflect the groundwater levels and trends, and the groundwater budget elements discussed in the response to Data Request Set 1A Item 151, submitted to the California Energy Commission (CEC) on December 15, 2009. This submittal included information regarding historical and existing groundwater demand and the groundwater budget for the Chuckwalla Valley Groundwater Basin[1]. Looking forward, the cumulative impact analysis for the project extends through Project construction and the 30-year operating life of the solar power plant. Geographically, it is appropriate to include in the cumulative impact analysis those projects that are likely to have an affect on water levels or the water budget in the Chuckwalla Valley Groundwater Basin. This primarily includes projects located in the basin, but could also include projects in adjacent basins if they have the potential to effect conditions in the basin.

Cumulative projects considered in this analysis include planned and reasonably foreseeable future projects located within the time and geographic boundaries described above. A preliminary list of projects was provided by CEC (CEC, 2009), and additional projects were identified in a solar project

[1] Evapotranspiration at Palen Lake was not estimated in the submittal responding to the CEC's Data Request Set 1A; however, this component of the water budget is discussed below in this letter.

list available from BLM (BLM, 2009a) and the EIS prepared for the Eagle Crest Pumped Storage Project (Eagle Crest, 2009). The CEC list included several projects located in the Palo Verde Mesa Groundwater Basin. These projects were eliminated from further consideration based on their hydrogeologic setting, because they are unlikely to affect groundwater resources in the Chuckwalla Valley. The Eagle Mountain Landfill project, originally proposed in the mountains northwest of Desert Center, was eliminated from consideration because a recent Appeals Court decision eliminates a land swap that was considered a core component of that project. Finally, the MWD's Hayfield Aquifer Storage and Recovery project in the Orocopia (Hayfield) Valley west of Desert Center was not considered because it would have no net long term effect on groundwater conditions in the Chuckwalla Valley Groundwater Basin (Eagle Crest, 2009).

The remaining potential cumulative projects are listed in **Table 1**, and include several solar power and transmission line projects, and the Eagle Crest Pumped Storage project. BLM is currently processing 62 solar energy right-of-way applications in the California Desert District, covering a total of 577,000 acres. These applications cover a wide spectrum of project status and viability, and this is also the case for solar right-of-way applications filed in Chuckwalla Valley. For inclusion in the cumulative analysis, projects were considered planned or reasonably foreseeable if the environmental review process under the California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA) or Warren Alquist Act had begun or was imminent. The remaining projects were considered to speculative to be considered in the cumulative analysis at this time. The rationale for the inclusion of projects in the cumulative impact analysis and the groundwater demand associated with the cumulative projects in summarized in **Table 1**.

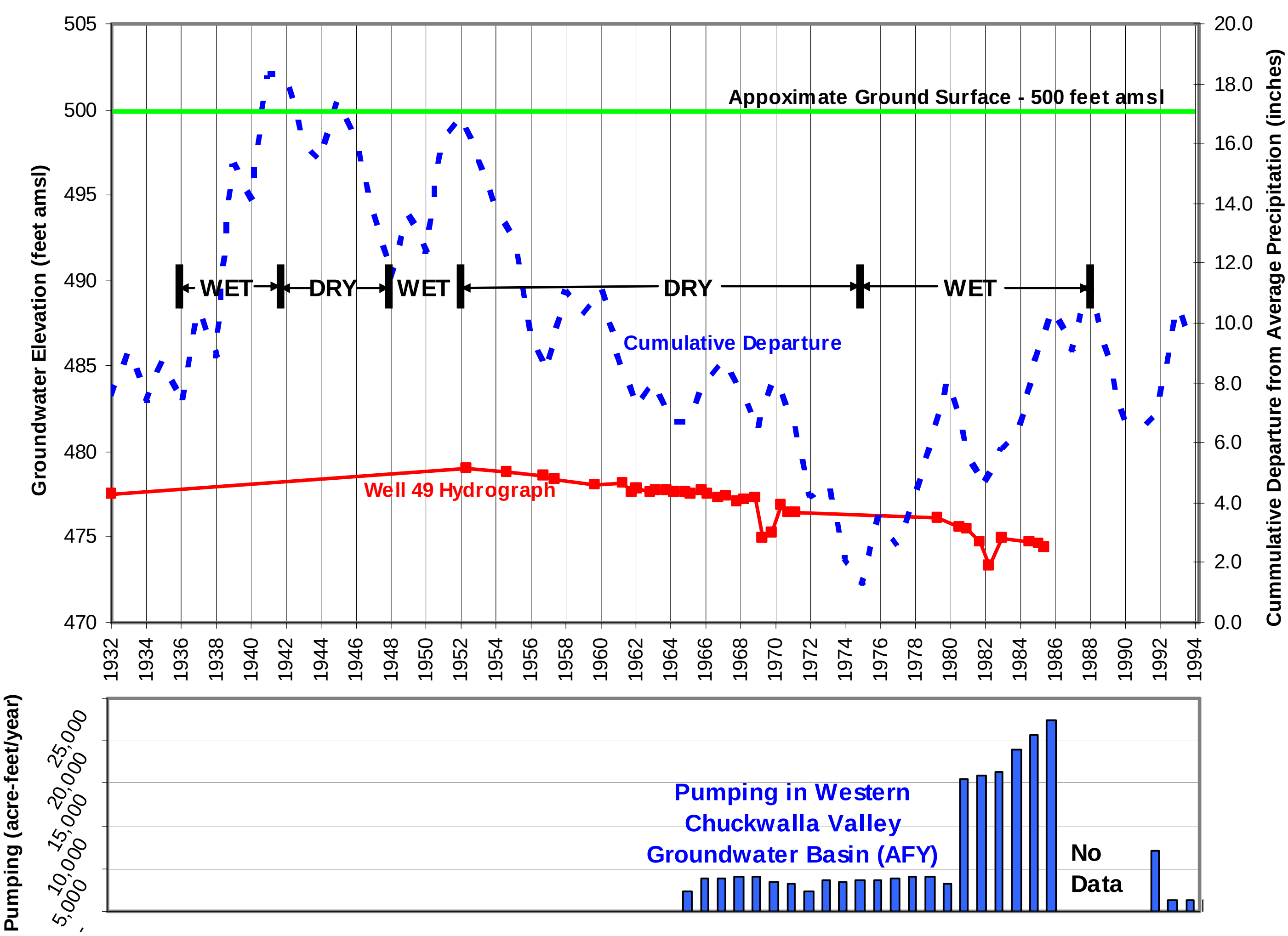
Potential cumulative impacts evaluated in this analysis include impacts to the groundwater budget of Chuckwalla Valley Groundwater Basin as well as drawdown and potentially associated adverse affects to well owners, surface water resources, and biological resources. These potential impacts are discussed in the following sections.

Palen Lake Evapotranspiration

Information regarding evapotranspiration at Palen Lake is a necessary part of understanding the water budget for Chuckwalla Valley Groundwater Basin and of the background to cumulative impact analysis. Regional groundwater flow and discharge mapping performed by USGS (Bedinger, et al., 1989) did not identify Palen Lake as an area where groundwater discharges at the ground surface. Nevertheless, groundwater elevation contour mapping (Steinemann, 1989) suggests that groundwater may occur near the ground surface beneath approximately the northwestern 25 percent of Palen Lake. Well 49 is located approximately 2 miles north of Palen Lake, is reported to be completed to a depth of 501 feet below a ground surface elevation of 500 feet above mean sea level (amsl) (WorleyParsons, 2009). A screened interval for the well is not reported. Groundwater levels in this well were reported to be approximately 20 to 25 feet below the ground surface between 1932 and 1984. Given that the surface elevation at Palen Lake 2 miles to the south is approximately 460 feet amsl, or 40 feet lower, it appears possible that groundwater levels are very close to the ground surface beneath the northern portion of the playa. In addition, DWR (1963) identified the presence of mesquite trees on low mesa-like promontories of Pleistocene lacustrine sediments at the northwest margin of Palen Lake playa, also suggesting the possible presence of relatively shallow groundwater. These data suggest it is possible that an area in the northern portion of Palen Lake is discharging groundwater by evaporation as a wet playa. Groundwater levels beneath the southeastern portions of Palen Lake, and a small ancillary playa located approximately 1 mile southeast of Palen Lake, are 20 to 30 feet below ground level (Steinemann, 1989), indicating these are dry playa areas.

Groundwater levels measured in Well 49 between 1932 and 1984 are presented in the graph below together with cumulative departure from average precipitation in Blythe (WRCC, 2009) and reported pumping in the western portion of the Chuckwalla Valley Groundwater Basin. An upward trend in the cumulative departure curve indicates a period that is wetter than normal; whereas, a downward trend reflects below normal precipitation. Based on examination of the well hydrograph and cumulative departure curve, there do not appear to be any climatically induced or seasonal variations in the water levels in this well. Between 1954 and 1984, groundwater levels fell by approximately 5 feet, presumably due to groundwater pumping in the basin.

Graph Showing Well 49 Groundwater Levels, Precipitaiton Trends and Area Pumping



Potential indicators of groundwater discharge at Palen Lake would include free surface water, wetland vegetation dependant on very shallow groundwater, salt accumulation, moist soil, or a near surface groundwater table. To investigate the potential presence and extent of these features, WorleyParsons reviewed historical imagery, performed a surface reconnaissance in December 2010, and performed a surface and subsurface reconnaissance on December 30, 2009. Salt would be expected to accumulate in Palen Lake simply by virtue of the fact that it is the terminal sink of a drainage area that is over 400,000 acres in size, and periodic surface water inflow will tend to both transport salt to the playa and dissolve and re-crystallize salt deposits that are present. Therefore, our reconnaissance investigation focused on observation identifying whether plant species are present that are indicative of shallow, near surface groundwater, observation of the type and distribution of salt deposits, investigation of the soil moisture profile, and investigation for shallow groundwater.

Review of aerial photography indicates an approximately 700 acre area of dissected salt pan in the northwest portion of the playa (**Figure 1**). This feature is surrounded by an additional approximately 1,300 acres that show evidence of more limited surface salt accumulation. The extent of this area is visible in aerial imagery from November 2005, and was generally confirmed by a reconnaissance performed on December 10 and 30, 2009. Review of the historical progression aerial imagery presented in **Figure 1** indicates no or limited salt accumulation in this area from 1996 through 2002, light salt accumulation in March of 2005, and the currently observed salt pan area in November 2005. This suggests that salt pan accumulation in the playa is episodic; however, seasonal, intermittent accumulation cannot be ruled out. Historical precipitation records indicate that 2005 rainfall in Blythe was approximately twice the long term annual average, with 5.10 inches occurring in January and February 2005 (WRCC, 2009), just before the March 2005 aerial photograph was taken. These storm events would be expected to have resulted in the accumulation of runoff in Palen Lake, and consequently in dissolution and re-crystallization of salt deposits during evaporation of surface water, and by wetting and subsequent drying of salt containing playa sediments. As such, these rainfall events are likely responsible for at least a portion of the observed salt accumulation; however, groundwater discharge by evaporation at the ground surface could also be responsible.

During our December 10 site visit, conditions at the northwestern edge of the playa were investigated. Intermittent salt deposits were observed to be located both in low lying areas and on the tops of low, dissected, mesa-like promontories of Pleistocene lacustrine sediments approximately 3 feet high that extend into the playa. Deposition of salt by groundwater evaporation at the surface would be expected to occur on the sides as well as the top of these promontories. The occurrence of salt deposits on the top, but not on the sides, suggests that these deposits are the result of salt dissolution from layers with elevated salt content and reposition as soil moisture evaporates at the ground surface. During this reconnaissance, the shallow soil beneath the salt deposits was observed to be wetted to a depth of approximately 3 inches from a recent rain event, but underlying soil to depths of approximately 1 foot were observed to be generally dry. As such, evidence of salt deposition by evapotranspiration at the playa surface was not observed in this area during our reconnaissance.

Mesquite trees were observed in the area north of the playa, but wetland species or other species indicative of or dependant on shallow groundwater were not observed. Mesquite trees are typically thought to be associated with “shallow” groundwater; however, the term shallow should be understood in a relative sense -- the depth to groundwater utilized by mesquite trees may be several tens of feet below the ground surface. This would be too deep to support groundwater discharge at the ground surface. Thus, the presence of mesquite is not necessarily indicative of discharging playas.

During the December 30 site visit, two hand auger borings were advanced to approximately 10 feet below the ground surface beneath the salt pan area in the northwest portion of the playa. The moisture content of the soil was observed to increase with depth in both borings, and free groundwater was encountered at a depth of approximately 8 feet below the playa salt pan surface in one of the borings. Subsurface soil encountered consisted of alternating layers clay/silt mixtures and sandy sediments. A depth of 2 to 3 meters is generally the maximum depth of free water documented beneath discharging playas. This suggests that groundwater could be shallow enough to discharge at the surface by capillary rise and evaporation to occur at least some of the time.

Based on the above data, salt accumulation at Palen Lake is likely the result of dissolution and re-crystallization of existing salt deposits during times of surface water inflow, as well as limited episodic and possibly seasonal or intermittent groundwater discharge. The rate of groundwater discharge in a wet playa is dependant on the depth to groundwater and magnitude of upward vertical gradients, the ability of subsurface materials to facilitate capillary rise, climatic conditions, and the presence and extent of free water, wetlands and salt pans on the playa surface (Tyler, 2005; Allen and Sharike, 2003). In general, groundwater discharge rates are highest when groundwater is shallow, temperatures are high, and when open water or wetlands are exposed at the playa surface. Increased depth to groundwater, lower temperatures, the presence of coarse grained material that inhibits capillary rise, and the presence of salt pan (which increases albedo) tends to decrease groundwater discharge rates. Based on these factors, discharge of groundwater at Palen Lake appears to be limited based on the depth to groundwater (including absence of vegetation that indicates consistent shallow groundwater), the presence of coarse grained layers that limit capillary rise and the apparent intermittent or episodic nature of discharge.

Groundwater discharge rates were estimated based on reported groundwater discharge rates at other playas, the area of identified salt accumulation, and the evident episodic or intermittent nature of salt accumulation. Measured evapotranspiration rates at Franklin Lake Playa were used to form a basis for this estimate (Czarnecki, 1997). Franklin Lake Playa is a well developed and extensively characterized wet playa in the Death Valley area. Evapotranspiration rates at Franklin Lake Playa were measured to be 38 to 41 cm/year (1.3 to 1.4 feet/year) using the Energy-Balance Eddy-Correlation method, which was reported to be the most reliable method for evapotranspiration measurement. These rates would be a conservative measure of evapotranspiration for an active wet playa at Palen Lake for the following reasons:

- Franklin Lake Playa is a terminal playa, which is the terminal discharge point of the local groundwater flow system; whereas, Palen Lake is a bypass playa, with most groundwater flowing laterally past the playa.
- Groundwater levels at Franklin Lake Playa are within approximately 3 feet of the ground surface; whereas, groundwater levels beneath the Palen Lake salt pan area were observed to about 8 feet below ground surface during our reconnaissance.

- Franklin Lake Playa includes extensive groundwater discharge features (e.g., wetlands, saltpan, and puffy ground). These features are generally less developed or lacking at Palen Lake, indicating less groundwater discharge would be expected at Palen Lake.
- The available data suggest that groundwater discharge, if it is occurring at Palen Lake, is episodic or intermittent; whereas groundwater discharge at Franklin Lake Playa occurs throughout the year.
- Evapotranspiration rates at wet playas are temperature dependant, with maximum rates typically occurring during the summer months. Franklin Lake Playa occurs in Death Valley, where mean annual and summer high temperatures typically exceed those at Palen Lake.

The total area of potential groundwater discharge at Palen Lake is estimated to be approximately 2,000 acres, with salt pan occupying approximately 700 acres of this total. Based on a groundwater discharge rate that is approximately half that at Franklin Lake Playa occurring for three months every year, the total discharge rate would be approximately 0.175 feet of water per year. Over an area of 2,000 acres, this equates to approximately 350 AFY.

Cumulative Impacts to the Groundwater Budget

The forecast groundwater budget for the Chuckwalla Valley Groundwater Basin is presented in **Table 2.** The baseline year for the water budget (2009) includes the inflow and outflow elements of the water budget discussed in our response to Data Request Item 151. Forecast groundwater demand associated with existing groundwater uses, the Project and other planned or reasonably foreseeable projects in the basin are summarized through 2043, which is the end of the Project's 30-year operational life. The forecast water budget also includes other reasonably foreseeable changes to groundwater budget inflows and outflows. For each year, the total and cumulative water budgets are summarized. The water budget is summarized separately for the western and eastern Chuckwalla Valley Groundwater Basin, as well as for the entire basin. As discussed in greater detail in the *Draft Groundwater Resources Investigation, Genesis Solar Energy Project*, (WorleyParsons, 2009), hydrogeologic differences between the western and the eastern portions of the basin include the fact that the groundwater producing aquifers in the western portion of the basin are unconfined; whereas, the producing aquifers in the eastern part of the basin are confined and separated from the water table by several hundred feet of clay aquitards. In addition, the aquifers in the western portion of the basin are composed of materials with hydraulic conductivities that are approximately one half to one order of magnitude greater than average hydraulic conductivities reported for the eastern part of the basin (50 to 150 feet/day vs. 14 feet/day). Current and future pumping is also expected to be several times greater in the western than in the eastern portion of the basin. These differences indicate that the western portion of the basin may be expected to respond differently than the eastern portion of the basin during pumping. Thus, although they are part of the same groundwater basin, a more detailed analysis of these two portions of the basin is warranted. For the purposes of this analysis, we have divided the basin along the lines of the two sub-watersheds that drain internally to Palen and Ford Dry Lakes (the DWR's Palen and Ford Detailed Analysis Units, respectively).

The baseline groundwater budget includes a conservative estimate of agricultural pumping that is maintained for forecast years to allow for the possible expansion of mature date palm and citrus orchards east of Desert Center (Eagle Crest, 2009). Groundwater demand for the state prison complex in the eastern portion of the basin is forecast to decrease based on planning information from prison (Eagle Crest, 2009; Lanahan, 2009).

As a simplifying convention, baseline underflow between the western and eastern portions of the basin is not accounted in the groundwater budget; however, modeled changes in underflow from the western to the eastern portions of the basin that are induced by Project pumping are accounted for internally and cancel each other out. Underflow from the Orocopia and Pinto Valley Groundwater Basins is treated as inflow to the western portion of the Chuckwalla Valley Groundwater Basin, and underflow from the Chuckwalla Valley Groundwater Basin into the Palo Verde Mesa Groundwater Basin is treated as outflow from the western part of the basin. Treatment of underflow in this fashion means that the western and eastern portions of the basin are not handled completely separately in terms of their water budgets (i.e., baseline underflow from the western to the eastern portions of the basin are assumed to cancel each other out and are not accounted); however, including changes in underflow allows the affect of Project pumping on the water balance of the western part of the basin to be assessed.

As summarized in **Table 2**, the cumulative affect of the Project and other planned or reasonably foreseeable projects on the groundwater budget is increased groundwater demand primarily in the western Chuckwalla Valley Groundwater Basin. The proposed pumping for the Project represents an approximately 16 percent increase over the current groundwater demand in the basin and an approximately 6 to 14 percent increase of all future pumping in the basin. The existing groundwater demand in the eastern portion of the basin is less, and the project would represent an approximately 31 to 82 percent increase over current and foreseeable future pumping in that part of the basin. This would not result in a water budget deficit. Pumping for the Project would result in an increased additional outflow from the western portion of the basin of about 0 to 2 percent during the life of the Project.

The cumulative groundwater demand from all current and future sources results in a net annual and cumulative water budget deficit in the western portion of the basin while the eastern part of the basin remains in balance. The basin as a whole also remains approximately in balance, with a relatively small budget deficit shown for a 20-year period from 2016 to 2036. This small net deficit results primarily from pumping in the western sub-basin to fill the reservoirs associated with the Eagle Crest Pumped Storage project. For perspective, the calculated deficit is limited to less than half of the inflow for the basin during a single year, and is within the range of anticipated year to year variation in recharge from precipitation. A maximum net deficit of 7,400 acre feet in the basin as a whole would imply an average water level drop of less than 0.1 foot in the water producing aquifers across the area of the basin. A net deficit of 63,000 acre feet in the groundwater budget for the western part of the basin would imply an average water level decline of approximately 1.1 foot in that part of the basin (given an area of 279,000 acres and an unconfined storage coefficient of 0.2). Drawdown would be greater in the areas near the pumping centers and less in outlying areas.

The existence of drawdown or small imbalances in the basin water budget for a limited period of time does not necessarily imply the existence of adverse affects, significant impacts or overdraft conditions. The California DWR defines overdraft as the condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which the water supply conditions approximate average conditions (DWR, 2003). Overdraft can be characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years. A basin is considered subject to critical conditions of overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts (including increased extraction costs, costs of well deepening or replacement, land subsidence, water quality degradation, and environmental impacts). No time frame is specified in these definitions. Definition of the time frame is the responsibility of the local water managers, as is the definition of significant adverse impacts, which would be related to the local agency's management objectives (DWR, 2003). We propose that the projected water budget deficits would be considered significant if they produced basin-wide adverse affects related to drawdown. The potential for such affects is further discussed below.

Cumulative Impacts to Regional Groundwater Levels

Drawdown from multiple sources is considered additive, that is, the drawdown at any particular point is the sum of all drawdowns from surrounding pumping wells. The majority of the existing and future cumulative projects in the Chuckwalla Valley Groundwater Basin are located in the western Chuckwalla Valley, beyond the predicted drawdown cone resulting in the pumped aquifer form the Project as shown on **Figure 2** and **Figure 3**. In addition, historical hydrograph records suggest that extensive pumping near Desert Center in the early to mid-1980s did not result in significant drawdown in the eastern Chuckwalla Valley Groundwater Basin (WorleyParsons, 2009). As such, Project pumping is not anticipated significantly to an adverse cumulative affect to regional groundwater levels.

To further assess potential cumulative impacts, drawdown associated with future pumping was plotted on maps at the completion of project construction and at the end of the 30-year operating life of the project and cumulative drawdown contours were interpolated where the areas of drawdown influence from the various projects overlapped. In addition, cumulative drawdown associated with all current and future pumping at the end of the 30-year operating life was assessed in a similar fashion. The results of this analysis are presented in **Figures 4, 5** and **6**. It should be noted that these figures represent drawdown in the pumped aquifer, and not at the water table. In the eastern portion of the basin, the pumped aquifer is separated from the water table by several hundred feet of clay. Similar conditions have been identified by USGS during the drilling of test borings in Palen Lake (Simoni, 1981). As such, groundwater drawdown at the water table from pumping deeper water producing aquifers is expected to be much less in these areas.

Drawdown at the end of the construction is presented in **Figure 4** and incorporates the following data:

- Drawdown for the Eagle Crest Pumped Storage project was derived from the modeling results presented in the Eagle Crest EIS (Eagle Crest, 2009) for the end of the four-year reservoir filling period, which is projected to be completed in 2018. Construction for the Genesis Solar Energy

Project (and the other cumulative solar projects in the basin) is projected to be completed in 2013, the year before pumping for construction of the Eagle Crest project is scheduled to begin. Incorporating drawdown associated with construction of the Eagle Crest project in this figure therefore significantly overestimates drawdown that is expected in 2013, but is a reasonable approximation of drawdown in 2018, at the end of the period with the highest projected groundwater demand.

- Drawdown for the Palen Solar Power Project was derived from modeled drawdown presented in the AFC for that project (AECOM, 2009). Drawdown during construction was reportedly modeled using an extraction rate of 600 gpm, which is approximately twice the construction water demand projected for the project. As such, the extent of drawdown associated with this project may be overestimated. Drawdown predictions used in this analysis were based on the lower of two modeled transmissivities and storage coefficients, which appears reasonable for this portion of the basin.
- Drawdown predictions for the Chuckwalla Solar I and the First Solar Desert Sunlight projects were developed using an analytical spreadsheet model based on a derivation of the Theis equation. The model assumed a transmissivity of 6,300 square feet/day, a well depth of 500 feet, a storage coefficient of 0.05 and the pumping rates presented in **Table 1**. This is similar to the assumptions used by AECOM for modeling the impacts associated with the Palen Solar Power Project. For these projects, drawdown at the end of the construction was predicted to be less than 1 foot at distances greater than 100 feet from the pumping wells. The pumping well for the Chuckwalla Solar I project was assumed to be located in the center of that site, and the pumping well for the First Solar Desert Sunlight project was assumed to be located near the southeast corner of that site.
- Pumping associated with future transmission projects represents less than 0.05 percent of cumulative construction pumping and was not considered in the cumulative drawdown analysis.

Figure 4 shows that drawdown exceeding 5 feet in the pumped aquifer is predicted to extend across a broad area in the eastern Chuckwalla Valley Groundwater basin, and drawdown in the pumped aquifer is predicted to exceed 10 feet within an area approximately 3.5 miles in diameter centered in the proposed Eagle Crest well field north of Desert Center. These area of predicted drawdown in the pumped aquifer exceeding 5 feet associated with the Genesis Solar Energy Project is limited to the immediate proximity of the project pumping well. Significant drawdown at the water table at Palen Lake or in the eastern part of the basin is not anticipated. Drawdown data in the pumped aquifer for the Project presented in **Figures 2** indicates that the Project will make no measurable incremental contribution to drawdowns impacts associated with construction of the other planned or reasonably foreseeable projects in the western part of the basin.

Drawdown associated with planned and reasonably foreseeable projects at the end of the 30-year operating life of the Project is presented in **Figure 5** and incorporates the following data:

- Drawdown for the Eagle Crest Pumped Storage project was derived from the modeling results after 25 years of operation presented in the Eagle Crest EIS (Eagle Crest, 2009). This coincides with drawdown in 2043, at the end of the operating life of the proposed solar projects in the basin.

- Drawdown for the Palen Solar Power Project was derived from modeled drawdown presented in the AFC for that project (AECOM, 2009). Drawdown predictions used in this analysis were based on the lower of two modeled transmissivities and storage coefficients, which appears reasonable for this portion of the basin.
- Drawdown predictions for the Chuckwalla Solar I project was developed using an analytical spreadsheet model based on a derivation of the Theis equation. The model assumed a transmissivity of 6,300 square feet/day, a well depth of 500 feet, a storage coefficient of 0.05 and the pumping rates presented in **Table 1**. This is similar to the assumptions used by AECOM for modeling the impacts associated with the Palen Solar Power Project. For this projects, drawdown at the end of operation was predicted to be less than 1 foot at distances greater than 100 feet from the pumping well; however, a drawdown of 1 foot was assumed during contouring of cumulative drawdowns. The pumping well for the Chuckwalla Solar I project was assumed to be located in the center of that site.
- Pumping associated with operation of the First Solar Desert Sunlight project is projected to be very small; however, a drawdown of 1 foot was assumed for the area within about 1 mile of the assumed project well location in the southeast corner of the site for cumulative analysis purposes.
- Pumping associated with the First Solar Desert Sunlight and future transmission projects represents about 0.1 percent of cumulative pumping and was not considered in the cumulative drawdown analysis.

Figure 5 shows that drawdown in the pumped aquifer exceeding 5 feet is predicted to extend across an area in the eastern Chuckwalla Valley Groundwater basin centered in the proposed Eagle Crest well field north of Desert Center. Small additional areas of drawdown exceeding 5 feet are predicted to be located in the immediate vicinity of the Palen Solar Power Project and the Genesis Solar Energy Project. Significant drawdown at the water table at Palen Lake or in the eastern part of the basin is not anticipated. Drawdown data in the pumped aquifer for the Project presented in **Figures 3** indicates that the Project will make no measurable incremental contribution to drawdown impacts associated with operation of the other planned or reasonably foreseeable projects in the western part of the basin.

Drawdown associated with current planned and reasonably foreseeable projects at the end of the 30-year operating life of the Project is presented in **Figure 6**. This figure incorporates the data for the analysis described above. In addition, this analysis incorporates drawdown associated with existing groundwater pumping in the basin, and following additional data:

- Drawdown associated with existing pumping was derived from modeling conducted for the Eagle Crest Pumped Storage project after a period of 50 years as presented in the Eagle Crest EIS (Eagle Crest, 2009). The predicted drawdown associated with existing pumping thus represents a time period 25 years beyond the time that is being simulated. As such the modeled drawdown is much greater than what would be expected at this time.
- Drawdown for the Chuckwalla Valley and Ironwood State Prisons is taken from observed drawdown in wells in the area which indicates that drawdown exceeding 5 feet has occurred to distances within approximately 1.5 miles of the prison wells. This represents cumulative drawdown associated with past operation of the prison wells. Drawdown at the prisons appears to have

stabilized, and groundwater extraction at the prisons is projected to decrease, so additional drawdown beyond this amount is not anticipated.

Because of the overly conservative nature of the drawdown assumptions incorporated into **Figure 6**, it should not be considered to constitute a drawdown prediction, but applied as an a worst case analytical tool to evaluate whether significant cumulative drawdown may reasonably be expected in the basin. **Figure 6** shows drawdown exceeding 5 feet may extend across a broad area in the western Chuckwalla Valley Groundwater basin and into the eastern part of the basin near the Project site and the state prison complex. A small area with drawdown exceeding 10 feet is approximately centered within the proposed Eagle Crest well field north of Desert Center. Significant drawdown at the water table at Palen Lake or in the eastern part of the basin is not anticipated for the reasons mentioned previously. Drawdown data for the Project presented in **Figures 3** indicates that the Project will make no measurable incremental contribution to drawdown impacts in the western part of the basin, but will incrementally contribute to drawdown in the eastern part of the basin.

Conclusions

- Pumping for the Project will contribute incrementally to the groundwater demand on the basin, increasing groundwater demand by 16 percent over current conditions and 6 to 14 percent over future conditions. Pumping for the Project would result in an increased additional outflow from the western portion of the basin of about 0 to 2 percent during the life of the Project.

- Forecast water budgets including existing and cumulative pumping are approximately in balance for the basin as a whole (a relatively small deficit is shown for a period of time) and for the eastern portion of the basin. A deficit of 63,000 acre feet is calculated for the western portion of the basin by the end of the Project, due almost exclusively to current and future pumping in that part of the basin. While a deficit implies that groundwater will be taken out of storage for a period of time, the existence of drawdown or imbalances in the basin water budget for a limited period of time does not necessarily imply the existence of adverse affects, significant impacts or overdraft conditions. A basin is considered subject to critical conditions of overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts (including increased extraction costs, costs of well deepening or replacement, land subsidence, water quality degradation, and environmental impacts). No time frame is specified in these definitions. Definition of the time frame is the responsibility of the local water managers, as is the definition of significant adverse impacts, which would be related to the local agency's management objectives (DWR, 2003).

- Cumulative drawdown for planned and reasonably foreseeable projects in the basin is presented in **Figures 4** and **5**. Drawdown at the water table is expected to be much less, due to vertical impedance in groundwater flow. Drawdown from future projects will occur primarily in the western portion of the basin, and the Genesis Solar Energy Project will not contribute measurably to drawdown in that area.

- **Figure 6** represents a worst case analysis of cumulative drawdown in the pumped aquifer due to existing and planned future pumping in the basin. Because the analysis includes drawdown from existing pumping for a period that extends 25 years beyond the design life of the Project, it should be considered a worst case analysis useful for evaluating whether adverse drawdown-related may be possible, but should not be taken as a prediction of the actual magnitude of the drawdown, which is expected to be less. Under this analysis, the area of drawdown exceeding 5 feet in the pumped aquifer encompasses a large portion of the basin; however, importantly, water levels are not anticipated to fall below Colorado River Accounting Surface. Therefore, no cumulative impacts to the Colorado River or triggering of potential future requirements for water entitlements are anticipated.

- As shown on **Figure 6**, the project will contribute incrementally to drawdown of the pumped aquifer in the eastern part of the basin, resulting in a larger area that may be drawn down for 5 feet or more, the threshold of significance for well interference drawdown proposed for the project and adopted by the CEC for the Blythe Energy Project I and II. The amount of cumulative drawdown is not reasonably anticipated to cause any existing wells to go dry or to render them unusable; however, such drawdown could cause an incremental increase in well pumping and maintenance costs. The nature of these impacts is discussed in detail in the draft Groundwater Resources Investigation Report (WorleyParsons, 2009). Well interference impacts, to the extent they occur, can be readily mitigated using a well interference mitigation program similar to that adopted by CEC for Blythe Energy Project I and II.

- Drawdown at the water table at Palen Lake and in the western part of the basin will be much less due to the presence of significant clay aquitards, and is expected to be less than significant in these areas, that is, it is not expected to result in adverse affects to surface water or biological resources.

- The Project would not significantly contribute to drawdown-related impacts in the western part of the basin.

Please let us know if you have any questions or require additional information.

Sincerely,
WorleyParsons

Michael Tietze
Infrastructure & Environment Location Manager

REGISTERED GEOLOGIST
MIKE TIETZE
No. EG1803
Exp.
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Attachments: Tables 1 and 2; Figures 1 through 6

References

AECOM, 2009, Palen Solar Power Project Application for Certification. August 24.

Allen, B.D., and Shafike, N.G., 2003, Groundwater Loss from Playa Lakes in the Estancia Basin, New Mexico: New Mexico Water Resources Research Institute, Symposium on Hydrologic Modeling, Socorro, 12 August.

Bedinger, et al, 1989, Map Showing Relative Ground-Water Travel Times and Flow Paths at the Water Table and Natural Discharge Areas, Sonoran Region, California: USGS Professional Paper 1370E, Plate 5.

BLM, 2009a, First in Line Solar Applications: http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pa/energy/solar.Par.45875.File.dat/Renewable_Solar_12-09.pdf. December 21.

BLM, 2009b, Personal communication between Tricia Bernhardt of Tetratech EC and Holly Roberts of BLM on December 29.

California Department of Water Resources (DWR), 1963, Data on water wells and springs in the Chuckwalla Valley area, Riverside County, California: California Dept. Water Resources Bulletin 91-7.

California Department of Water Resources (DWR), 2003, California's Groundwater: California Dept. Water Resources Bulletin 118 – Update 2003.

Czarnecki, John B., 1997, Geohydrology and Evapotranspiration at Franklin Lake playa, Inyo County, California: USGS Water Supply Paper 2377.

California Energy Commission (CEC), 2009, Cumulative Projects, I-10 Corridor: Electronic file received via email December 15, 2009.

Eagle Crest Energy Company (Eagle Crest), 2009, Eagle Mountain Pumped Storage Project, No. 13123, Exhibit E: Applicant Prepared Environmental Impact Statement: Submitted to Federal Energy Regulatory Commission, June 22.

Lanahan, 2009, Personal communication with Mr. Lee Lanahan, Plant Manager, Chuckwalla Valley and Ironwood State Prison.

Simoni, T.R., 1981, Geophysical and Lithologic Data from Test Wells on Palen Dry Lake, Riverside County, California: USGS Open Filer Report 81-014.

Steinemann, A.C. 1989. Evaluation of Nonpotable Ground Water in the Desert Area of Southeastern California for Powerplant Cooling. U.S. Geological Survey Water-Supply Paper 2343. 44 pages.

Tyler, 2005, The Measurement and Use of Playa/Saline Lake Evapotranspiration to Constrain Basin Recharge: Geological Society of America Salt Lake City Annual Meeting, October 16-19, 2005, Session No. 64: The Wasatch Range – Great Salt Lake Hydroclimatic System.

WorleyParsons, 2009, Draft Groundwater Resources Investigation, Genesis Solar Energy Project, Riverside County, California. November 30.

Table 1 - Groundwater Demand from Cumulative Projects

	Annual Water Demand (AFY)		Cumulative Future Water Demand for Planned and Reasonably Forseeable Projects											
Project	**Construction**	**Operation**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019 to 2043**	**Source**	**Remarks**
Projects in Western Chuckwalla Valley Groundwater Basin														
Chuckwalla Solar I (CACA048808)	20	40	0	20	20	20	40	40	40	40	40	40	BLM, 2009a; CEC, 2009	SF-299 Filed. NOI issued. Construction 2011 to 2013
Palen Solar Power Project (CACA048810)	436	300	0	426	426	436	300	300	300	300	300	300	AECOM, 2009	SF-299 Filed. NOI issued. AFC Filed. Construction 2011 to 2013
enXco Eagle Mountain Solel (CACA049491)	--	--	--	--	--	--	--	--	--	--	--	--	BLM, 2009a; CEC, 2009	SF-299 Filed, but neither CEQA or NEPA process has been initiated.
enXco Desert Lili (CACA049492)	--	--	--	--	--	--	--	--	--	--	--	--	BLM, 2009a; CEC, 2009	SF-299 Filed, but neither CEQA or NEPA process has been initiated. Not on BLM's list of active projects as of Sep-09.
Solel Desert Lili (CACA049494)	--	--	--	--	--	--	--	--	--	--	--	--	BLM, 2009a and 2009b	Project has been withdrawn
First Solar Desert Sunlight (CACA048649)	27	3.8		27	27	27	3.8	3.8	3.8	3.8	3.8	3.8	CEC, 2009; BLM, 2009b	SF-299 Filed. NOI imminent. 3 year construction period. Assume 2011 construction start.
enXco (CACA049489)	--	--	--	--	--	--	--	--	--	--	--	--	BLM, 2009a	SF-299 Filed, but neither CEQA or NEPA process has been initiated.
Solel (CACA049493)	--	--	--	--	--	--	--	--	--	--	--	--	BLM, 2009a and 2009b	Project has been withdrawn
Devers-Palo Verde II Transmission	2	--	0	2	2	2	0	0	0	0	0	0	CEC, 2009	Assumed 2 AFY in western basin from 2011 to 2013
Blythe Energy Transmission Line	2	--	2	2	0	0	0	0	0	0	0	0	CEC, 2009	Under construction. Assume 2 AFY in western basin from 2010 to 2011
Desert SW Transmission	0.3	--	0	0	0	0.3	0.3	0	0	0	0	0	CEC, 2009	Assume 0.3 AFY in western basin from 2013 to 2014
Eagle Crest Pumped Storage Startup	2,380 to 8,066	1,628	0	0	0	0	8,066	8,066	8,066	8,066	2,380	1,628	Eagle Crest, 2009	Groundwater demand during reservoir filling 8,066 AFY 2014 to 2017; 2,380 AFY 2018
Total Sub-Basin Groundwater Demand			**2.0**	**477.0**	**475.0**	**485.3**	**8,410.1**	**8,409.8**	**8,409.8**	**8,409.8**	**2,723.8**	**1,971.8**		
Projects in Eastern Chuckwalla Valley Groundwater Basin														
Genesis Solar Energy Project	616 to 1,368	1,644		1,368	616	616	1,644	1,644	1,644	1,644	1,644	1,644		
enXco Mule Mountain Solel (CACA049488)	--	--	--	--	--	--	--	--	--	--	--	--	CEC, 2009; BLM, 2009b	SF-299 Filed, but neither CEQA or NEPA process has been initiated.
Bullfrog Mule Mountain (CACA049097)	--	--	--	--	--	--	--	--	--	--	--	--	CEC, 2009; BLM, 2009b	Formerly Altera; SF-299 Filed, but neither CEQA or NEPA process has been initiated.
Devers-Palo Verde II Transmission	2	--	0	2	2	2	0	0	0	0	0	0	CEC, 2009	Assumed 2 AFY in western basin from 2011 to 2013
Blythe Energy Transmission Line	2	--	2	2	0	0	0	0	0	0	0	0	CEC, 2009	Under construction. Assume 2 AFY in western basin from 2010 to 2011
Desert SW Transmission	0.3	--	0	0	0	0.3	0.3	0	0	0	0	0	CEC, 2009	Assume 0.3 AFY in western basin from 2013 to 2014
Total Sub-Basin Groundwater Demand			**2.0**	**1,372.0**	**618.0**	**618.3**	**1,644.3**	**1,644.0**	**1,644.0**	**1,644.0**	**1,644.0**	**1,644.0**		

Notes:

-- No data. Project does not meet criteria for consideration in cumulative impact analysis for groundwater resources.

BLM, 2009a, First in Line Solar Applications: http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pa/energy/solar.Par.45875.File.dat/Renewable_Solar_12-09.pdf. December 21.

BLM, 2009b, Personal communication between Tricia Bernhardt of Tetratech EC and Holly Roberts of BLM on December 29.

CEC, 2009, Cumulative Projects, I-10 Corridor: Electronic file received via email December 15, 2009.

Eagle Crest, 2009, Eagle Mountain Pumped Storage Project No. 13123 Final License Application Technical Appendices for Exhibit E, Applicant Prepared Environmental Impact Statement, Volume 3 of 6, appendix C - Technical Memoranda, Groundwater Pumping Technical Memorandum. June 22.

Table 2: Cumulative Water Budget Forecast

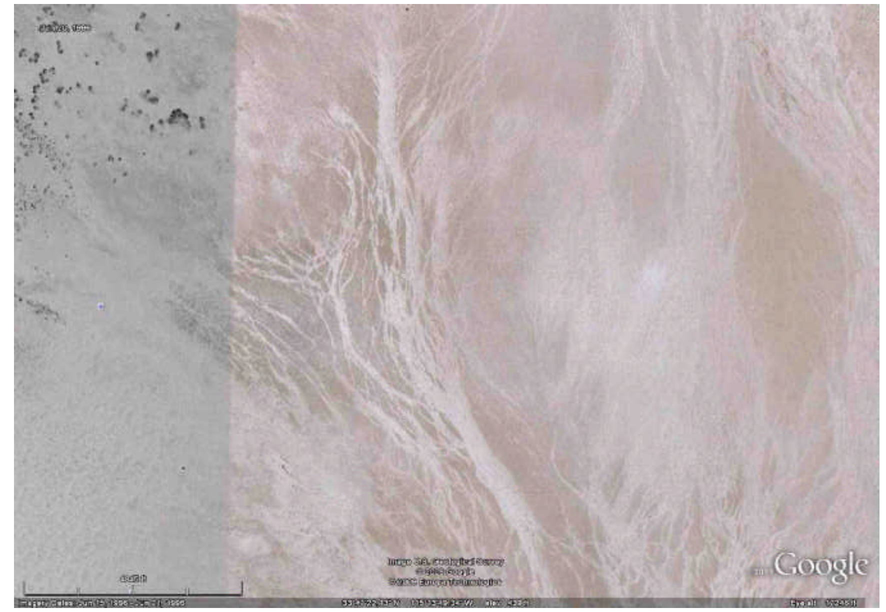
Year	Western Chuckwalla Valley Groundwater Basin [1]											Eastern Chuckwalla Groundwater Basin [2]										Chuckwalla Valley Groundwater Basin Water Budget	
	Inflow (AFY)				Outflow (AFY)					Sub-Basin Water Budget (AFY)		Inflow				Outflow				Sub-Basin Water Budget			
Year	Subsurface Inflow [3]	Recharge from Precipitation [3]	Irrigation Return Flow [3]	Wastewater Return Flow [3]	Total Current Pumping [3]	Total Future Construction Pumping	Total Future Operations Pumping	Palen Lake Evapo-transpiration	Increased Outflow to Eastern Basin	Annual Water Budget	Cumulative Water Budget	Recharge from Precipitation [3]	Irrigation Return Flow [3]	Wastewater Return Flow [3]	Increased Inflow from Western Basin	Outflow to PVMB	Total Current Pumping [3]	Total Future Construction Pumping	Total Future Operations Pumping	Annual Water Budget	Cumulative Water Budget	Basin Annual Water Budget	Basin Cumulative Water Budget
2009	3,500	4,680	750	36	7,868	0	0	350	0	**748**	**748**	4,760	50	795	0	400	2,607	--	--	**2,598**	**2,598**	**3,346**	**3,346**
2010	3,500	4,680	750	36	7,866	2	0	350	0	**748**	**1,496**	4,760	50	795	0	400	2005 [4]	2	0	**5,203**	**7,801**	**5,951**	**9,297**
2011	3,500	4,680	750	36	7,866	477	0	350	0	**273**	**1,769**	4,760	50	795	0	400	2,005	1372	0	**1,828**	**9,629**	**2,101**	**11,398**
2012	3,500	4,680	750	36	7,866	475	0	350	0	**275**	**2,044**	4,760	50	795	0	399	2,005	618	0	**2,583**	**12,212**	**2,858**	**14,256**
2013	3,500	4,680	750	36	7,866	485.3	0	350	0.5	**264**	**2,308**	4,760	50	795	0.5	388	2,005	618.3	0	**2,594**	**14,806**	**2,858**	**17,114**
2014	3,500	4,680	750	36	7,866	8,066.30	344	350	2.5	**-7,663**	**-5,354**	4,760	50	795	2.5	373	2,005	0.3	1,644	**1,585**	**16,391**	**-6,077**	**11,037**
2015	3,500	4,680	750	36	7,866	8,066	344	350	5	**-7,665**	**-13,019**	4,760	50	795	5	360	2,005	0	1,644	**1,601**	**17,992**	**-6,064**	**4,973**
2016	3,500	4,680	750	36	7,866	8,066	344	350	7.5	**-7,667**	**-20,687**	4,760	50	795	7.5	347	2,005	0	1,644	**1,617**	**19,609**	**-6,051**	**-1,078**
2017	3,500	4,680	750	36	7,866	8,066	344	350	10	**-7,670**	**-28,356**	4,760	50	795	10	334.5	2,005	0	1,644	**1,632**	**21,240**	**-6,038**	**-7,116**
2018	3,500	4,680	750	36	7,866	2,380	344	350	12.5	**-1,986**	**-30,343**	4,760	50	795	12.5	322	2,005	0	1,644	**1,647**	**22,887**	**-340**	**-7,456**
2019	3,500	4,680	750	36	7,866	0	1,972	350	15.5	**-1,237**	**-31,580**	4,760	50	795	15.5	308	2,005	0	1,644	**1,664**	**24,550**	**426**	**-7,029**
2020	3,500	4,680	750	36	7,866	0	1,972	350	19	**-1,241**	**-32,821**	4,760	50	795	19	295	2,005	0	1,644	**1,680**	**26,230**	**439**	**-6,590**
2021	3,500	4,680	750	36	7,866	0	1,972	350	24	**-1,246**	**-34,067**	4,760	50	795	24	281.5	2,005	0	1,644	**1,699**	**27,929**	**453**	**-6,138**
2022	3,500	4,680	750	36	7,866	0	1,972	350	28	**-1,250**	**-35,316**	4,760	50	795	28	269	2,005	0	1,644	**1,715**	**29,644**	**465**	**-5,672**
2023	3,500	4,680	750	36	7,866	0	1,972	350	33.5	**-1,255**	**-36,572**	4,760	50	795	33.5	256.5	2,005	0	1,644	**1,733**	**31,377**	**478**	**-5,195**
2024	3,500	4,680	750	36	7,866	0	1,972	350	39	**-1,261**	**-37,832**	4,760	50	795	39	245	2,005	0	1,644	**1,750**	**33,127**	**489**	**-4,706**
2025	3,500	4,680	750	36	7,866	0	1,972	350	44.5	**-1,266**	**-39,099**	4,760	50	795	44.5	233	2,005	0	1,644	**1,768**	**34,894**	**501**	**-4,204**
2026	3,500	4,680	750	36	7,866	0	1,972	350	50	**-1,272**	**-40,371**	4,760	50	795	50	221	2,005	0	1,644	**1,785**	**36,679**	**513**	**-3,691**
2027	3,500	4,680	750	36	7,866	0	1,972	350	56	**-1,278**	**-41,648**	4,760	50	795	56	210	2,005	0	1,644	**1,802**	**38,481**	**524**	**-3,167**
2028	3,500	4,680	750	36	7,866	0	1,972	350	63	**-1,285**	**-42,933**	4,760	50	795	63	199.5	2,005	0	1,644	**1,820**	**40,301**	**535**	**-2,632**
2029	3,500	4,680	750	36	7,866	0	1,972	350	70	**-1,292**	**-44,225**	4,760	50	795	70	190	2,005	0	1,644	**1,836**	**42,137**	**544**	**-2,088**
2030	3,500	4,680	750	36	7,866	0	1,972	350	77.5	**-1,299**	**-45,524**	4,760	50	795	77.5	180	2,005	0	1,644	**1,854**	**43,990**	**554**	**-1,534**
2031	3,500	4,680	750	36	7,866	0	1,972	350	85	**-1,307**	**-46,831**	4,760	50	795	85	170	2,005	0	1,644	**1,871**	**45,861**	**564**	**-970**
2032	3,500	4,680	750	36	7,866	0	1,972	350	93.5	**-1,315**	**-48,146**	4,760	50	795	93.5	160	2,005	0	1,644	**1,890**	**47,751**	**574**	**-395**
2033	3,500	4,680	750	36	7,866	0	1,972	350	102	**-1,324**	**-49,470**	4,760	50	795	102	150	2,005	0	1,644	**1,908**	**49,659**	**584**	**189**
2034	3,500	4,680	750	36	7,866	0	1,972	350	110.5	**-1,332**	**-50,802**	4,760	50	795	110.5	140	2,005	0	1,644	**1,927**	**51,585**	**594**	**783**
2035	3,500	4,680	750	36	7,866	0	1,972	350	121.5	**-1,343**	**-52,146**	4,760	50	795	121.5	131	2,005	0	1,644	**1,947**	**53,532**	**603**	**1,386**
2036	3,500	4,680	750	36	7,866	0	1,972	350	131.5	**-1,353**	**-53,499**	4,760	50	795	131.5	122	2,005	0	1,644	**1,966**	**55,497**	**612**	**1,998**
2037	3,500	4,680	750	36	7,866	0	1,972	350	141.5	**-1,363**	**-54,862**	4,760	50	795	141.5	113	2,005	0	1,644	**1,985**	**57,482**	**621**	**2,620**
2038	3,500	4,680	750	36	7,866	0	1,972	350	151.5	**-1,373**	**-56,236**	4,760	50	795	151.5	106	2,005	0	1,644	**2,002**	**59,483**	**628**	**3,248**
2039	3,500	4,680	750	36	7,866	0	1,972	350	162	**-1,384**	**-57,619**	4,760	50	795	162	98	2,005	0	1,644	**2,020**	**61,503**	**636**	**3,884**
2040	3,500	4,680	750	36	7,866	0	1,972	350	172.5	**-1,394**	**-59,014**	4,760	50	795	172.5	90	2,005	0	1,644	**2,039**	**63,542**	**644**	**4,528**
2041	3,500	4,680	750	36	7,866	0	1,972	350	184.5	**-1,406**	**-60,420**	4,760	50	795	184.5	83	2,005	0	1,644	**2,058**	**65,599**	**651**	**5,179**
2042	3,500	4,680	750	36	7,866	0	1,972	350	196	**-1,418**	**-61,838**	4,760	50	795	196	77	2,005	0	1,644	**2,075**	**67,674**	**657**	**5,837**
2043	3,500	4,680	750	36	7,866	0	1,972	350	209	**-1,431**	**-63,269**	4,760	50	795	209	71	2,005	0	1,644	**2,094**	**69,768**	**663**	**6,500**

Notes:

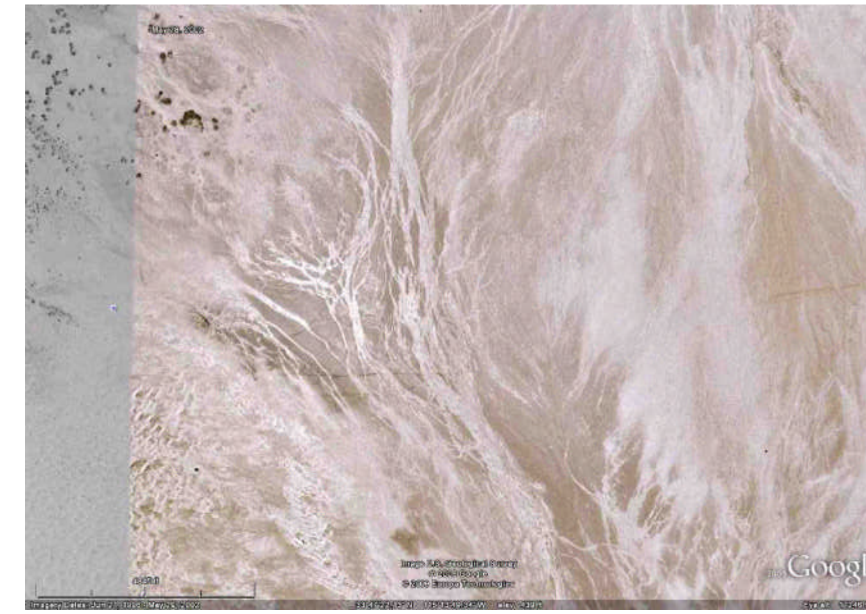
1. Western Chuckwalla Valley Groundwater Basin boundaries assumed to coincide with DWR's Palen Detailed Analysis Unit
2. Eastern Chuckwalla Valley Groundwater Basin boundaries assumed to coincide with DWR's Ford Detailed Analysis Unit
3. For details, see Response to Data Request Item 151, submitted to CEC December 15, 2009.
4. Reflects decreased prison water demand starting in 2010 due to water conservation and population reduction (Eagle Crest, 2009; Lanahan, 2009).

OVERVIEW MAP

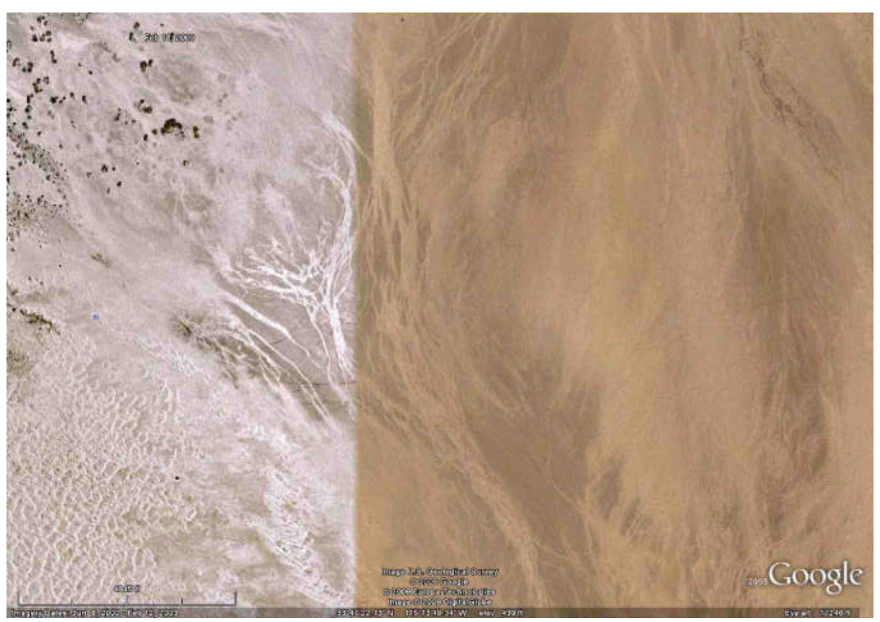
0 5
APPROXIMATE SCALE IN MILES



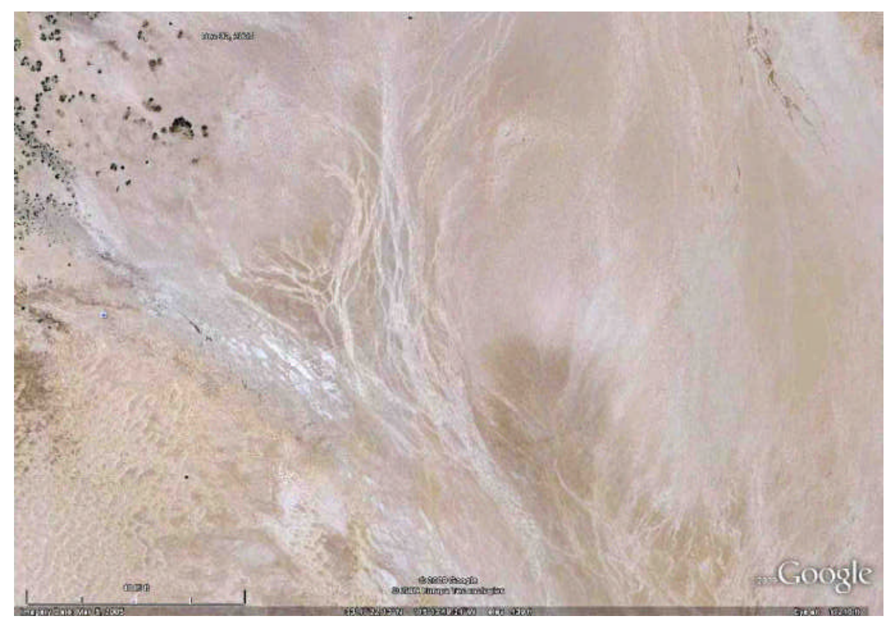
JUNE 15, 1996



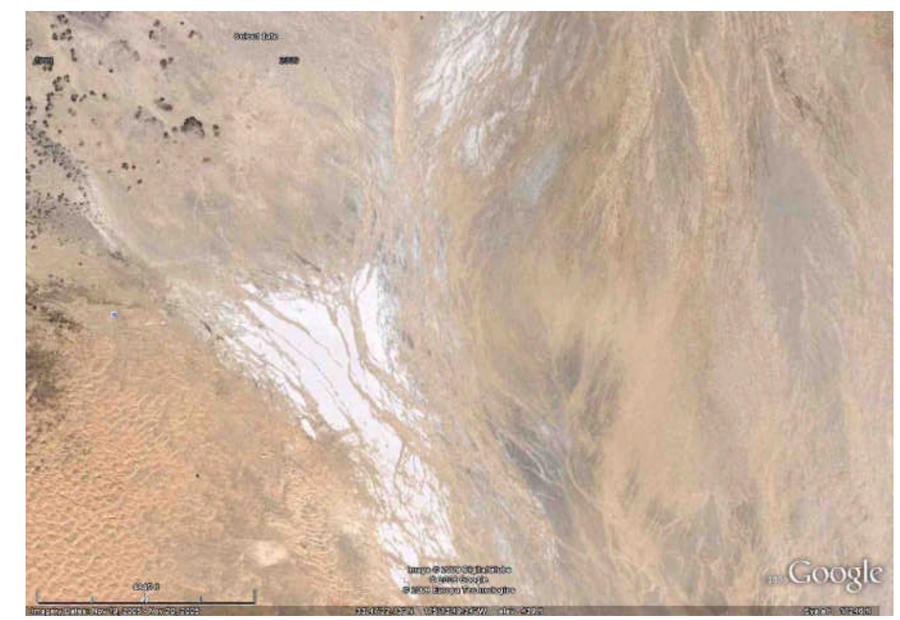
JUNE 21, 1996 - MAY 29, 2002



JUNE 8, 2002 - FEBRUARY 12, 2003



MARCH 5, 2005



NOVEMBER 19, 2005 - NOVEMBER 20, 2005

N

0 1
APPROXIMATE SCALE IN MILES

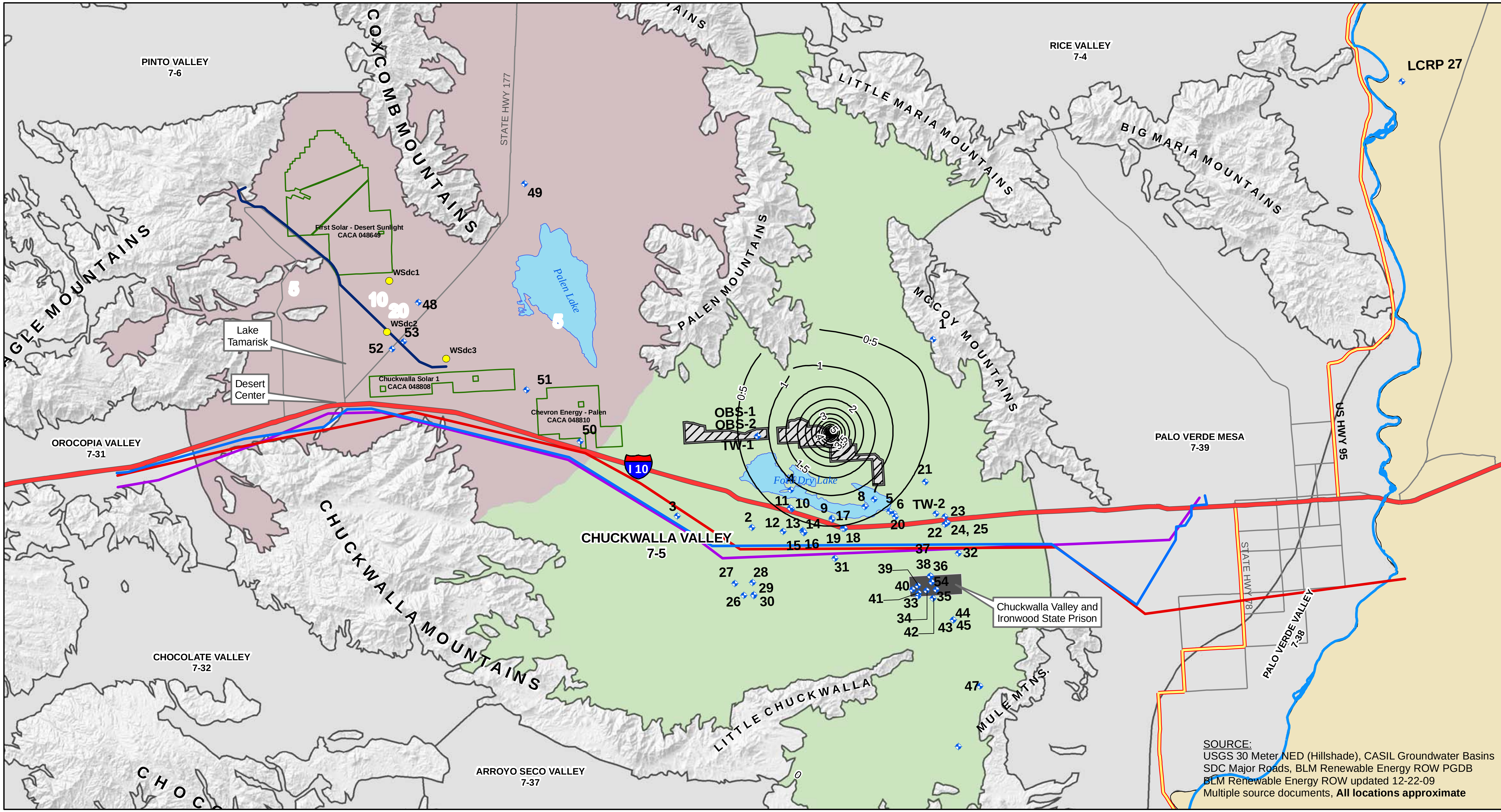
GENESIS SOLAR LLC.
PROJECT NO. 52011206

WorleyParsons
resources & energy

HISTORICAL AERIAL IMAGERY OF PALEN LAKE SALTPAN AREA

DRAWN BY:	EDITED BY:	DATE:
RF	RF	12/2009
APPROVED: MT		1

12/30/2009 6:39PM Historical Imagery of Palen Lake Saltpan Area.dwg



- Eagle Crest Proposed WS Well
- Existing Wells
- Eagle Crest Pumped Storage Project Supply Pipeline
- Blythe Energy Transmissin Line
- Desert Southwest Transmission Project
- Devers Palo Verde No. 2 Transmission Project
- Layer 12 Drawdown after 3 years
- Proposed Solar Project Sites
- PROJECT SITE
- Eastern Chuckwalla Valley Groundwater Basin
- Western Chuckwalla Valley Groundwater Basin

N S W E

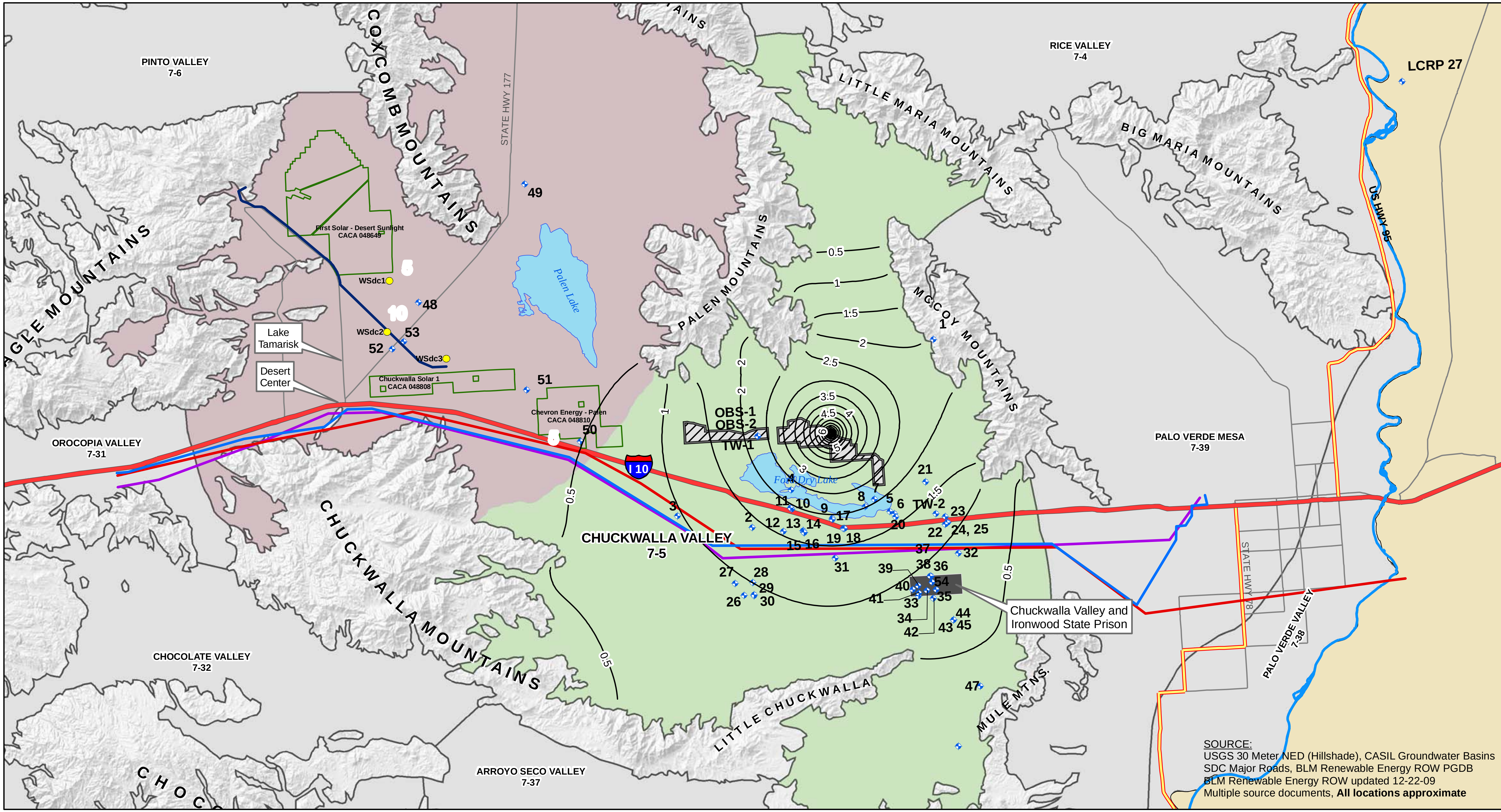
0 7.5 Miles

GENESIS SOLAR, LLC

WorleyParsons
resources & energy

GENESIS SOLAR ENERGY PROJECT DRAWDOWN IN PUMPING ZONE AT END OF CONSTRUCTION

SWL	MT	12/2009
52004617		2



- Eagle Crest Proposed WS Well
- Existing Wells
- Blythe Energy Transmission Line
- Desert Southwest Transmission Project
- Devers Palo Verde No. 2 Transmission Project
- Eagle Crest Pumped Storage Project Supply Pipeline
- Layer 12 Drawdown after 33 Years
- Project Site
- Proposed Solar Project Sites
- Eastern Chuckwalla Valley Groundwater Basin
- Western Chuckwalla Valley Groundwater Basin

N / W / E / S

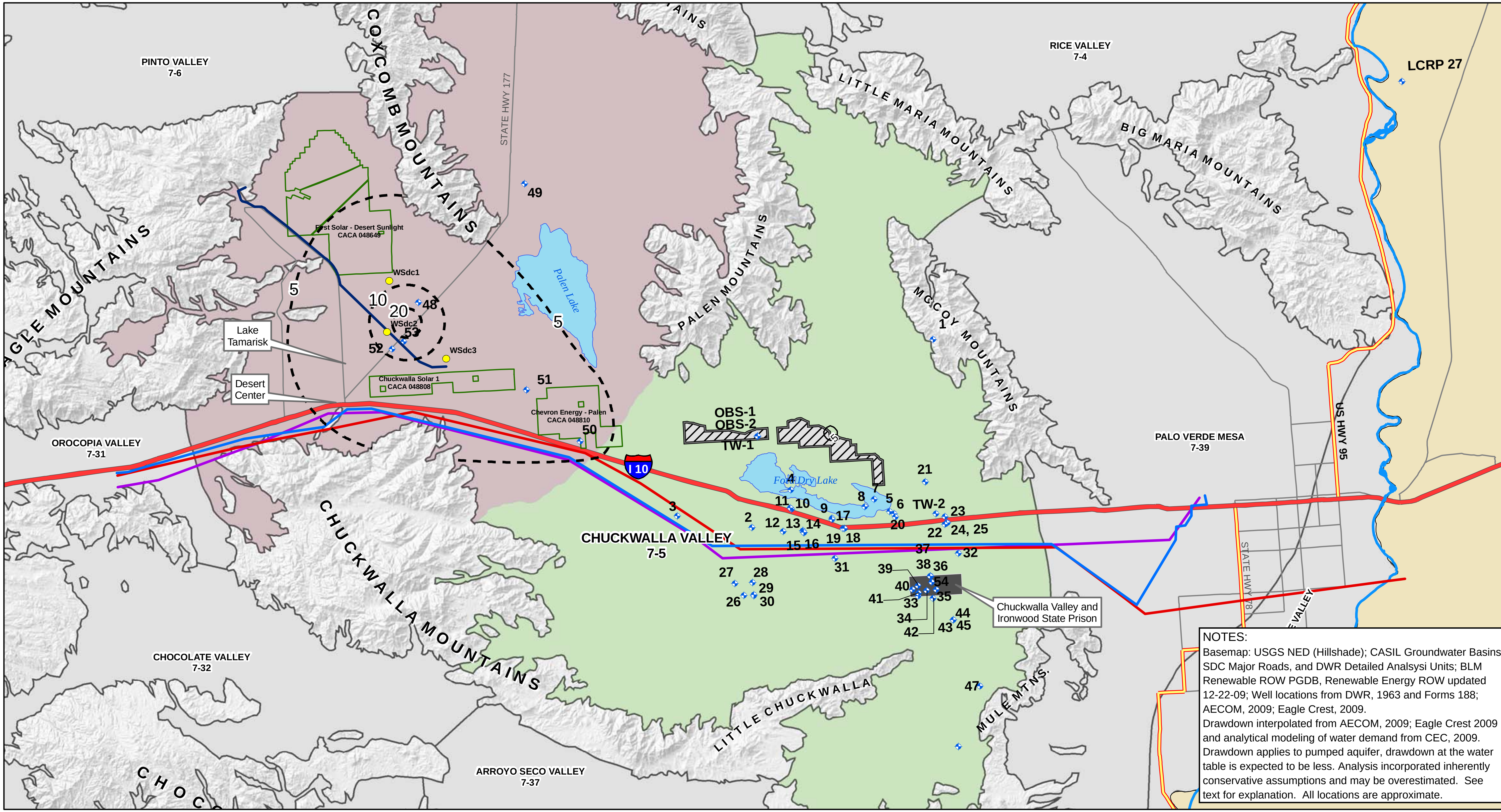
0 — 7.5 Miles

GENESIS SOLAR, LLC

WorleyParsons
resources & energy

GENESIS SOLAR ENERGY PROJECT DRAWDOWN IN PUMPING ZONE AT END OF OPERATION

SWL	MT	12/2009
52004617		3



- Eagle Crest Proposed WS Well
- Existing Wells
- Eagle Crest Pumped Storage Project Supply Pipeline
- Blythe Energy Transmissin Line
- Desert Southwest Transmission Project
- Devers Palo Verde No. 2 Transmission Project
- Interpolated Line of Equal Groundwater Drawdown in the Pumping Zone
- Layer 12 Drawdown after 3 years
- Proposed Solar Project Sites
- PROJECT SITE
- Eastern Chuckwalla Valley Groundwater Basin
- Western Chuckwalla Valley Groundwater Basin

N W E S

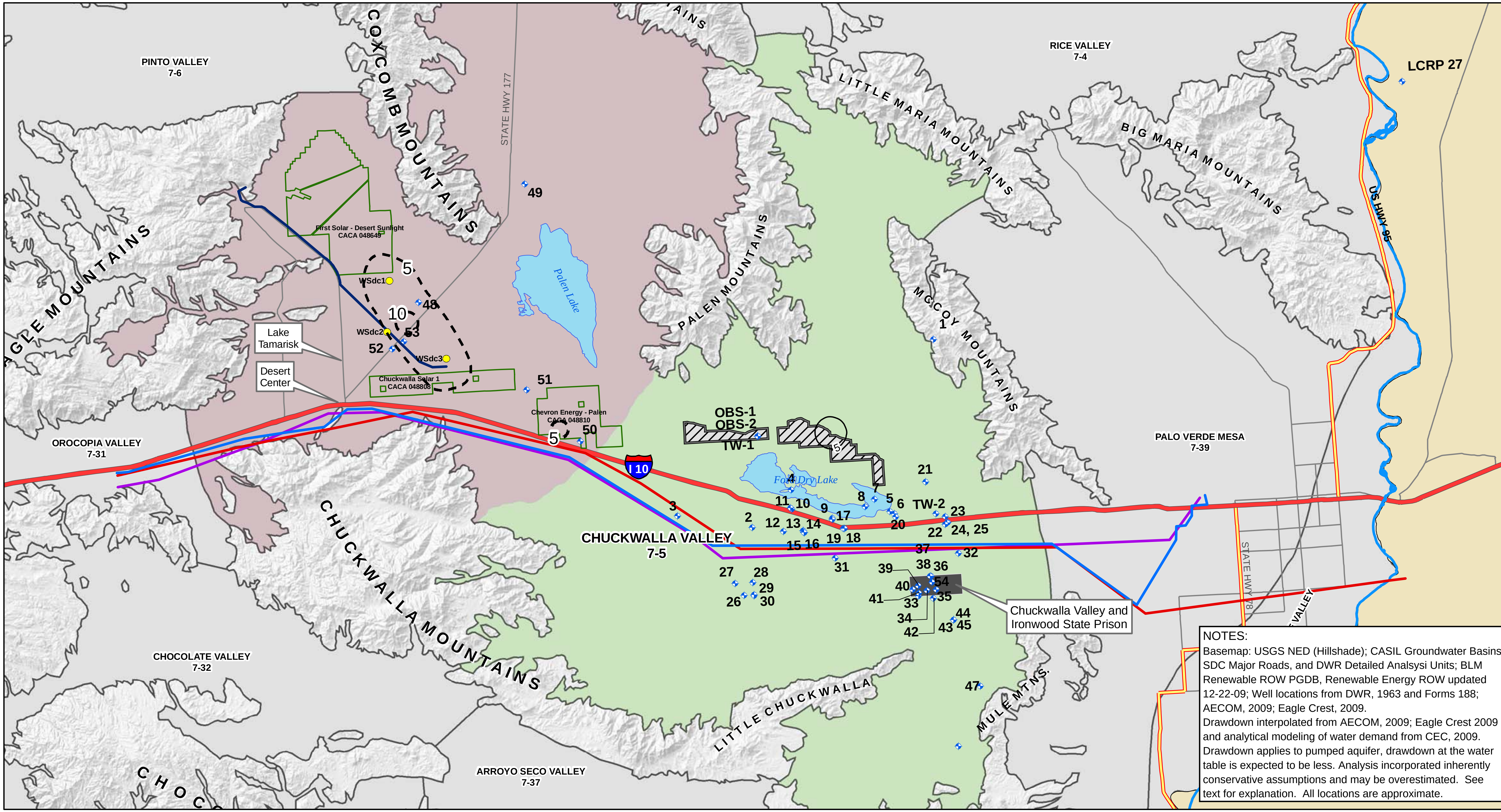
0 7.5 Miles

GENESIS SOLAR, LLC

WorleyParsons resources & energy

CUMULATIVE DRAWDOWN IN PUMPED AQUIFER FROM PLANNED AND REASONABLY FORESEEABLE PROJECTS AT END OF PROJECT CONSTRUCTION

SWL	MT	12/2009
52004617		4



- Eagle Crest Proposed WS Well
- Existing Wells
- Blythe Energy Transmission Line
- Desert Southwest Transmission Project
- Devers Palo Verde No. 2 Transmission Project
- Eagle Crest Pumped Storage Project Supply Pipeline
- Interpolated Line of Equal Groundwater Drawdown in the Pumping Zone
- Layer 12 Drawdown after 33 Years
- Project Site
- Proposed Solar Project Sites
- Eastern Chuckwalla Valley Groundwater Basin
- Western Chuckwalla Valley Groundwater Basin

N S W E

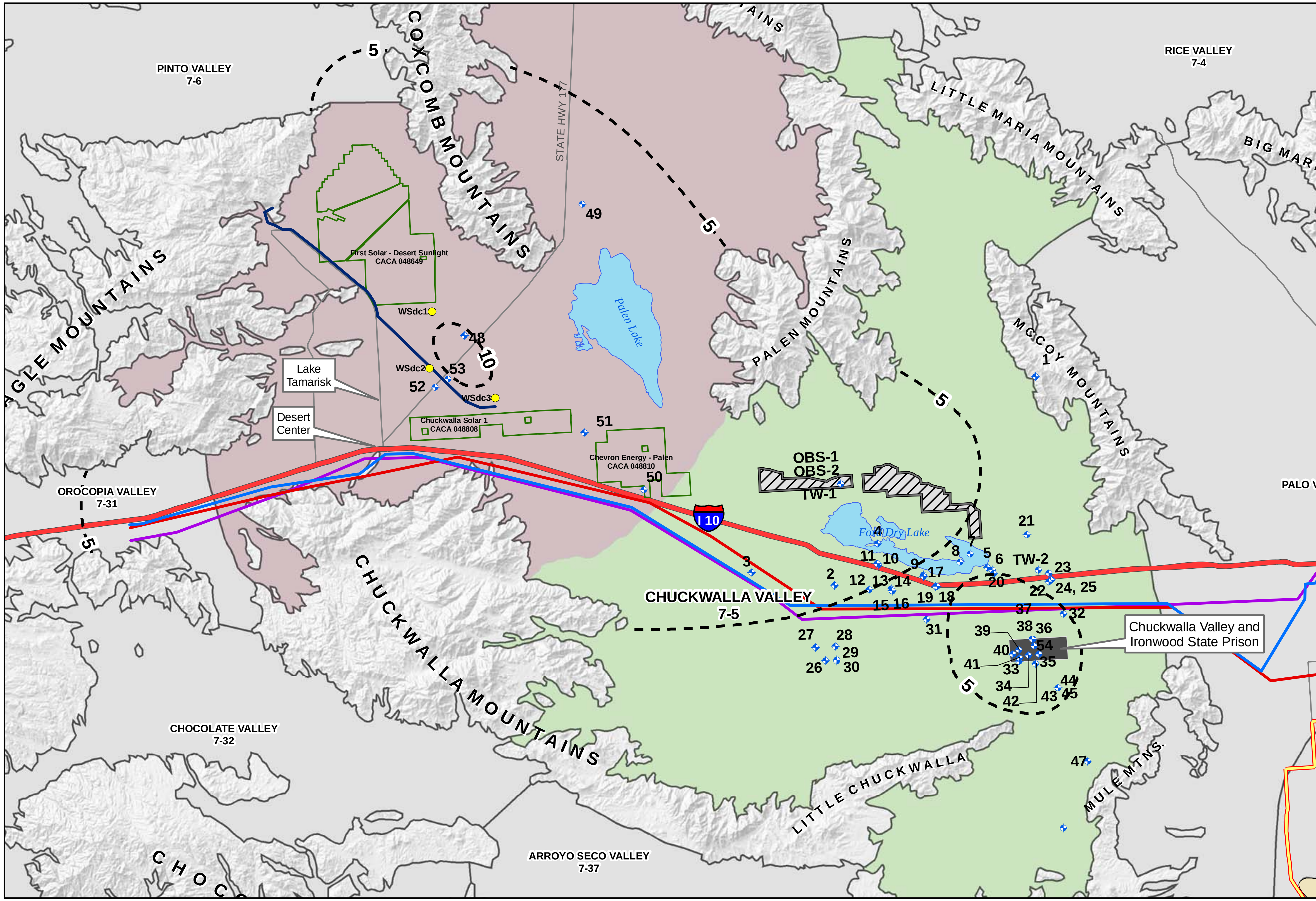
0 7.5 Miles

GENESIS SOLAR, LLC

WorleyParsons resources & energy

CUMULATIVE DRAWDOWN IN PUMPED AQUIFER FROM PLANNED AND REASONABLY FORESEEABLE PROJECTS AT END OF PROJECT OPERATION

SWL	MT	12/2009
52004617		5



NOTES:

Basemap: USGS NED (Hillshade); CASIL Groundwater Basins, SDC Major Roads, and DWR Detailed Analsysi Units; BLM Renewable ROW PGDB, Renewable Energy ROW updated 12-22-09; Well locations from DWR, 1963 and Forms 188; AECOM, 2009; Eagle Crest, 2009.

Drawdown interpolated from AECOM, 2009; Eagle Crest 2009; analytical modeling of water demand from CEC, 2009; EA, 1990; modeled drawdown for the Genesis Solar Energy Project and NWIS water level data. Drawdown applies to pumped aquifer, drawdown at the water table is expected to be less. Analysis incorporated inherently conservative assumptions, including drawdown from pumping of existing projects for an additional 25 years after the end of Project operation, and therefore should be considered a worst case analysis to constrain the upper bound of potential impacts rather than a prediction of drawdown. See text for explanation. All locations are approximate.

- Eagle Crest Proposed WS Well
- Existing Wells
- Blythe Energy Transmission Line
- Desert Southwest Transmission Project
- Devers Palo Verde No. 2 Transmission Project
- Eagle Crest Pumped Storage Project Supply Pipeline
- Interpolated Line of Equal Groundwater Drawdown in the Pumping Zone
- Proposed Solar Project Sites
- Project Site
- Eastern Chuckwalla Valley Groundwater Basin
- Western Chuckwalla Valley Groundwater Basin

N W E S

0 8
Miles

GENESIS SOLAR, LLC

WorleyParsons
resources & energy

CUMULATIVE DRAWDOWN IN PUMPED AQUIFER FROM EXISTING, PLANNED AND REASONABLY FORESEEABLE PROJECTS AT END OF PROJECT OPERATION

SWL	MT	12/2009
52004617		6