DR-S&W-132

Information Required:

Please provide an assessment of changes in the groundwater basin balance and water levels, and potential impacts related to project pumping by IWVWD that would occur in single dry year and multiple dry year drought scenarios for the life of the project.

Response:

Please refer to the response to DR-S&W-133.

DR-S&W-133

Information Required:

Please provide an assessment of changes in the groundwater basin balance and water levels, and potential cumulative impacts related to groundwater pumping by IWVWD for the project and reasonably foreseeable projects. The assessment should include consideration of water supply and demand planning that may be included in Groundwater Management Plan and/or Urban Water Management Plan for the basin.

Responses:

The primary concern expressed in DR-S&W-132 and DR-S&W-133 is the impact to the groundwater basin (water level decline and storage depletion) from the project pumping under normal and dry year conditions and a future projected condition and the possibility of a basin-wide increase of pumping during the life of the project. The response to the data request was addressed utilizing the Brown and Caldwell (BC 2009) model constructed for the Indian Wells Valley Groundwater Basin for the Indian Wells Valley Water District (District). Because DR-S&W-132 and DR-S&W-133 are related, these two requests are addressed together based on the results of systematically designed model simulations.

Seven model scenarios (Runs 1, 2a, 2b, 3a, 3b, 4a and 4b) were conducted to progressively evaluate various stresses on the groundwater basin through changes in recharge (i.e., single and multi-year dry seasons) and project and regional pumping. Run 1 provides a baseline scenario in which the BC (2009) model was extended to the end of the project (year 2043). Runs 2a and 2b were designed to assess impact under dry year conditions. In Runs 3a and 3b, the basin was further stressed with increased pumping based on the District's projected water use estimate for 2010 to 2020 adding onto the dry condition assessment in Runs 2a and 2b. Finally, in Run 4a and 4b, the Project water use was added to assess the impact by comparison with previous scenarios. Below are detailed descriptions of each model scenario.

Run 1 – Baseline scenario

In the BC (2009) model, the transient calibration ends at the end of 2007. Before conducting predictive simulations, the BC model had to be extended to the beginning of 2011 (i.e., the beginning of the project). To reflect pumping conditions between 2007 and 2010, the pumping rate for proposed District supply wells #18, #33 and #34 to be used for the Project were set at 600 gallons per minute (gpm). This was the base rate prior to adding the Project pumping. This is based on the information provided by the District (Attachment DR-SW-133)

The historical pumping rates of the other wells in the model domain vary from year to year. Comparison of the pumping rate in 2007 (the last year of the BC model) and the average pumping rate of the last ten years of the BC model (1998-2007) indicates that the average pumping rate is higher than that in the last year (2007). To provide a representative baseline, the average pumping rate for the other wells within the model was used through the entire duration of the model simulation (2011 through 2043).

Run 2a – Single and multiple dry years scenario (25% of baseline inflow)

Run 2a provides a dry year scenario in which the inflow (i.e., recharge) was 25% of the baseline amount (Model Run 1). In this run, the model setup between 2008 and 2010 is identical to that in Run 1. However, from the beginning of 2011 to the end of the project (2043), three dry periods were included in the project duration. The dry periods consisted of two single dry years (2018, 2036) and one multiple dry year period (2026, 2027, 2028).

To properly place dry years in the project duration, a "dry year" had to be defined. Many methods were developed to define "dry" or drought condition; however given the available data, it is believed that use of precipitation data to approximate "dry year" is appropriate. The concept used in the modeling is that precipitation is directly related to the mountain front recharge, which, based on the BC (2009) model report, is the primary recharge to the Indian Wells Valley Groundwater Basin.

The precipitation data from the Western Regional Climate Center for both Inyo-Kern station (1940-2009) and Indian Well Canyon station (1996-2009) were reviewed. The data from the Indian Well Canyon station are of a very short duration and not sufficient for "wet-dry" cycle analysis. Therefore, only the historical precipitation data for Inyo-Kern located in the vicinity of the Inyo-Kern Airport and within the Indian Wells Valley Groundwater Basin were analyzed. The detailed steps in the analysis of wet-dry year cycles are as follows:

- Calculate the minimum, average and maximum annual precipitation and the standard deviation for the period of 1940 to 2009.
- Determine the upper limit of precipitation for the dry year (mean minus standard deviation:1.27 inches)
- Identify the dry years (i.e., all the years with precipitation at or less than 1.27 inches)
- Determine percentage of precipitation in a dry year relative to an average year using minimum precipitation divided by average precipitation (15%)
- Determine percentage of precipitation in a dry year relative to an average year using the average precipitation in dry years divided by average precipitation (25%)
- Determine the frequency of occurrence of dry year(s) (any year with precipitation less than 1.27 inches) using number of times occurred over the history (about every seven years for a single dry year and there are no consecutive years)

Based on the results of the analysis, it was determined that zero precipitation is not supported by the data and therefore it is not appropriate to consider zero inflow in the model scenarios. In addition, there are no consecutive dry years as defined above. With these analyses, Run 2a was conducted with the recharge being 25% of the baseline amount (Run 1). The occurrences of dry year(s) are based on the frequency determined and placed in 2018, 2026, 2027, 2028, 2036 based on actual project duration (Figure DR- S&W -133-1). Although there are no multiple dry years documented; but an occurrence of multiple dry years was placed in the operation as described to simulate the worst case scenario.

Run 2b – Single and multiple dry year scenario (15% of baseline inflow)

Run 2b is identical to Run 2a except for the inflow input. Run 2b provides a worse-case scenario in comparison with Run 2a because of the larger inflow reduction (15% of the baseline amount).

Run 3a – Impact from District projected water use increase (25% of baseline inflow)

Run 3a is identical to Run 2a with regard to the recharge reduction; but differs in the pumping rate of some of the wells in the model domain. To further stress the aquifer, the projected pumping rates into the future for wells operated by the District were added. Based on the projections in annual use provided by the District for the period between 2010 and 2020, the annual pumping increase from a baseline of 2007 is projected to be 721 gpm in 2011 to 950 gpm in 2020. Because it is not clear in the projection how the increase is allocated across District wells, the amount of increase was evenly distributed to proposed water supply wells #18, #33 and #34 for the project. By placing all of the projected increase in the proposed water supply wells, not across the entire District well field, it should be noted that this will bias the cone of depression in the area of the proposed Project water use.

Because the projected increase for the years 2021 to 2043 was not provided by the District the future increase to the term of the model period (2043) was based on the trend of annual increase provided for 2013 to 2020. From this period from 2013 to 2020 (0.2% to 0.3%), the amount of increase was estimated by cumulative increase of 0.3% from 2020 to 2043. The increase in the pumping rates were applied to the proposed pumping wells for the project and the pumping rates for all other wells in the model domain were not changed from the baseline condition (Run 1).

Run 3b – Impact from District projected water use increase (15% of baseline inflow)

Run 3b is identical to Run 2b except for the inflow input. Run 3b provides a worst case scenario in comparison with Run 3a because of the larger recharge reduction (15% of the baseline amount).

Run 4a – Impact assessment from proposed Project water use (25% of baseline inflow)

Run 4a is identical to Run 3a except that the Project water use was incorporated into the model by adding the pumping rate (190 gpm per well for construction and 30 gpm per well for the operation) to each of the three wells (#18, #33 and #34).

Run 4b – Impact assessment from proposed Project water use (15% of baseline inflow)

Run 4b is identical to Run 4a except for the change in recharge. Run 3b provides a worst case scenario in comparison with all other scenarios because of the incorporation of the larger inflow reduction (15% of the baseline amount), projected increased pumping from IWV and addition of the RSI project water use.

Model results and impact evaluation

The results of the modeling are shown to:

- Illustrate the difference in groundwater level drawdown between Scenario 3a/3b, which include the effects of draught conditions and projected increases in pumping and project pumping drawdown (Scenario 4a/4b) at the end of construction and at the end of the project (Figures DR-S&W-133-2 and DR-S&W-133-3), and
- Changes in the storage depletion between the no project condition (Scenario 3a/3b) and proposed project pumping (Scenario 4a/4b) (Table DR-S&W-133-1).

When groundwater pumping exceeds the natural recharge, water has to be taken out of the basin storage to balance the water budget in the model. The deficit of recharge leads to basin storage depletion. In the seven model runs, the amount of water taken out of the basin storage or storage depletion was calculated and presented in Table DR-S&W-133-1 for each of the scenarios (Runs 1 through 4b) and for five periods starting with the end of construction (2013) through a single and multiple dry years (2018, 2028, 2036) and end of the project (2043). The table shows the individual model year and the deficits between scenarios for each year (i.e., vertical column) and the cumulative model deficit for each scenario through the model period (i.e., horizontal row).

As can be observed, at the end of construction in year 2013, the storage depletion is identical for Runs 1, 2a and 2b, and between 3a and 3b, and between 4a and 4b, The changes in depletion at the end of the construction period reflect changes in the projected regional pumping (3a/3b) and adding the proposed project pumping (4a/4b). The similarity between Run 1 and 2a/2b reflects the fact that for this period there was no dry year condition. Beyond the construction period, from Run 2a/2b to Run 3a/3b, draught conditions were added (less recharge) and more pumping was applied beyond the baseline condition to simulate future changes in projected water supply as provided by the District (Table DR-S&W-133-1).

Storage depletion can also be evaluated by comparison using percentage increase between scenarios. As can be observed, occurrence of dry years (less recharge) could lead to up to 6% increase of storage depletion (change between Scenarios 1 vs. 2). The projected pumping increase through the District could lead to additional 6% increase of storage depletion (comparison between Scenarios 2 vs. 3).

The impact from the proposed Project water use can be assessed by comparison between Scenario 3 and Scenario 4. As shown in Table DR-S&W-133-1, more storage depletion occurs at the end of construction due to higher pumping rate. For all other periods of interest, increase of storage depletion by the Project is only 1% by comparison to Scenario 3a/3b.

Figures DR-S&W-133-2 and DR-S&W-133-3 show the difference in drawdown from Project induced pumping by comparison to the no project Scenario 3a/3b which includes the draught year conditions and increases in projected regional pumping through the District. The figures show the difference in the predicted drawdown for the end of construction (2013) and for the end of the project (model year 2043). As shown for Scenario 4a (25% of the baseline recharge) the Project-induced pumping adds less than 5 feet of drawdown in the area of the pumping wells, and between 0.5 and 1 foot of drawdown to the most proximal adjacent water supply wells (Figure DR-S&W-133-2). As shown for Scenario 4b (15% of the baseline recharge) the results are the same, revealing that the model is not sensitive to variations in the draught scenarios and the change in recharge at the frequency applied in the model (Figure DR-S&W-133-3).

Table DR-S&W-133-1 Basin Storage Depletion as Modeled for Dry Years and Increased Pumping Scenarios

Model Scenario		Year 2013 End of construction	Change from Previous Run	Year 2018 End of dry year	Change from Previous Run	Year 2028 End of multiple dry years	Change from previous run	Year 2036 End of dry year	Change from previous run	Year 2043 End of operation	Change from previous run
		Acre-feet	Acre-feet	Acre-feet	Acre-feet	Acre-feet	Acre-feet	Acre-feet	Acre-feet	Acre-feet	Acre-feet
Water taken out of basin storage to balance pumping (storage depletion)											
Run 1	Baseline[1]	55,390		195,388		431,113		612,181		749,535	
Run 2A	Single and multiple dry years at 25% of inflow[2,3]	55,390	(0)	201,371	(5984)	454,812	(23699)	641,082	(28901)	777,581	(28046)
Run 2B	Single and multiple dry years at 15% of inflow[2,3]	55,390	(0)	202,169	(6782)	457,970	(26857)	644,937	(32756)	781,328	(31793)
Run 3A	Run 2A with projected increased pumping[4]	58,202	(2,812)	212,316	(10,944)	481,054	(26,242)	679,716	(38,634)	826,001	(48,420)
Run 3B	Run 2B with projected increased pumping[4]	58,202	(2,812)	213,114	(10,944)	484,213	(26,243)	683,572	(38,636)	829,750	(48,422)
Run 4A	Run 3A with Project water use added[5]	59,619	(1,417)	214,565	(2,249)	484,712	(3,658)	684,476	(4,760)	831,611	(5,610)
Run 4B	Run 3B with Project water use added[5]	59,619	(1,417)	215,362	(2,249)	487,872	(3,659)	688,331	(4,759)	835,361	(5,611)
Percent Increase of Storage Depletion											
Run 2A vs. Run 1		0%		3%		5%		5%		4%	
Run 2B vs. Run 1		0%		3%		6%		5%		4%	
Run 3A vs. Run 2A		5%		5%		6%		6%		6%	
Run 3B vs. Run 2B		5%		5%		6%		6%		6%	
Run 4A vs. Run 3A		2%		1%		1%		1%		1%	
Run 4B vs. Run 3B		2%		1%		1%		1%		1%	

1. Baseline conditions include District Wells #18, 33, and 34 each pumping at 600 gpm and setting the pumping rate through 2043 for other wells in the modeling using the 1999 - 2007 average.
2. Single dry years were simulated for 2018 and 2036 by decreasing recharge to 15% or 25% of baseline for those years.
3. Multiple dry years were simulated by decreasing recharge to 15% or 25% of baseline for 2026, 2027, and 2028.
4. For Runs 3A and B the project increase in pumping was varied from a basinwide increase of 721 gpm in 2011 to 950 gpm in 2020 and 953 gpm in 2021 to 1,018 gpm in 2043 (distributed evenly to wells #18, 33, 34).
5. For Runs 4A and B the pumping rate for each well (#18, 33, and 34) was increased by 190 gpm for construction and 30 gpm of operation

DR-S&W-134

Information Required:

Please conduct a statistical analysis of the longest period that could occur with no runoff (i.e., the highest salt loading to soils on the site) based on historic rainfall data and estimate of the threshold precipitation rate where runoff (offsite) would occur.

Response:

Daily rainfall data from Inyokern Station (NOAA National Data Centers) from January 1959 to the present was analyzed for the duration of the interval between precipitation events at various thresholds. These durations were then compiled into a dataset. Using ProUCL 4.0, the durations were tested to see if they conformed to a normal, lognormal, or gamma distribution. Regardless of threshold, the data did not conform to a discernable distribution.

Because there was no discernable distribution to the data, the non-parametric Hall's Bootstrap method was selected and a 95% upper confidence limit was calculated for each of four magnitudes by ProUCL 4.0. The results are plotted on Figure DR-S&W-134.

DR-S&W-135

Information Required:

Please provide a discussion of potential salt loading using the longest period salt loading factor developed from the above data request. The discussion must include the impacts associated with other parameters including pH, boron, metals, radionuclides and any other constituents that may be present in the runoff water and are detrimental to flora and fauna on and adjacent to the project site.

Response:

The scenario presented in the Volume III Data Adequacy Supplement (Soil and Water DA-5), provided to the CEC October 26, 2009, considered that all brine solids deposited on the unpaved road areas of the site on an annual basis were removed from the site in an annual frequency storm event. Infiltration was intentionally neglected in an effort to be conservative. This scenario was attractive because it allowed for a quantitative and readily understood evaluation of the greatest potential impact of the practice of using brine for dust suppression.

Statistical analysis of precipitation data from Inyokern Station supports the annual basis used in the data adequacy submission. It indicates that a 0.75-inch precipitation event is 95% likely to occur within a 380 day period. Revisions of the calculations provided in the data adequacy submission reflecting this scenario are presented in Tables DR-S&W-135-1 and DR- S&W-135-2.

Even if there were no precipitation at the site, brine application (3.55 in/yr) would be expected to infiltrate into the soil. Infiltration into site soils is expected to reduce the quantity of brine salts available for runoff. Site soils have a composition of approximately 90% sand, 5% silt, and 5% clay (Soils Report).

Permeability on the compacted site roads would eventually be very low; however roads only constitute 1.9% of the solar farm total surface. Permeability of the soil over the entire solar field is expected to be relatively high (conservatively estimated at 1 in/hr). As brine is applied and rain falls on the site, brine constituents will follow that water into the soil. As evaporation removes the water from the soil surface, brine salts will be left behind. This will result initially in the formation of a salt pan just below the soil surface and, with compaction and additional deposition, lead to a nearly impervious road surface. Salts that do not contact incident rainwater cannot be dissolved by it and collection of salt below the surface and reduced permeability will both limit the available salt for potential contact with storm water.

Qualitatively, it could be expected that cations would be reduced in their mobility due to cation exchange. Sodium, potassium, calcium, and magnesium were the only cations detected in the groundwater samples collected. Neither toxic metals nor radionuclides have been detected in groundwater samples and as such, are not considered to be present in the brine. The presence of carbonate in the brine may temporarily elevate soil pH, but due to constant contact with the atmosphere it is expected to return quickly to neutral. Among the anions, sulfate is present in the greatest quantity. Chloride is the next most abundant and has the highest solubility. Nitrate, fluoride, and borate concentrations in the brine are relatively minor.

Infiltration will occur not only on the unpaved road surface (representing 1.9% of the site area), but also on the remainder of the site which is unpaved (approximately 98.1% of the site area). During precipitation events that do not produce runoff, the salts on the road surface will be transported to the adjacent down slope unpaved non-road areas. Infiltration in unpaved non-road areas is expected to store brine salts that run off the unpaved road areas. Storage will be expected to take place below the soil surface. This salt below the ground surface in the non-road areas will not be available for contact with storm water runoff.

The potential of runoff water to be “detrimental to flora and fauna on and adjacent to the Project site” is considered negligible in the context of construction and operations on the site which will remove any existing vegetation and habitat, install a fence around the site, channelize site runoff, and dilute site runoff with water from the adjacent sub-basins of the watershed.

Table S&W-135-1 Estimate of TDS Concentration in Solar Field Storm Water Runoff from Brine Water used for Dust Suppression

North and South Field Contributions to Center Outfall - Ridgecrest Solar Power Plant		**Units**	**Comments**
Unpaved Road Width	24	Feet	unpaved road width
Unpaved Road Length	61,300	Feet	unpaved road length
Brine Application Area	1,471,200	square feet	
Brine Application Area	34	Acres	
Solar Field Area	79,174,656	square feet	
Percentage Roads/Solar Field Area	1.9%	percentage inclusive of road areas	
Annual Brine Application	10	acre/feet	per AFC Solar Field Description
Brine Applied per Year	0.296	Feet	
Brine Applied per Year	3.553	Inches	annual amount of Brine applied above the unpaved roads
Volume Applied	8.384	liters applied/ year/ ft^2	
TDS Concentration	6.782	g/l TDS in RO Brine	
Annual Mass Applied	57	g/ ft^2/ yr	
Mass Applied in Period (95% UCL)	59.4	g/ ft^2/ 381 days	
Area Ratio Dilution in Solar Field	53.816	dilution factor	
Rainfall event	0.750	Inches	NOAA Atlas 14
Amount of water in Annual Rain event	1.771	liters in rain event / year/ ft2	
TDS Conc. in water -Unpaved Road	33.519	g/L	
Predicted TDS leaving Solar Field Roads	0.623	g/l TDS if all dissolves in rain event	
Percentage Solar Field Area w/o roads	98.1%	percentage Excludes road areas	
Predicted TDS from Solar Field ex. roads	0.200	g/l TDS for the storm water falling on and running off the remainder of the solar field	
Predicted TDS leaving Solar Field	0.819	g/L TDS weighted average for solar field	

Table S&W-135-2 Estimate of TDS Contribution to Storm Water Runoff in Outfalls from Brine Water usage in Solar Fields

Objective

Estimate the % contribution of the stormwater flow running off each solar field to the appropriate stormwater channel flow discharging from Project site

Procedure

From the Ridgecrest Solar Power Project Drainage Report (RSPPDR)(AECOM, August 7, 2009) find the peak flow discharge for each solar field and the total peak flow discharge at the outfall for the channel associated with each solar field

Compare the peak flow discharge for each solar field to the total peak flow discharge for the appropriate channel outfall to determine the % contribution for each field

Assumptions

This estimate assumes that the Aug version of the Drainage report will still apply in general terms to the flow from the Dec design for Ridgecrest solar plant
This estimate assumes that the peak flow from each sub-basin (includes solar field) would occur at the same time as the total peak flow for the associated channel at the outfall.
This estimate assumes that the 10-year storm event peak flows estimated are proportionally similar to a storm event with any frequency.

Site Data

Ridgecrest Solar Power Project will use the El Paso Wash for stormwater conveyance; (AECOM, 30% Concept Design Dec 18, 2009)
The contribution from areas upstream of the solar farm remain the same as calculated in the Report
The south solar unit fields will be graded so that runoff drains into ditches and mix with the El Paso Wash before the wash leaves the property
The north solar unit fields will be graded so that runoff drains into ditches and mix with the El Paso Wash before the wash leaves the property

Sub Basin ID on Map	Description	Area (mi2)	Discharges to Channel/ Outfall	10-Yr Peak Discharge (cfs)	Contribution based on 10-yr Peak event
O2c	North Field	1.49	Central, #2	209	7.9%
O2b	South Field	1.35	Central, #2	168.5	6.3%
O2	Off Site to the South	20.73			
	Total	**23.57**		**2655.6**	
	Total Contribution from Unit #2 to Total Flow at Center Outfall				**14.2%**
Predicted TDS conc. contribution from solar field to the total storm water discharged from the site via Center Outfall					
	TDS conc. in discharge avg from North & South Solar Fields .		819	mg/L TDS	14.2%
	TDS conc. contribution in the upstream source (est)		**200**	**mg/L TDS**	85.8%
	TDS weighted average for Outfall		**288**	**mg/L TDS**	

DR-S&W-136

Information Required:

Please identify alternatives for disposal of the RO reject water including offsite disposal.

Response:

One alternative disposal option for RO reject water involves solidification of residual solids through a mechanical drying process of some kind (e.g., crystallizer), with characterization of the waste and off-site transport and disposal at an appropriately permitted facility. Another approach would involve placing RO water in an appropriately designed and permitted surface impoundment or open topped above ground storage tank for evaporation. Solids remaining after evaporation would be collected and disposed off-site at an appropriately permitted facility. All of these options would add costs to the Project above the selected option, and would also require additional water to be used for dust control.

DR-S&W-137

Information Required:

Please identify whether, except for the exclusive permitting authority of the Energy Commission, the applicant would need a permit from the Regional Water Quality Control Board (RWQCB) for the discharge of high saline groundwater to land.

Response:

Richard Booth of the Lahontan RWQCB staff responded verbally to an AECOM query to this question about using RO water for dust control for the Ridgecrest site by indicating that his agency does not have the jurisdiction to require a permit; he agreed with the assessment that there would be no water quality impacts from the use of RO reject water at that site as provided in the data adequacy response to the AFC (personal communication Richard Booth, December 11, 2009). While there are significant differences in water chemistry between the two sites, the use of RO water for dust suppression appears acceptable to the Lahontan RWQCB staff.

Although the final determination regarding the need for a Report of Waste Discharge (ROWD) permit has not been made by the RWQCB, a ROWD application document has been prepared and is included as Attachment DR-WASTE-241. This application was not prepared for RO discharge, but for the Land Treatment Unit only.

DR-S&W-138

Information Required:

If a ROWD permit is necessary, please provide all the permit information necessary to the RWQCB and include the appropriate application fee. Please copy the Energy Commission with the information provided to the RWQCB.

Response:

The ROWD is provided in Attachment DR-WASTE-241.

DR-S&W-139

Information Required:

Please provide details on the sizing of the LTU and how HTF-impacted soils would be treated including information on the presence of indigenous bacteria to breakdown the HTF, breakdown products, time for achieving breakdown from the 10,000 mg/kg maximum to the 100 mg/kg reuse level.

Response:

The LTUs are sized based on data from an existing solar farm that uses an LTU to bioremediate HTF-impacted soil and the following basis:

1. HTF-impacted soil is generated at a rate consistent with existing solar farm experience. Kramer Junction is a 150 MW facility that generates an average of 500 cubic yards (cyd) of HTF-impacted soil per year (DTSC correspondence, 1995). This rate is ~ 3.3 cyd/year/MW.
2. Applying the Kramer Junction experience to the 250 MW Ridgecrest facility, the Ridgecrest facility is estimated to generate ~833 cyd/year of HTF-impacted soil.
3. HTF-impacted soil is treated in 6-inch thicknesses, so, on average, 45,000 square feet, or 1.1 acres, is needed for HTF-impacted generated per year.
4. The LTU will be used for either placement of HTF-impacted soil or treatment of HTF-impacted soil. That is at any one time the LTU is used to place material to be treated as it is generated or being used for soil treatment. HTF-impacted soil treatment is estimated to take 1 to 4 months to complete bioremediation; however the design of the LTU will allow soil placed at the beginning of the year to have up to twelve months to complete bioremediation and removal.

To address above average spill events, Kramer Junction has additional capacity in the LTU or a factor of safety for HTF-impacted soil treatment. Kramer Junction has a capacity to treat 1,944 cyd/year and generates an average of 500 cyd/year of HTF-impacted soil, so the facility has an approximate 3.9 factor of safety. Applying this factor of safety to Ridgecrest, the total area estimated for the LTU is ~175,000 square feet, or 4 acres.

DR-S&W-140

Information Required:

Explain what impact the use of RO concentrate on soils for dust suppression would have on the ability of indigenous bacteria to breakdown the HTF?

Response:

According to standard procedures for handling spills, soils contaminated with HTF will be transferred to the land treatment unit (LTU) for disposal. The use of RO concentrate on unpaved roads for dust suppression is not expected to have any impact on the ability of indigenous bacteria to break down HTF within the LTU. The LTU is designed with a minimum 2-foot berm. This berm is more than adequate to prevent runoff from the site from entering the LTU even during a 100-year storm (3.41 inches of rain in 24 hours).

Soil containing brine concentrate might be introduced into the LTU in the instance where a spill took place on soil that contained brine salts. In this case, the quantity of soil containing brine which is contaminated with HTF is expected to be small compared to the total volume of the LTU. Mixing and watering of the LTU is expected to dilute this material sufficiently that it will not reduce biodegradation rates in the LTU. If a large volume of soil containing brine was contaminated with HTF (greater than approximately 10 percent of the LTU volume), it would need to be introduced into the LTU gradually but could be biologically treated.

Outside the LTU, the unpaved road areas (less than three percent of the solar field area) routinely receive brine and would be expected to have a reduced capability to degrade spills of HTF due to osmotic pressures on indigenous soil microorganisms. This phenomenon is not however expected to have any impact on overall HTF biodegradation since spills and associated material are transferred to the LTU.

DR-S&W-141

Information Required:

Explain how runoff and/or leachate potentially generated from operation of the LTU would be managed?

Response:

Each LTU is surrounded by a 2-ft high berm. The berm will divert stormwater run-on from adjacent areas entering the LTU. Stormwater runoff and/or leachate within the berm will be collected in a sump. Each LTU is designed to drain to a sump. Stormwater runoff and/or leachate that collect in the sump will be either reused for bioremediation, discharged, or will be properly disposed. If excess storm water accumulates in the LTU, the stormwater will be inspected for the presence of a sheen. Regardless of whether a sheen is observed, the excess storm water will be runoff and/or leachate will be sampled and analyzed for HTF constituents. If the results of the water analysis are below regulatory levels for the HTF constituents, then the runoff and/or leachate will be transferred to the RO system and reused onsite. If the results of the water analysis indicate that HTF constituents are above regulatory levels, then the water will be disposed offsite at an appropriate facility.

DR-S&W-142

Information Required:

Explain potential impacts from operation of the LTU on surface and groundwater quality.

Response:

The material that will be placed in the LTU consists of soil that is impacted with Therminol VP-1™ HTF as a result of minor leaks or spills that occur during the course of daily operational or maintenance activities. At ambient temperatures, HTF is a highly viscous material that is virtually insoluble in water. Operation of an LTU is not expected to impact surface water or groundwater quality beneath the site. The LTU will be surrounded on all four sides by berms that will protect the LTU from surface water flow. Because of the viscous and insoluble nature of the HTF, it is not likely to mobilize from the soil downwards to the water table. The LTU will be constructed with a 2-ft-thick clay layer on the floor of the LTU (underlain by three-feet of native soil that has been compacted to 95 percent of optimal compaction) that will serve as a protective barrier to the downward movement of contaminants from the LTU. Moreover, should any contaminants

escape the LTU, the water table is approximately 480 feet beneath the LTU. In sum, based on the viscosity of HTF at ambient temperatures, its insolubility, the depth of the water table beneath the RSPP site, and the placement of protective berms around the LTU, it is expected that surface water and groundwater quality beneath the site will not be impacted by the LTU operation.

DR-S&W-143

Information Required:

Please provide all information necessary to file a Report of Waste Discharge discharge to a LTU with the RWQCB.

Response:

The ROWD is provided in Attachment DR-WASTE-241.

DR-S&W-144

Information Required:

Please provide all information necessary to file a Report of Waste Discharge to the RWQCB and include the appropriate application fee.

Response:

The ROWD is provided in Attachment DR-WASTE-241.

DR-S&W-145

Information Required:

Please identify how much cut and fill would occur at the site.

Response:

The amount of cut and fill for the revised site design will be provided as part of the conceptual Engineering Plans to be submitted on February 10, 2010. The total cuts and fills for the revised site plan are anticipated to be less than the previous site plan.

DR-S&W-146

Information Required:

If the cut and fill quantities are not balanced, please show how the balance differences would be resolved.

Response:

The cut and fill quantities will be balanced onsite.

DR-S&W-147

Information Required:

Please provide calculations indicating the stockpile locations are sufficient to support the volume of soil and vegetation expected to be generated.

Response:

The vegetation that is generated from clearing the site is proposed to be burned in accordance with acceptable County requirements. The soil associated with grading will not be stockpiled in any large manner inasmuch as stockpiled material is subject to additional erosion and results in a double-handling of the material. A few small stockpiles will be created in the areas of active grading on an on-going basis, and these locations will change with time and are not restricted by a fixed size location. The storage areas around the warehouse are proposed for materials associated with the construction of the mirrors, general building materials, piping, insulation, etc. Onsite gravels may be screened and stockpiled for use in areas to control dust and erosion, but these stockpiles will be located within the solar field areas and not restricted by any space limitations.

DR-S&W-148

Information Required:

Please provide plans and maps showing how sheet and channel flow into and across the project site, over roads, around the mirrors, and off the site would be managed through engineering controls.

Response:

The grading plans will depict how the sheet and channel flow occurs across the site. The engineering controls consist of providing established grades with minimum slope in the field areas to minimize any erosion and maximize infiltration, providing swales between the solar loops at predetermined locations to collect the field drainage, collection channels are located at the ends of the swales so that they collect the water from the fields, and these collection channels direct the drainage to the primary drainage channels that are located on the perimeter of the site. The grading plans can be seen as Sheets C-04 and C-05 of the Conceptual Engineering Drawings that will be provided on February 10, 2010.

DR-S&W-149

Information Required:

Please provide erosion and deposition predictions on the up-slope and down-slope sides of the project.

Response:

The potential for erosion and deposition of material associated with this Project site should be evaluated in five distinct areas of focus: 1) El Paso Wash, 2) upstream of the south field, 3) upstream of the north field, 4) off-site drainage areas, and 5) within the solar fields.

Impacts to the El Paso Wash will be largely avoided, with the exceptions of the road culvert crossing at Brown Road, the HTF pipe bridge, the new 230-kV transmission line, and 8 to 10 drainage channel tie-ins. These drainage tie-ins are proposed to aid in maintaining natural flow diverted from swale complexes within the Project footprint that would be impacted by construction activities for the RSPP. The small drainage channel connections to El Paso Wash will be made using standard Kern County or APWA details and the outwash aprons will be constructed of soil cement so that erosion is not an issue within the wash. Further details regarding the impacts associated with the reconfigured site plan are being developed and will be provided in February.

The upstream area from the south field is a relatively small area compared to the site as a whole and is generally centered in a flat ridge between El Paso Wash and a small un-named wash to the west. As such, the upstream area does not create a large flow of water to either channel, and the slopes, ground cover condition, and rocky crust in this area does not create much opportunity for sediment transport. The construction of the south field will intercept some of the drainage in a minor ephemeral wash that drains to the west, but this drainage will be allowed to meander westerly along the south boundary of the site to its prior point of connection with a drainage depression west of the solar field. This new drainage flow path is longer than the current flow path and thus flow velocities should be reduced compared to the existing small flow upstream of the south field. In addition, using the low impact drainage approach preferred by the BLM (allowing this intercepted water to migrate westerly in an overland flow condition) will not result in any discernible increase in sedimentation or erosion in this area.

The area upstream of the north field is bounded by Brown Road and thus there is no impact to erosion or sedimentation resulting from flows upstream of the north field. The flows along Brown Road will be channelized as part of the onsite drainage and incorporated into the flows within the solar fields.

The off-site drainage areas immediately east of the south field are very small and the drainage from these areas into the engineered channels on the perimeter of the site is not expected to create any erosion or sedimentation issues. These engineered channels will be created from native soil and will incorporate drop structures constructed from soil cement prior to discharge into the El Paso Wash. The flows in the channels are small, velocities in these channels will be less that scour velocity, and the drop structures along the length of these channels at 1,300-ft intervals and at the end of the channel will capture any minor amount of sediment that gets washed into these channels. The off-site drainage east of the north field is primarily a flow resulting from 1-24 inch culvert below US Highway 395. This drainage and the other isolated drainage in the area will be directed to a diversion channel on the east side of the north field. The type of soil in the area, the existing ground slope, and the vegetation appear to minimize any erosion in this area. The flow in the new engineered channels is relatively small; velocity in this channel will be less that scour velocity; and the drop structures along the length of this channel (at 1,300-ft intervals and at the end of the channel) will capture any minor amount of sediment that gets washed into this channel. There is not anticipated to be any sedimentation impact to the downstream channels as a result of the off-site flows intercepted by the engineered channels.

The onsite flows within the solar fields will be non-erosive by design. The swales between the fields are very flat (0.015%), and the drainage channels within the site will also be relatively flat throughout the length of the channel. The discharge points for these channels will require a drop structure to be placed prior to connection to the existing El Paso Wash. There will be no sediment transport originating from the site due

to the flat slopes that will exist onsite, and the drop structures at the termination of the channels will be constructed of soil cement, therefore, avoiding erosion impacts to the El Paso Wash. The outwash aprons at the end of these drainage channels will also be protected with soil cement and therefore erosion and sedimentation are not considered to be a problem as a result of the on-site drainage flows.

DR-S&W-150

Information Required:

Please provide information showing how soils would be maintained to prevent erosion during operation.

Response:

During operations, the following measures will be utilized to control erosion:

- The primary access road to the site and the roads between the administration building, warehouse, and all power blocks will be paved.
- The gravel roads on the perimeter of the solar fields will be watered to control erosion by using excess water from the water treatment plant on a regular basis.
- The 3:1 graded terrace slopes onsite will be treated on a regular basis with a bio-degradable dust palliative. These palliatives generally have a life of 6 to 15 months depending on application rates and water content.
- A 30-ft high wind fence will be constructed on the east and west faces of the Project and at intermediate locations to control the wind affect in the solar fields.
- The solar fields will remain as native material and are protected from erosion by the solar collectors. The solar collectors sit approximately 3 feet above the ground, they are approximately 20 feet across their mirror face, and are spaced at a repeating interval of 22 meters which creates an air-foil effect across the solar field. This air-foil effect precludes wind from coming down into the field and lifting the material up into the air.
- The drainage channels will be created with 3:1 side slopes to mitigate the erosion process and the channels will also be designed with very low slopes to keep water velocities non-erosive.

DR-S&W-151

Information Required:

Please provide maps and plans showing how the site soils would be returned to the original state along with long-term management of the site soils upon decommissioning of the project. (Staff's current understanding is that desert pavement and varnish can take 100s to 1000s of years to form – see USGS Bulletin 1793 - The Response of Vegetation to Disturbance in Death Valley National Monument, California).

Response:

Site reclamation/restoration activities will be conducted in accordance with a Decommissioning Plan developed in accordance with BLM regulations. Our understanding is that the California State BLM Office will be developing guidance for reclamation/restoration activities. A plan will developed in accordance with regulations promulgated by BLM at 43 CFR 3809 et seq. Potential funding associated with channel maintenance and closure activities at the RSPP site will also described in the Decommissioning Plan. Funding for channel maintenance and decommissioning will be established in accordance with regulations promulgated by BLM at 43 CFR 3809.550 et seq.

DR-S&W-152

Information Required:

Please provide a comprehensive discussion of how dust control would be achieved by mirror washing and compaction. Specifically identify:

A. How water from mirror washing would be directed to all the disturbed areas.
B. How equipment traffic will compact the soil and not break up soil crusts and/or create silt.
C. How would water be applied when mirror washing is not occurring.

Response:

1. The mirror washing process has no effect on the dust control process onsite. The water for mirror washing is applied by a water-brush and the water drips off the mirrors and infiltrates into the ground.
2. The traffic onsite will utilize the perimeter gravel roads to navigate around the site. These roads will be sprayed regularly with residual water from the water treatment plant or dust palliatives will be applied. The traffic within the site on unpaved roads will move at slow speeds so as not to create any blowing dust; as dust quickly reduces the efficiency of the mirrors. The soils onsite will be compacted naturally, in the process of constructing the site, and as such the daily operational equipment will have no further effect on the soils. A natural firm base will be established onsite over time in the area of the solar troughs, and the vehicles that may operate in these areas move at speeds less than 5 miles per hour and will have negligible effect on the soils. As previously noted, the wind effect in the solar field is mitigated by construction of wind fences and the solar arrays themselves.
3. The mirror washing process has no effect on the dust control process onsite. A water truck will be used to spray water on the site gravel roads.

DR-S&W-153

Information Required:

Please provide clarification indicating whether the project is inside or outside of the district's service boundary.

Response:

The Project is currently outside of the Indian Wells Valley Water District's service boundary. IWVWD is in the process of annexing the Project into their service boundary. A copy of the annexation map is provided as Attachment DR-S&W-153.

DR-S&W-154

Information Required:

Please provide a copy of the agreement between the applicant and the IWVWD for construction and operation water supply.

Response:

A copy of the "will serve" agreement was provided as Attachment Water-D in Volume III Data Adequacy Response, submitted to the CEC on October 26, 2009.

DR-S&W-155

Information Required:

If the project is outside the district's boundaries, please provide a copy of a proposed annexation agreement to indicate the district would annex the site to provide water services.

Response:

The Project is currently outside of the District's service boundary. The District is in the process of annexing the Project into their service boundary. As stated previously, a copy of the annexation map is provided as Attachment DR-S&W-153.

DR-S&W-156

Information Required:

If the project is outside the district's boundaries, please provide a copy of a proposed annexation agreement to indicate the district would annex the site to provide water services.

Response:

Please refer to the response to DR-Soil/Water-153.

DR-S&W-157

Information Required:

Please identify whether the groundwater basin is managed pursuant to a groundwater management plan or is adjudicated. If the basin is managed, indicate the operational parameters used for basin management.

Response:

The IWV Groundwater Basin is not an adjudicated basin. In 2006, the major water service providers and stakeholders in the IWV Groundwater Basin formed the Indian Wells Valley Cooperative Groundwater Management Group and published the Cooperative Groundwater Management Plan. Participants in the plan include the IWVWD, the China Lake Naval Air Weapons Station (NAWS), the BLM, Searles Valley Minerals, the Kern County Water Agency, and other local agencies and stakeholders. The plan outlines seven objectives with the intent to extend the useful life of the groundwater resources to meet current and foreseeable future needs. The seven objectives are as follows:

1) Limit additional large scale pumping in areas that appear to be adversely impacted. Under this objective, no signatory producing water will increase its annual production of water from the groundwater depression in the area in T26S R40E Sections 29, 30, 32, and parts of sections 31, and 33; and T27S R40E Sections 4, 5, and northern part of Section 9; and T26S R39E part of Section 25. This applies to extractions greater than 5 afy.

2) Distribute new groundwater extraction within the Valley in a manner that will minimize adverse effects to existing groundwater conditions (levels and quality), and maximize the long-term supply within the IWV. Under this objective, the participants will consider developing wells in the outlying areas of the IWV.

3) Aggressively pursue the development and implementation of water conservation and education programs. Under this objective, the Signatories have collectively developed a written policy regarding water conservation (Water Conservation Public Advisory) and will continue to develop water conservation guidelines and education programs.

4) Encourage the use of treated water, reclaimed water, recycled, gray and lower quality water where appropriate and economically feasible. The Signatories will consider the use of non-potable water, such as treated sewage effluent or poor quality sources, for appropriate re-use applications.

5) Explore the potential for other types of water management programs that are beneficial to the IWV. Under this objective, the Signatories will consider projects such as water transfers, water banking, water importation, groundwater replenishment, and other programs that will enhance or prolong groundwater reserves in the IWV.

6) Continue cooperative efforts to develop information and data which contributes to further defining and better understanding the groundwater resources in the IWV. Under this objective, the Signatories will continue to efforts to gather data and analyze projects focusing on groundwater recharge, discharge, storage, quality, transmissivity, and storativity with respect to groundwater resources of the IWV.

7) Develop an interagency management framework to implement objectives of this Plan. This objective lists the Signatories to the Plan and provides for the further development of this cooperative agreement to define the roles, responsibilities, rights, and obligations of all participants. It also affords the opportunity to enlist new members and provides the administrative framework for implementing applicable elements of this Plan.

DR-S&W-158

Information Required:

If available please provide a copy of the groundwater management plan, urban water management plan or any other documents discussing management and governance of water supplies in the basin.

Response:

A copy of the Indian Wells Valley Cooperative Water Management Group Working Group 2010/2011 Objectives is provided as Attachment DR-S&W-158.

DR-S&W-159

Information Required:

Please provide a comprehensive discussion of the condition of the basin including basin balance, the amount of overdraft (if any), and any legal/management thresholds for total amount of water that can be extracted from the basin.

Response:

Condition of the basin– The IWV Groundwater Basin is located in the west-central portion of the South Lahonton Hydrologic Region and is bounded to the east by the Argus Range, to the south by the El Paso Mountains; to the west by the Sierra Nevada Range; and to the north by the Coso Range. Other groundwater basins that are adjacent to the IWV Groundwater Basin include the Coso Valley Groundwater Basin to the north, the Rose Valley Groundwater Basin to the northwest, the Searles Valley Groundwater Basin to the east, and the Fremont Valley Groundwater Basin to the southwest.

The IWV Groundwater Basin is virtually closed, and there is very little groundwater underflow to or from adjacent valleys. As a closed basin, surface drainage does not "exit" the basin and flow from the surrounding mountains drain toward China Lake, or other small playas in the area. Evapotranspiration (ET) from the playa areas was the primary outflow from the IWV Groundwater Basin until the about 1950s or 1960s. At this time, groundwater pumping began to exceed ET rates. Prior to this time, ET from the China Lake area (playa) was the primary outflow of groundwater from the IWV Groundwater Basin. Current groundwater pumping rates have intercepted water flowing east towards the playa, reducing the amount of ET from the IWV Groundwater Basin.

In 2009, a groundwater flow model and hydrogeologic study of the IWV Groundwater Basin was performed for the IWVWD by Brown and Caldwell. Using existing data and previous studies by the USGS, United States Bureau of Reclamation (USBR), and studies conducted for China Lake NAWS, four key hydrostratigraphic features were identified that were critical to understanding the basin-wide water budget and in developing the hydrogeologic conceptual model. These features include: a) the existence of a north-south fine-grained sediment plug in the west-central basin, b) an east-west high permeability gravel zone in the Ridgecrest-Inyokern area, c) a high groundwater gradient between the neighboring El Paso Sub-basin and the southwest area of the IWV Groundwater Basin, and d) playa ET losses and changes over time.

Basin Balance – The model calculated water budgets for model years 1953, 1985, and 2006. The 2006 transient water budget is as follows.

Inflows	Mountain Front recharge:	9,500 acre feet per year (AFY)
	Groundwater subflow	1,500 AFY
	Storage	17,346 – 21,246 AFY
	Total inflows	**28,346 – 32,346 AFY**
Outflows	Evapotranspiration	4,000 – 8,000 AFY
	Pumping wells	24,336 AFY
	Total outflows	**28,346 – 32,346 AFY**

Amount of Overdraft – The groundwater flow model led to the estimation and refinement of the water budget for the IWV Groundwater Basin that concluded that groundwater storage in the aquifer has been in overdraft condition averaging approximately 20,000 AFY and totaling about 900,000 AF since 1920. Most of the total overdraft has occurred since the 1950s.

Legal/Management Thresholds – The California Water Code allows any local public agency that provides water service whose service area includes a groundwater basin or portion thereof that is not subject to groundwater management pursuant to a judgment or other order, to adopt and implement a groundwater management plan (California Water Code Sections 10750 et. seq.) Groundwater Management Plans often require reports of pumping and some restrictions on usage. In 2006, the major water service providers and stakeholders in the IWV Groundwater Basin formed the Indian Wells Valley Cooperative Groundwater Management Group and published the Cooperative Groundwater Management Plan. Participants in the plan include the IWVWD, the China Lake Naval Air Weapons Station (NAWS), the BLM, Searles Valley Minerals, the Kern County Water Agency, and other local agencies and stakeholders. The plan outlines seven objectives with the intent to extend the useful life of the groundwater resources to meet current and foreseeable future needs. The seven objectives are as follows:

1. Limit additional large scale pumping in areas that appear to be adversely impacted. Under this objective, no signatory producing water will increase its annual production of water from the groundwater depression in the area in T26S R40E Sections 29, 30, 32, and parts of sections 31, and 33; and T27S R40E Sections 4, 5, and northern part of Section 9; and T26S R39E part of Section 25. This applies to extractions greater than 5 afy.

2. Distribute new groundwater extraction within the Valley in a manner that will minimize adverse effects to existing groundwater conditions (levels and quality), and maximize the long-term supply within the IWV. Under this objective, the participants will consider developing wells in the outlying areas of the IWV.

3. Aggressively pursue the development and implementation of water conservation and education programs. Under this objective, the Signatories have collectively developed a written policy regarding water conservation (Water Conservation Public Advisory) and will continue to develop water conservation guidelines and education programs.

4. Encourage the use of treated water, reclaimed water, recycled, gray and lower quality water where appropriate and economically feasible. The Signatories will consider the use of non-potable water, such as treated sewage effluent or poor quality sources, for appropriate re-use applications.

5. Explore the potential for other types of water management programs that are beneficial to the IWV. Under this objective, the Signatories will consider projects such as water transfers, water banking, water importation, groundwater replenishment, and other programs that will enhance or prolong groundwater reserves in the IWV.

6. Continue cooperative efforts to develop information and data which contributes to further defining and better understanding the groundwater resources in the IWV. Under this objective, the Signatories will continue efforts to gather data and analyze projects, focusing on groundwater recharge, discharge, storage, quality, transmissivity, and storativity with respect to groundwater resources of the IWV.

7. Develop an interagency management framework to implement objectives of this Plan. This objective lists the Signatories to the Plan and provides for the further development of this cooperative agreement to define the roles, responsibilities, rights, and obligations of all participants. It also affords the opportunity to enlist new members and provides the administrative framework for implementing applicable elements of this Plan.

Negotiations have been completed with the IWVWD to secure water supply for the RSPP. An MOU has been approved by the IWVWD Board, and has been finalized that will secure a reliable source of water for the Project. Please See Response to Data Request DR-S&W-170 below for a discussion of mitigation.

DR-S&W-160

Information Required:

Please discuss in detail whether a 401 certification is required. If required, please discuss compliance with the RWQCB requirements discussed on the following RWQCB webpage: http://www.waterboards.ca.gov/lahontan/water_issues/programs/clean_water_act_401/index.shtml.

Response:

It is not anticipated that a 401 Water Quality Certification will be required, since it the US Army Corps of Engineers is expected to determine that there are no federal jurisdictional waters impacted by the Project. A Jurisdictional Delineation Report (JDR) submitted to the United States Army Corps of Engineers (USACE) on October 23, 2009. However, there are “State” waters under the Porter Cologne Act that require a similar permit through the RWQCB, which is called a “dredge and fill” permit. At this time, the JDR is being revised to incorporate the reconfiguration of the Project. It is anticipated that a revised JDR will be available on March 5, 2010, at which time a “dredge and fill” permit will be prepared detailing the revised project “State” waters.

DR-S&W-161

Information Required:

Submit a jurisdictional delineation to the USACE, a section 401 water quality certification application to the RWQCB, and a Streambed Alteration Notification package to the CDFG. Provide copies of all these documents to the BLM. This response may be prepared in conjunction with the response to related Biological Resources data requests.

Response:

The jurisdictional delineation was provided to the CEC and USACE on October 23, 2009. As stated above in DR-S&W-160, the JDR is currently being revised to incorporate the reconfiguration of the Project. A copy of the revised JRD will be provided to the USACE and CDFG. The Streambed Alteration Agreement (SAA) was submitted to the CEC and CDFG on November 25, 2009.

DR-S&W-162

Information Required:

Please provide the thresholds or levels of significance that were used to evaluate the potential impacts associated with the water supply impacts. The thresholds must consider any and all regulations, management plans, agreements, court orders, and other policies that may apply to the IWV groundwater basin.

Response:

In evaluating potential significant impacts to groundwater supplies, the Appendix G, "Environmental Checklist" of the CEQA Guidelines (California Code of Regulations, Title 14, Appendix G, § VIII, subdivision (b)) was considered. Appendix G asks whether the project would *"[s]ubstantially 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)*."*

To assess the effect of Project pumping, impacts were evaluated using a numerical groundwater model developed by Brown and Caldwell (2009) for the Indian Wells Valley Groundwater Basin and the IWVWD and China Lake Naval Air Weapons Center. Data response 132 and 133 outline revisions to the model to incorporate draught and conditions of future pumping estimated by the District for their well field. The predicted additional drawdown induced by the proposed project water supply at the end of the construction period and end of the operational period of five feet at or more at an adjacent water supply well was considered potentially significant. Figures DR-S&W-133-2 and DR-S&W-133-3 show the differences in water levels from a no-project condition and the proposed Project pumping. As shown, by comparison to the no-project condition, the difference in the water levels in surrounding water supply wells is significantly less than five feet. This informal criterion has been used at many other projects licensed by the CEC as a measure of potential significance in the evaluation of the changes to the water level in surrounding water supply wells. Given that the predicted difference to the no-project simulation is small there is not a significant impact to surrounding water supply wells.

To evaluate if the Project would induce "substantial depletion of an aquifer or would produce a net deficit in aquifer volume", changes to the aquifer storage from the proposed Project pumping were considered. As noted in the AFC and as discussed in DR-S&W-133, the Indian Wells Valley Groundwater Basin has been in overdraft since 1920 and has shown an average water level decline of between 1 to 1.5 feet per year. An estimate of the overdraft is about 20,000 acre-feet per year. Given this condition, any additional water use, and water use proposed by the Project, would contribute to what is already substantial depletion of the aquifer. It is important to note, while the Project pumping would contribute to an already over drafted condition, the contribution from proposed construction water use amortized over the life of the Project and the operational supply amounts to about a 1 percent increase. Nevertheless, the Project is proposing offsets to its proposed water supply as noted under S&W DR-170, 171 and 172.

Consideration of applicable plans and policies was investigated as part of the assessment of criterion of thresholds of significance. The LORS provided in the AFC listed applicable ordinances that were considered in the evaluation of proposed project pumping. There is no groundwater management plan, or court orders for the Indian Wells Valley Groundwater Basin, and the basin is not listed on the State Water Resources Control Board (SWRCB)'s list of adjudicated groundwater basins.

DR-S&W-163

Information Required:

Please identify whether onsite construction water supply wells would be used to supply construction water.

a. If yes, please provide site data that indicates a viable water supply and a conceptual model of the site specific hydrogeology in sufficient detail to modify the existing Brown & Caldwell numerical model.
b. Please modify the Brown & Caldwell numerical model based onsite specific data, and calibrate and run sensitivity analysis to evaluate potential drawdown impacts.
c. Please provide an analysis demonstrating the numerical modeling was completed consistent with the techniques/requirements set forth in:
    a. ASTM D5447 - Application of a Ground-Water Flow Model to a Site-Specific Problem
    b. ASTM D5490 - Comparing Ground-Water Flow Model Simulations to Site-Specific Information
    c. ASTM D5609 - Defining Boundary Conditions in Ground-Water Flow Modeling
    d. ASTM D5610 - Defining Initial Conditions in Ground-Water Flow Modeling
    e. ASTM D5611 - Conducting a Sensitivity Analysis for a Ground-Water Flow Model Application
    f. ASTM D5981 - Calibrating a Ground-Water Flow Model Application
d. Please provide an impact analysis on water level declines along with any potential impacts to adjacent water users, overall basin storage, and changes in groundwater quality associated with extracting groundwater for construction purposes at the site.

Response:

Onsite wells will not be used for construction water. Construction water will be provided by Indian Wells Valley Water District initially by trucking and then through the water supply pipeline.

DR-S&W-164

Information Required:

For operational water supply, please include a discussion of the conceptual model used as part of the development of the Brown & Caldwell groundwater model along with a discussion of how effective the calibration was and of the sensitivity analysis of the Brown & Caldwell model. Please summarize the results of the Brown & Caldwell calibration and sensitivity analysis.

Response:

<u>Conceptual Model</u> – The conceptual model includes:

- Physical basin boundaries;
- Estimated special distributions of the alluvial aquifer material properties including hydraulic conductivity and storage parameters;
- Estimated water flow into the basin;
- Estimated water flow out of the basin; and
- A basin scale groundwater budget.

The model domain encompasses the area of the IWV Groundwater Basin (288,000 acres) to a depth of 2,000 feet bgs and is comprised of four layers, developed from the interpretation of lithostratigraphic conditions within the IWV Groundwater Basin. Layer thickness and distribution were developed from the 3-D geologic model and cross sections, and in part, interpolation of the geologic contacts through kriging managed in Surfer™. The model grid was established at a uniform cell size of 1,320 feet by 1,320 feet (1/4 mile on a side, 16 cells per square mile).

Four key hydrostratigraphic features were identified within the hydrogeologic conceptual model. These features include: 1) the existence of a north-south fine-grained sediment plug in the west-central basin, 2) an east-west high permeability gravel zone in the Ridgecrest-Inyokern area, 3) a high groundwater gradient between the neighboring El Paso Sub-basin and the southwest area of the IWV Groundwater Basin, and 4) playa ET losses and changes over time.

Feature #1 – Fine-grained Sediment Plug is a thick and regionally extensive deposit of primarily fine-grained sediments located approximately 3 to 4 miles east of the Sierra Nevada mountain-front. This feature trends north-south. Starting at a depth of approximately 340 feet bls, the deposit is as much as 1,340 feet thick. The large thickness of the fine-grained deposit suggests that a great deal of recharge from the Sierra Nevada canyons to the west, essentially from Five-Mile Canyon south to at least Grapevine Canyon, is “dammed up” behind the fine-grained plug.

Feature #2 – Gravel Zone is a west-east trending region of coarse-grained high permeability sediments. It is present from the mouth of Indian Wells Canyon to approximately the northwest portion of Ridgecrest. This region contains most of the high volume production wells.

Feature #3 – The High Gradient zone refers to a large groundwater gradient (approximately 100 feet per mile) observed across the narrows extending from the El Paso Sub-Basin into the main IWV Basin near the Southwestern Area. Under the current conceptual and numerical flow model, this feature is theorized to be caused primarily by a combination of a narrowing of the area available for flow, possibly by currently unknown shallow bedrock from the Sierra Nevada, and the influx of recharge from Freeman Canyon.

Feature #4 –ET from the playa area was the primary outflow of the groundwater from the IWV Basin until sometime in the 1950s and 1960s when the magnitude of groundwater pumping likely began to exceed it. Because no new data on ET rates was developed for this work, B&C assumed the volume of ET per year in 1920 was equal to the 1920 total estimated flow into the basin. During calibration, a maximum depth to water at which ET could occur was adjusted to a depth of 15 feet and the maximum rate of ET was set at 1.0 feet per year

The wells were simulated as 173 grid independent analytical features. The model calculated water budgets for model years 1953, 1985, and 2006. The 2006 transient water budget is as follows.

Inflows	Mountain Front recharge:	9,500 acre feet per year (AFY)
	Groundwater subflow	1,500 AFY
	Storage	17,346 – 21,246 AFY
	Total inflows	**28,346 – 32,346 AFY**
Outflows	Evapotranspiration	4,000 – 8,000 AFY
	Pumping wells	24,336 AFY
	Total outflows	**28,346 – 32,346 AFY**

Brown and Caldwell then converted the conceptual flow model into a format that could be efficiently modeled using numerical modeling software. This process involved appropriately simplifying the groundwater flow system and calibrating the model.

Calibration and sensitivity analysis. Calibration is the process of adjusting model parameters such as boundary conditions, stresses, and aquifer parameters, to achieve a good match between the simulated and observed hydraulic heads or other relevant hydrologic data such as water budget components. The observed data are called calibration targets. Initial estimates for hydrogeologic parameters are varied within an observed or estimated range of values to improve the model's ability to simulate or predict these targets.

The model was calibrated over the full model time frame (i.e., 1920 to 2006). The calibration was conducted both qualitatively and quantitatively. The qualitative review of the model-calculated flow regime was performed to assess the general groundwater flow system and to provide a subjective indication of the difference between model-calculated and field-measured heads. Quantitative analysis of the model calibration utilized both statistical measures of model residuals and direct comparisons of simulated and observed water levels.

The model was calibrated to historical groundwater elevations from 1920 to 2006. During the calibration process, aquifer physical properties, recharge, and discharge were varied to best match available groundwater elevation data. The calibration used both qualitative and quantitative methods to match historic water levels for years 1920 (assumed steady-state condition), 1953, 1985 and 2006. Calibration targets for the transient portion of the model included measurements from seven periods beginning in 1946 and ending in 2006, with targets ranging from 22 to 225 well locations. From the calibration, Brown and Caldwell concluded that the model can be employed to for future predictive simulations and planning purposes.

Results of calibration and sensitivity analysis. Sensitivity analysis is integrated with calibration. While performing calibration, the modeler determines which parameters are more sensitive to changes with regard to the final model result. By recording the changes made during calibration and evaluating the results, the model designer is performing the sensitivity analysis. During the calibration process, the aquifer parameters, recharge, subflow and ET were varied in an effort to best match available measured historical water level data. The calibrated recharge rates for the recharge areas were generally consistent with the conceptual model rates with the exception of recharge occurring within the El Paso SubBasin which was reduced by 75 percent, and recharge along the northeastern boundary of the model domain which was doubled. In general, the model results match the historical water levels better for the early years (including 1920 and 1953) than for later years (including 1985 and 2006). A review of the 2006 model residuals shows that simulated model water levels are locally overestimated in the vicinity of Ridgecrest. This is likely due to the presence of local pumping depressions. The model underestimated the water levels immediately south of the Playa. This is likely due to local perched groundwater conditions. Based on a thorough set of quantitative calibration criteria, the basin-wide distribution of model water levels deemed appropriate to use the model for future predictive simulations and planning purposes.

The model parameters that are considered well constrained are subsurface outflow from the basin, basin thickness, and groundwater pumping. Model parameters that are considered moderately constrained are mountain front recharge, specific storage and specific yield parameters, and for the saturated alluvium hydraulic conductivity (in the areas of the basin that have well and borings installed). Model inputs or parameters that are considered poorly constrained are hydraulic conductivity where there are no geologic or geophysical logs, subflow into the basin from Rose Valley and Coso Basins, and the magnitude of evapotranspiration that exits the basin over time.

DR-S&W-165

Information Required:

Explain what parameters were used to predict future water level declines in the basin including but not limited to: groundwater production estimates, artificial recharge estimates (if any), hydrologic regimes (wet vs. dry or average conditions) and any other estimates that were used to predict water level declines in the projected water supply well(s).

Response:

Water level fluctuation in a groundwater basin is a result of complicated hydrodynamics involving inflows and outflows. In general, water level rises as the inflows increase, outflows decrease or both, and vice versa. In the Indian Wells Valley Groundwater Basin, the primary inflow to the basin is through mountain front recharge and primary outflows are groundwater extraction from wells and evapo-transpiration. To predict future water level declines in the basins, two factors are considered: 1) demand of water that may increase and results in more pumping from wells; 2) dry or drought conditions that may occur and result in reduction of inflow to the basin.

Seven model simulations (Runs 1, 2a, 2b, 3a, 3b, 4a, and 4b) were conducted to assess and predict water level declines and changes in the basin storage as described under Data Response No.133 above. Details for each simulation and the change in basin storage are presented in Table DR-S&W-133-1. Changes in water levels (drawdown) by comparison to the no project conditions (Scenario 3a/3b) and project pumping (Scenario 4a/4b) are shown on Figures DR-S&W-133-2 and DR-S&W-133-3.

DR-S&W-166

Information Required:

Please clarify what would be the source of water for construction.

Response:

The source of water for construction will initially be through trucking of water from a source through the Indian Wells Valley Water District. The majority of water will be provided through the water supply line along China Lake Boulevard.

DR-S&W-167

Information Required:

Please describe the source of water that would be trucked to the site and what potential impacts would be related to project use.

Response:

The water source for the Project is groundwater provided through the IWVWD. The IWVWD source of water will be provided from the Ridgecrest Heights storage tank. Quality of water from IWVWD is given in Table DR-Soil/Water-167. No data is available for silica. No offsite backup water source is included as part of the Project.

Water received from IWVWD will meet the requirements of the California Department of Health Services for potable water supplies and will not require further treatment for this purpose. Power cycle makeup, mirror washing water, and cooling of ancillary equipment will require onsite treatment for reduction of dissolved solids, and this treatment varies according to the quality required for each of these uses. Based on the water quality of the IWVWD supply and the additional treatment of water for operations, this water supply are not considered have the potential for impacts to the Project.

Table DR-Soil/Water-167 Summary of Water Quality Data (IWVWD Supply)
(all values reported in mg/L)

Analyte	IWVWD Wells[1]	Proposed Project Supply Wells[2]		
	General Water Quality	Well 18	Well 33	Well 34
Arsenic	0.0024 – 0.025	ND	ND	0.004
Bicarbonates (HCO_3)	87 – 150	150	140	140
Boron	0.180 – 1.20	0.26	0.29	0.29
Calcium	7.5 – 68	36	36	38
Chloride	21 – 210	25	30	31
Fluoride	0.43 – 1.20	0.94	0.73	0.62
Magnesium	ND	4.8	5.1	6.3
Nitrate (N)	6.5	1.7	1.8	2
Sodium	35 - 180	41	41	49
Sulfate	ND	43	43	46
Total Hardness ($CaCO_3$)	21 - 250	110	110	120
Total Dissolved Solids (TDS)	220 – 720	290	280	290
Uranium (in pCi/L)	2.1 – 6.1	NS	NS	NS
Gross Alpha Particle Activity (in pCi/L)	0.8 – 7.8	NS	NS	NS
Vanadium	ND - .04	0.014	0.012	0.016
pH	7.2 – 9.0	7.8	7.9	7.2

Key:
mg/L – milligrams per liter
ND – not detected at the practical quantitation limit shown
NS – not sampled
1. IWVWD, 2008.
2. Data provided by the IWVWD.

DR-S&W-168

Information Required:

Please provide a discussion of alternative water supply sources. The discussion should consider but not be limited to: recycled water, brackish water and other non-potable water that could be trucked into the site.

Response:

Table DR-S&W-168 presents the possible sources of recycled or brackish water for the Indian Wells Valley Groundwater Basin. Three options: The City of Ridgecrest wastewater treatment plant, Indian Wells Valley Water District, Northwest Well Field and regional shallow aquifer within the groundwater basin are possible sources of water. These options however, have limitations in terms of:

- Distance to the source and associated environmental impacts from constructing a pipeline, in most cases approximately 12 miles to the Project site.
- Quality of the water: the wastewater treatment plant does not treat to tertiary standards and the shallow groundwater may have TDS concentrations to high to be economical for the Project.
- Availability of the water from the shallow aquifer at a rate sufficient to meet project requirements.

Table DR-S&W-168 Alternative Sources of Water

Potential Water Source	Description
Reclaimed Water from City of Ridgecrest Wastewater Plant	The City of Ridgecrest wastewater treatment plant is located approximately 16 miles from the Project site. Presently, the City produces about 2,800 acre-feet per year (afy) of reclaimed water from the treatment plant, although the City is in the process of raising plant capacity. Of this 2,800 afy output, 750 afy is committed to the U.S. Navy for the NAWS golf course. The City also provides 400 afy for irrigation of an alfalfa field, leaving 1,650 afy available. At this time, the water from the plant is not treated to tertiary standards. The wastewater treatment plant consists of: head works, primary settling tanks, facultative oxidation ponds, and evaporation/percolation ponds. The sludge removed from the wastewater stream is treated with two aerobic digesters and solar sludge drying beds. Excess water is routed to evaporation/percolation ponds that have soil cement side slopes and unlined bottoms. There are approximately 132.2-acres of evaporation/percolation ponds. The location of the existing plant is approximately 3 miles northeast of the City's downtown area and 1 mile east of the intersection of H Street and Pole Line Road. A pipeline from the plant to the project site would be about 12 miles. The new wastewater treatment plant (plant 2) will service the southern portion of the City. At this time, a specific location has not been identified. Part of the scope of work for the project as noted in the RFQ/RFP is to assess several sites. The 2008 Final Project Report presented a proposed plant location on the east side of the City of Ridgecrest, near the intersection of Richmond Road and East Upjohn Ave. The plant construction is scheduled to start in 2011 and be completed by December 31, 2012. Limited details on the new plant would suggest that it will not treat the water for tertiary supply.

Potential Water Source	Description
Brackish Water – Northwest Well Field, North of the Inyo-Kern Airport	Apart from the China Lake area, another area of brackish water is reportedly located north of the Inyo-Kern Airport in the Indian Wells Valley Water District Northwest Well Field. The well field is located on the former Neal Ranch site, on an area of fallowed agricultural land. The well field consists of four wells operated by the District and groundwater reportedly contains total dissolved solids concentrations of approximately 2,300 milligrams per liter (mg/l). The District has undertaken a pilot program to evaluate the feasibility and economics of desalting the high TDS water to augment the potable supply. According to the initial study for the pilot project one of the former agricultural wells could produce between 200 to 500 gallons per minute (gpm). Under the assumption that all four wells could produce at this rate, the well field could produce between about 1,300 and 3,200 afy. The northwest well field is about 12 miles northwest of the Project along Brown Road. The Fine-Grained Sediment Plug located approximately three to four miles east of the Sierra Nevada mountain front and trends north-south roughly aligned along Brown Road. The upper contact of this feature begins at depth of approximately 340 feet bgs and sediments may be as much as 1,340 feet in thickness. The areal extent of this deposit is not well defined due to limited borehole data, and is thought to be Pleistocene lake bed deposit and the site of a historic topographic low in the valley. Sand and gravel deposits reportedly overly the fine-grained sediments at a depth above 340 feet bgs. Reportedly, water quality in this area gets worse with depth.
Shallow Aquifer, China Lake Area	There are two aquifer units in the Indian Wells Valley Groundwater Basin, the shallow aquifer and deep aquifer. The shallow aquifer is an unconfined unit comprised of predominantly fine-grained sediments with occasional lenses of sand that extends from China Lake westward to the center of the valley and from the area south of Airport Lake southward to the community of China Lake. Sediments of the shallow aquifer are as much as 300 feet thick and generally do not yield water readily. Water quality of the shallow aquifer is characterized by high concentrations of total dissolved solids (TDS). The deep aquifer is confined or partly confined by the lacustrine sediments of the shallow aquifer. In the past, water from the shallow aquifer was used only for fire protection and maintenance of a few buildings on China Lake NAWS. Some investigations have indicated that the shallow aquifer in the area of China Lake is semiperched and not in communication with the deeper aquifer within the basin. Brown and Caldwell (2009) in their model of the groundwater basin assigned the shallow aquifer to Layer 1 with a range in hydraulic conductivity of between 20 feet per day (ft/d) to 35 ft/d. No pumping wells were included in Layer 1 of the model. The shallow aquifer is not present in the vicinity of the Project site.

Carollo Engineers. September 2008, Wastewater Treatment Plant No. 2 Final Project Report. Prepared for City of Ridgecrest, California.

City of Ridgecrest – Public Works Department, October 2009, Request for Statement of Qualifications, Consulting Services for City Advisor and Owner's Representative for The New Wastewater Treatment Plant. October 8.

Brown and Caldwell, 2009, Final Indian Wells Valley Groundwater Flow Model and Hydrogeologic Study: Prepared for the Indian Wells Valley Water District, March 27, 2009: Brown and Caldwell, Tucson, Arizona.

Indian Wells Valley Cooperative Technical Advisory Committee and Geochemical Technologies Corporation (Groundwater Management Group), 2006, Cooperative Groundwater Management Plan for the Indian Wells Valley, March. Accessed at http://www.iwvgroundwater.org/.

Krieger and Stewart, Incorporated, 2007, Indian Wells Valley Water District, Initial Study and Draft Mitigated Declaration for the Northwest Well Field Brackish Water Desalting Facilities Pilot Study Project: Krieger and Stewart, Incorporated, Engineering Consultants, Riverside, California.

Kunkel, Fred, and Chase, G.H., 1969, Geology and Ground Water in Indian Wells Valley, California, U.S. Geological Survey, Open-File Report 69-329, January 23, 1969.

DR-S&W-169

Information Required:

Please clarify whether the project water supply would be supplied by IWVWD or another source.

Response:

The Project water supply will be provided by the IWVWD.

DR-S&W-170

Information Required:

Please discuss the specific quantity of water that can be conserved using the proposed mitigation methods.

Response:

In consideration of operational and construction water use and amortizing the construction water use over the term of the Project (30 years), an estimated 215 acre-feet per year needs to be offset. As has been discussed, the groundwater basin is in overdraft and the full proposed water volume will be offset. The following are a portfolio of options that are under consideration to address the offset of the proposed construction and operational water supply:

- Replacement of grass for xeriscaping at homes within the City of Ridgecrest (i.e., cash for grass offset);
- Conversion to low-flow irrigation at City recreational and government facilities; and
- Fallowing of agricultural land within the groundwater basin.

Table DR-S&W-170-1 presents a preliminary assessment of these options and their potential return on water savings. Additional discussion with City of Ridgecrest and IWVWD (District) staff is required to verify the potential quantity of savings. For example, verification of the number of potential residential properties that are available for the program within the District boundaries is required to better understand the potential savings for the “cash for grass” program.

As shown on Table DR-S&W-170-1, depending on the quantities available and accessibility, between 400 and 500 acre-feet per year are available for offset through these options.

At this time, the Applicant has entered into discussions with both City and District staff to discuss the implementation of one or more of these options. Based on these discussions and the timely communication of the quantities available to reduce water use from the City and District, it is anticipated that the final plan can be completed by February 15, 2010.

Table DR-SW-170-1: Summary of Potential Water Offsets - Water Mitigation Options Ridgecrest Solar Power Plant, Ridgecrest Solar I, LLC

Implementing Entity	Mitigation Alternative	DESCRIPTION	Total Offset Vol. (AFY/Acre)
RIDGECREST			
Indian Wells Valley Lucinda Crosby Water District Conservation Coordinator (760) 375-5086 lscrosby@iwvwd.com	Cash for Grass Program (Xeriscaping)	Replace lawn w/ Xeriscape (low water-use landscaping):	
		-Water Savings: 56 gal per sq ft / year [1.,2.]	
		-Number of owner occupied households in Ridgecrest: 6,191 [3.]	
		-Avg # homes that voluntarily participate in Cash for Grass Programs (statewide) 5%	
		5% of 6,191 homes = 310 households in Ridgecrest	
		-Avg lawn size in Ridgecrest = 2,000 sq ft [5.]	
		2,000 sq ft x 56 gal/sq ft / yr = 112,000 gal/yr per household water savings = 0.34 AF/yr	
		310 households x 0.34 AF/yr per household = 105 AF/yr offset vol if 5% homes participate	**105**
		620 households x 0.34 /af/yr per household = 211 AF/yr offset vol if 10% homes participate	**211**
City of Ridgecrest Parks & Recreation Dept	Ridgecrest City Parks: Convert to Low-Flow Irrigation	Replace irrigation system (sprinkler heads) with low-flow irrigation system	
		Freedom Park: 19.8-acre, open turf [6.]	
		Helmers Park: 5-acre lawn & trees [6.]	
		James M. Pearson Memorial Park: 4.5-acre, playground w/basketball court, grass & trees [6.]	
		Kerr McGee Youth Sports Complex: 11.7-acres, 5 baseball fields & 1 football field [6.]	
		Leroy Jackson Park Sports Complex: 56-acres, softball fields, tennis courts, soccer fields [6.]	
		Ridgecrest Senior Center: acreage not listed; combined paved areas & lawn [6.]	
		Upjohn Park: 6-acres; combined playground, basketball court, & lawns [6.]	
		Average Landscape Irrigation Water Use: 1.66 AF/yr per acre [4.]	
		Total Acreage of City Parks: 103 acres (103 ac x 1.66 AF/y per acre) x 0.20 = 34 AF / yr offset vol	**34 [9.]**

Implementing Entity	Mitigation Alternative	DESCRIPTION	Total Offset Vol. (AFY/Acre)
City Facility Buildings	Convert Landscaped Areas to Low-Flow Irrigation	Replace irrigation system (sprinkler heads) with low-flow irrigation system	
		City Hall (landscaped area: TBD)	
		Public Schools (Sierra Sands Unified School District) - landscaped area: TBD	
		Average Landscape Irrigation Water Use: 1.66 AF/yr per acre [4.]	
		Total Acreage of Landscaped City Facilities: TBD	**TBD**
Private Growers	Fallow agricultural land	Total Alfalfa Crop Acreage (Inyokern & Phelan): 971 acres 10.	
		Average size of Alfalfa Farm (Inyo & Phelan): 110 acres	
		Alfalfa crop water use for Southern Lahontan Basin: 5.1 acre-ft per year per acre [7.]	
		Rotationally fallow 50 acres / year	
		Lease or Purchase 100 Acres Alfalfa for Fallowing (50 acres x 5.1 af/yr per acre = 255 af/yr)	**255**
Potential Offset Volume			**394-500**

Footnotes:

1 Indian Wells Valley Water District - www.iwvwd.com
2 Southern Nevada Water Authority (SNWA) - www.snwa.com
3 City of Ridgecrest Demographics (http://profiles.nationalrelocation.com/California/Ridgecrest/)
4 Addink, S. 2004, "Cash for Grass" - A Cost Effective Method to Conserve Landscape Water?, University of California - Riverside Turfgrass Research Facility (http://ucrturf.ucr.edu/)
5 Personal communication between AECOM and Tom Mulvihill (Indian Wells Valley Water District), January 2010.
6 City of Ridgecrest (http://ci.ridgecrest.ca.us/index.aspx?id=174)
7 Department of Water Resources, 1986, Bulletin 113-4: Crop Water Use in California, April.
8 California Evapotranspiration Reference Zones Map, California Irrigation Management Information System (CIMIS), 2009
9 Based on 20% in water savings when converting to low-flow irrigation for Bermuda grass (Addink, 2004).
10 Permitted Crop Boundaries from Kern County Department of Agriculture - www.co.kern.ca.us/gis/downloads.asp

Conversion Factors: 1 acre = 43,560 sq ft; 325,829 gallons = 1 acre foot;

DR-S&W-171

Information Required:

Please provide an assessment of whether the proposed mitigation methods and whether they can achieve the intended savings in the basin.

Response:

The assessment of measures to ensure that the proposed mitigation options can reliably achieve the required offset will be provided in the final plan on February 15, 2010.

DR-S&W-172

Information Required:

Please provide the specific measures that will be used to demonstrate the water conservation would be achieved during the life of the project.

Response:

For proposed mitigation measures, verification of the water savings will be done through comparison of pre-offset and post-offset water use. In the case of the "cash for grass" program, annual residential water use records for each property will be reviewed to develop an average water use prior to xeriscaping and removal of the grass. This "pre-offset" average will be used to compare to the annual property water use following xeriscaping of the property and an annual basis. On an annual basis, a summary of savings will be done by comparing to the pre-offset average against the yearly property water use will be used to determine annual offset savings by the Project.

Details of the proposed monitoring and verification methodology for the portfolio of options will be contained in the final mitigation plan that will be provided on February 15, 2010.

DR-S&W-173

Information Required:

Please provide a revised site layout that allows El Paso Wash to pass through the project with little or no disturbance, or provide a detailed justification explaining why adjustments to the existing site plan cannot be made in order to eliminate the permanent loss of over 1.5 miles of this natural watercourse.

Response:

The RSPP site plan has been redesigned to avoid impacts to the El Paso Wash and is provided as Figure DR-ALT-49-1 and -2.

DR-S&W-174

Information Required:

Please provide analysis and plans or drawings showing overall channel stability in the project area and also specifically within the context of the proposed design, such as how the potential for lateral channel migration in El Paso Wash will be mitigated to prevent impact to the facility.

Response:

The site plan has been redesigned so that impacts to El Paso Wash are minimized and so that the stability of the banks of the Wash are not impacted by scour and migration that may have resulted from Project development and removal of material within the Wash. The Project is now located outside of the floodplain and beyond the banks of the Wash.

DR-S&W-175

Information Required:

Please include in the peak discharge table values taken from the effective Flood Insurance Study (FIS) for the area as well values calculated using the appropriate USGS Regional Regression Equation for the subject area. In addition, please consult the local BLM office to obtain relevant information from previous studies related to El Paso Wash and include this data in the drainage report.

Response:

The flow rates from the FIS as well as the other calculated flow rates and the City of Ridgecrest Master Drainage Plan will be provided with the new Project Drainage Report on February 24, 2010.

DR-S&W-176

Information Required:

Please provide a map showing the extents of soil types within each watershed as well as information correlating the specific soil types with the designated hydrologic soil groups.

Response:

This information will be provided with the new Project Drainage Report on February 24, 2010.

DR-S&W-177

Information Required:

Please provide a detailed analysis of the depth and extent of the existing and developed floodplain using an industry accepted methodology such as HEC-RAS. This analysis should utilize recent detailed topography and should accurately model the transitions from natural floodplain to constructed channel and back to natural floodplain. This analysis should follow FEMA guidelines for mapping riverine type drainages and for providing an acceptable tie-to the existing mapped floodplain.

Response:

This information will be provided with the new Project Drainage Report on February 24, 2010.

DR-S&W-178

Information Required:

> If the proposed design includes the diversion of El Paso Wash, please provide a detailed analysis using an industry accepted methodology such as HEC-RAS or HEC-6 that demonstrates similar sediment transport capacities within the natural and constructed channels for the 2- and 10-year flows. The model must demonstrate that significant erosion or deposition will not occur as a result of imbalanced sediment transport capacities.

Response:

Diversion of the El Paso Wash has been removed from the proposed Project and there will be no development within the El Paso Wash except for one new pipe bridge crossing which is approximately 100 feet wide, and some localized drainage channel connections between the Project site and the El Paso Wash.

DR-S&W-179

Information Required:

> Provide design details for the confluences of the diversion channels with the original natural channels that demonstrate how the design will achieve long term stability at these locations.

Response:

Diversion of the El Paso Wash has been removed from the proposed project and therefore there will be no confluences between the diversion channels and the natural channels.

DR-S&W-180

Information Required:

> Provide a detailed explanation of the data and assumptions used to complete the above referenced analysis as well as all associated data including digital input and output files for all hydraulic models.

Response:

This information will be provided with the new Project Drainage Report on February 24, 2010.

DR-S&W-181

Information Required:

Please provide a CLOMR application, completed to FEMA standards, so the extent of modifications to the existing FEMA mapped floodplains can be reviewed.

Response:

A CLOMR is currently in process of being prepared to identify changes to the floodway and floodplain with support of calculations inasmuch as the current mapping was applied without support of hydraulic modeling or calculations. Once the CLOMR is prepared, it will be provided to the CEC, the USACE, and Kern County for review and comment. The CLOMR application with supporting materials is anticipated to be submitted for review on February 24, 2010.

DR-S&W-182

Information Required:

Please provide design details that show the proposed channels control or prevent bank erosion and headcutting due to the interception of flows by the proposed diversion channels. All bank protection and erosion control measures, including grade control structures, must be traversable (4:1 slope or flatter) and not present an entrapment hazard to wildlife. More specifically, it has been determined the project site is Desert Tortoise habitat, and as such, bank protection measures such as dumped riprap, stacked gabions, or gabion mattresses would not be acceptable. Soil cement has been identified as the most probable alternative as it would prevent headcutting due to flow over the channel banks and would provide a traversable and quasi-natural surface. The use of bio-stabilization measures and/or geotextiles are not considered viable alternatives.

Response:

All slopes associated with the drainage channels and bank protection measures are 3:1 or flatter in accordance with provisions noted by CDF&G for desert tortoises. There is no riprap, gabions, or geotextile fabrics used on the Project. All bank protection measures will be provided by using soil cement. Details associated with the application of soil cement on embankments will be provided as part of the Conceptual Engineering Plans to be submitted on February 10, 2010.

DR-S&W-183

Information Required:

Provide detailed grading plans showing the geometry of the proposed diversion channels and how they would tie into existing grade.

Response:

Engineering grading plans and details associated with the Project, specifically related to drainage will be provided as Sheets C-04 to C-08 in the Conceptual Engineering Drawings, to be provided on February 10, 2010.

DR-S&W-184

Information Required:

Provide profiles for each channel that include existing and proposed grade along both the finished flowline as well as right and left top of banks. These drawings should be at a scale of no smaller than 1"= 200'. Also, please provide cross-sections through the collector/diversion channels every 100' which show existing and proposed grade and clearly demonstrate how these channels will tie into existing grade and into the proposed facility.

Response:

The channel profiles will be provided as part of the Conceptual Engineering Drawings to be provided on February 10, 2010. Details of the connections between the channels and the existing grade will be provided as part of these plans.

DR-S&W-185

Information Required:

Please provide documentation and analysis for establishing project specific non-erosive channel velocities based onsite soils, incoming sediment load, and the calculated 10-year flow.

Response:

A new Drainage Report is being prepared and will be provided on February 24, 2010 as part of this data request. This report verifies that the velocities in the engineered channels for the calculated 10 year flow are non-erosive. The drainage channels have been provided with drop structures (protected with soil cement) and relatively flat channel slopes to create a non-erosive channel profile.

DR-S&W-186

Information Required:

If required to reduce channel slope and velocity to acceptable values, provide detailed design plans for grade control structures. The use of channels without bank protection around the periphery and through the project would require it be demonstrated there are not significant side flows entering the channel, and that 10-year flow velocities are within the acceptable range for site specific conditions. Please clearly delineate all channel reaches where no bank protection is proposed and provide specific and detailed data to demonstrate compliance with the previously stated criteria.

Response:

Detailed plans for the grade control structures/drop structures are shown on the detail sheets as part of the Conceptual Engineering Drawings that will be submitted on February 10, 2010. Detail plans will also be provided for the bank protection around the periphery and in the areas of side flow entering the channel. The grading plans will delineate the areas where no bank protection is proposed.

DR-S&W-187

Information Required:

Please provide a detailed justification of why a 100-year capacity is required in the diversion channels.

Response:

The life span for this facility is anticipated to be from 30 to 60 years. The facility is designed to have large level areas for the solar collectors with intermittent drainage swales. The site is extensively developed with support structures for the solar collectors, access roadways for daily maintenance to the solar collectors, large (12 to 60 inches) insulated HTF pipes that are placed on short support above the ground, and graded terraces between areas of the site. If a large storm event were allowed to come onto the site, the swales between the solar collectors would likely be reshaped, the terraces would be damaged, the HTF pipe supports would be affected (which could cause spills of fluid) and the site roadways would possibly be impacted. The ability to access the site with large equipment to repair this type of damage would be problematic. The extent of damage that could be caused by this type of event needs to be precluded, and protection provided by designing the channels to carry the 100-year storm is prudent.

DR-S&W-188

Information Required:

Please provide documentation that the depth/width ratios in the channels would not likely result in the incision of a low-flow thalweg within the channel given the proposed slopes or that the potentially reduced velocities would not result in significant sediment deposition. If these are potential issues please consider the use of a compound section with a pre-constructed low-flow channel to more efficiently carry flow from the more frequent events.

Response:

The peripheral offsite drainage channels associated with this site are all relatively small and as such, it is anticipated that these channels will be allowed to return to as natural a state as can be provided. Vegetation will be allowed to re-establish in the channels, but will be limited to a height of 8 inches so that drainage conveyance is not affected. As such a low flow thalweg is not precluded. The only concern associated with a low flow thalweg in this channel is the possibility that the low flows, over time will affect the side slopes. The side slopes of the channels have been designed with 3:1 side slopes or flatter to mitigate this effect and a channel maintenance plan has been established to provide continual observation of the channel. If needed, the low flow thalweg will be re-directed away from the side slopes by cutting a new section of low flow channel with small equipment if channel maintenance personnel determine that it is required. The soils onsite are not supportive of the creation of a compound channel section inasmuch as larger storm events would completely destroy this compound channel section and major maintenance and repair would be required.

DR-S&W-189

Information Required:

Please identify whether any chemical or mechanical methods would be used for soil stabilization at the site.

Response:

There are no chemical or mechanical methods that will be used for soil stabilization on the site other than the initial compaction effort during the grading operations; the use of soil cement in the channels and at locations as previously noted; and on the graded terraces on-site that are established as 2:1 slopes that will be provided with annual spray of a dust palliative.

DR-S&W-190

Information Required:

Please provide a detailed discussion of the increased potential for onsite runoff volumes due to compaction and possible soil stabilization methods to be employed at the facility.

Response:

The existing soils onsite are very compact and very dense in their natural condition. The soils report from Kleinfelder provides information related to this existing condition. The mechanical compaction that will be provided to these soils during the grading operation has relatively no effect on the potential of these soils for increased runoff, due to the fact that the soils are relatively consistent throughout the site and are at their maximum density in their pre-development condition. In fact, the density of the soils in the pre-development condition is denser than will be achieved during the site grading. The slight decrease in soil density that will occur as a result of grading will actually allow a very minor increase in the permeability of the soil, however, this increase in permeability has been ignored inasmuch as the affect is so minor. The selection of CN values associated with the drainage channels and site soils reflects this evaluation. The pre-development CN value was established as 95 and the post development CN value was established as 95. The soil stabilization methods used onsite will only be used during the construction stages and will not have a detrimental effect on the site runoff inasmuch as the dust palliatives will primarily be water based products which allow continued permeability. In addition, the soils as currently defined are nearly impermeable and the use of soil stabilizers, even oil based products will have no real effect. In the area of the power block, a small detention basin (1 acre in size) will be provided to capture water from the power block to further mitigate any perceived impact of increased flows from the post development site.

DR-S&W-191

Information Required:

Please provide detailed information on the estimated discharges at each of the onsite drainage outfall locations, as well as detailed design plans to demonstrate how these points of outfall would be protected from erosion.

Response:

A new Drainage Report is being prepared and will be provided on February 24, 2010 as part of this data request. The detailed information at the outfall locations will be documented in the drainage report. At these locations, standard connection details (Kern County or APWA) will be provided such as headwalls, storm drain pipes, protected downdrains, and/or soil cement channel aprons. The Conceptual Engineering Plans to be provided on February 10, 2010, will provide references to these details.

DR-S&W-192

Information Required:

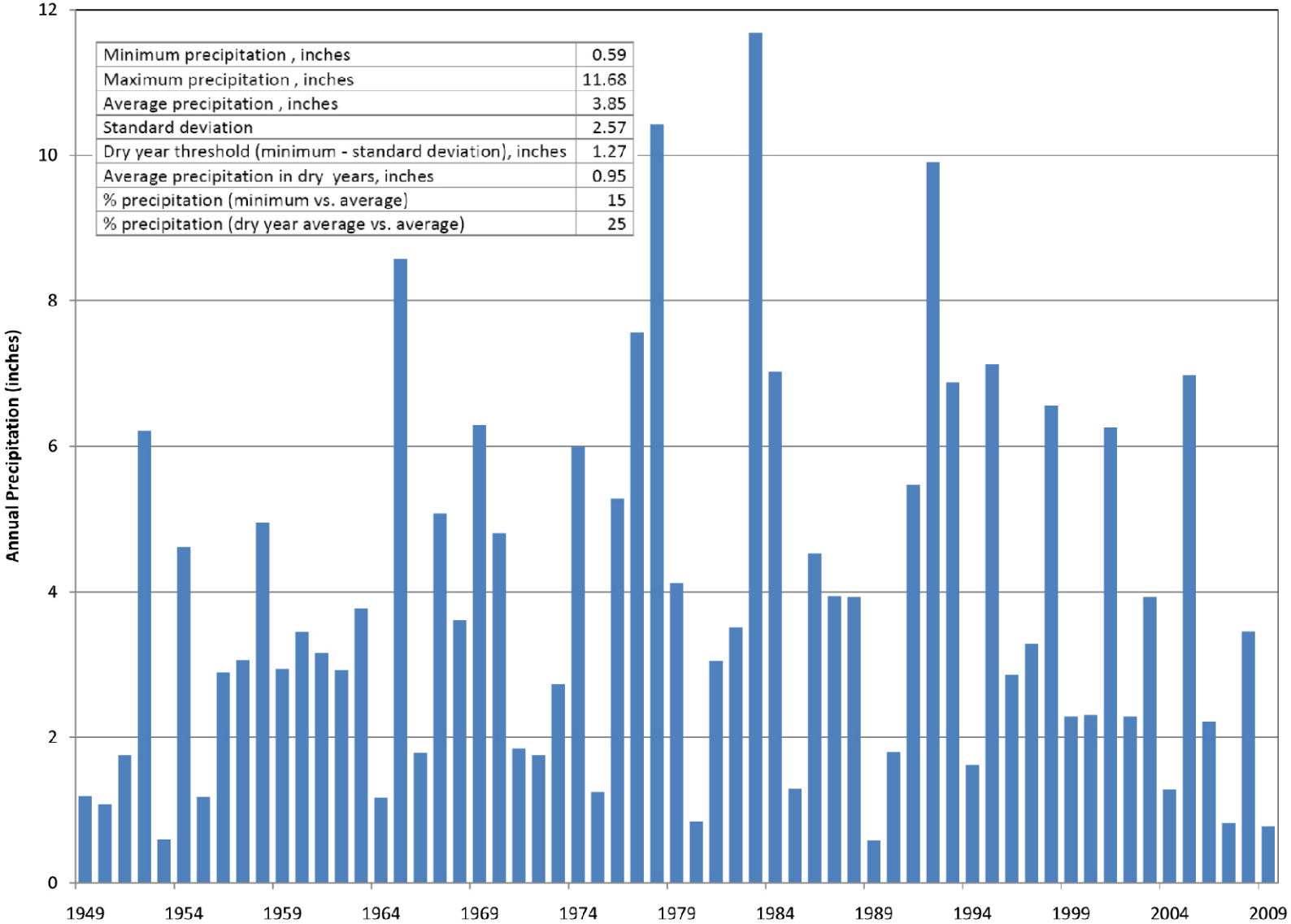
> The Drainage Report and associated hydrologic modeling must specifically address the issue of potential increases to downstream peak discharges. The hydrologic modeling must accurately represent the existing and proposed condition with respect to differences in runoff potential, floodplain routing and potential peak flood attenuation. In reference to the routing reach geometry used in the existing conditions model, Section 2.5 in the Drainage Report states "These bottom widths are conservative in that the actual channels will be wider and shallower that would lead to a slower velocity." This approach may lead to an overestimated existing peak discharge by not appropriately accounting for existing floodplain attenuation. It may also under estimate the difference between existing and developed peak discharges once the engineered channels are constructed and provide little flood peak attenuation. The analysis must demonstrate the proposed design would not increase downstream peak discharges.

Response:

A new Drainage Report is being prepared and will be provided on February 24, 2010, as part of this data request. This report provides the analysis, mapping, and discussions related to the flows adjacent to and from the Project site, the peak discharges, the floodplain depths, and the flows downstream of the site.

Attachment

Soil and Water Figures



Minimum precipitation , inches	0.59
Maximum precipitation , inches	11.68
Average precipitation , inches	3.85
Standard deviation	2.57
Dry year threshold (minimum - standard deviation), inches	1.27
Average precipitation in dry years, inches	0.95
% precipitation (minimum vs. average)	15
% precipitation (dry year average vs. average)	25

Map Location

Ridgecrest Solar Power Project

Figure DR-S&W-133-1
Inyo-Kern Station
Annual Precipitation
1949 - 2009

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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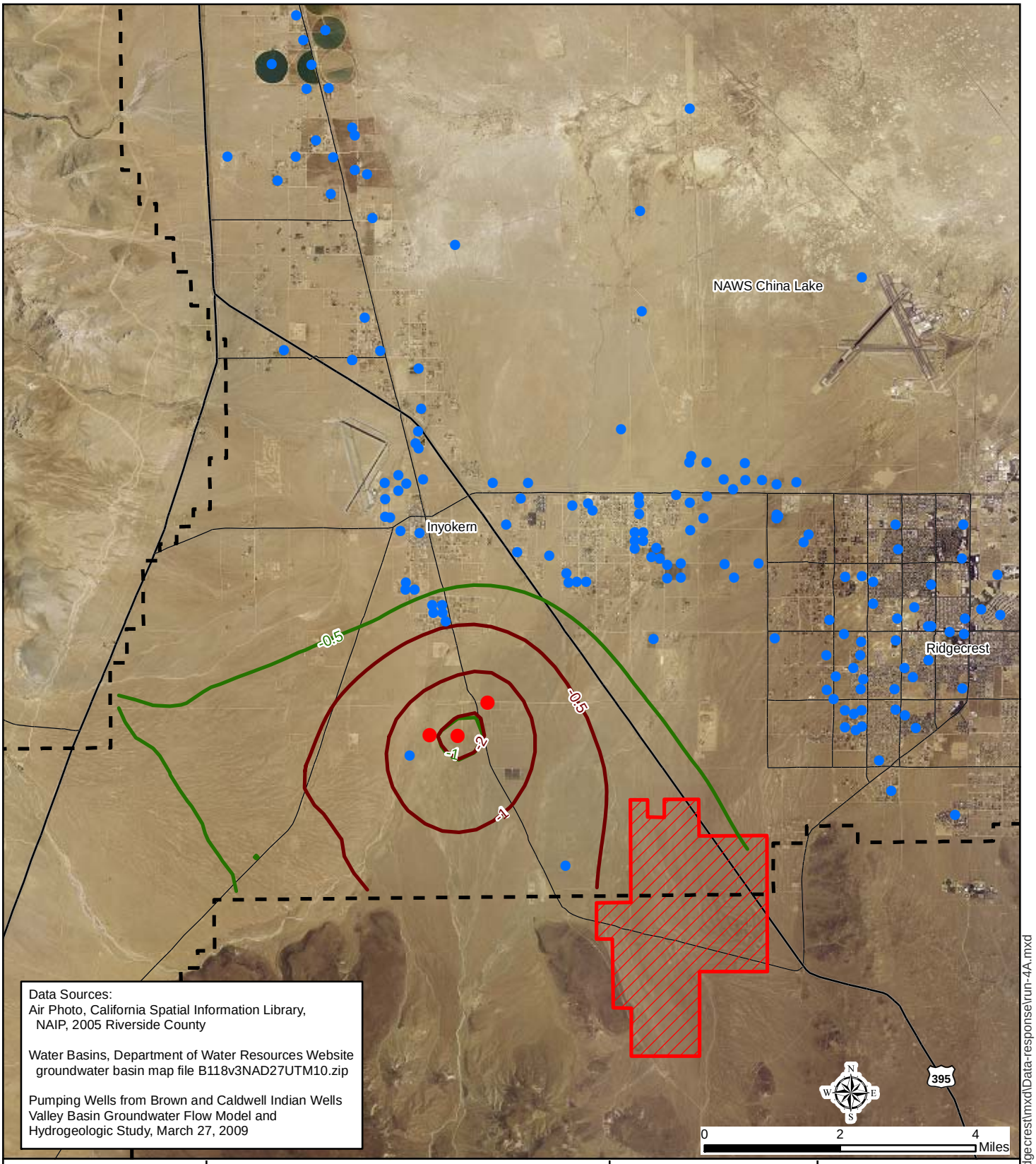

Data Sources:
Air Photo, California Spatial Information Library, NAIP, 2005 Riverside County

Water Basins, Department of Water Resources Website groundwater basin map file B118v3NAD27UTM10.zip

Pumping Wells from Brown and Caldwell Indian Wells Valley Basin Groundwater Flow Model and Hydrogeologic Study, March 27, 2009

Map Location

Legend

- Project Right-of-Way
- Model Boundary
- Pumping Well Locations based on Brown and Caldwell Pumping Well Database
- Pumping Wells used in the Simulation (Well No. 18, 33 & 34)

Water Level Difference in Feet

- 2013
- 2043

Simulation with Dry Years at 25% of Recharge

Ridgecrest Solar Power Plant

Figure DR-S&W-133-2 Predicted Water Difference 2013 and 2043 Scenario(3a) and Project (4a)

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

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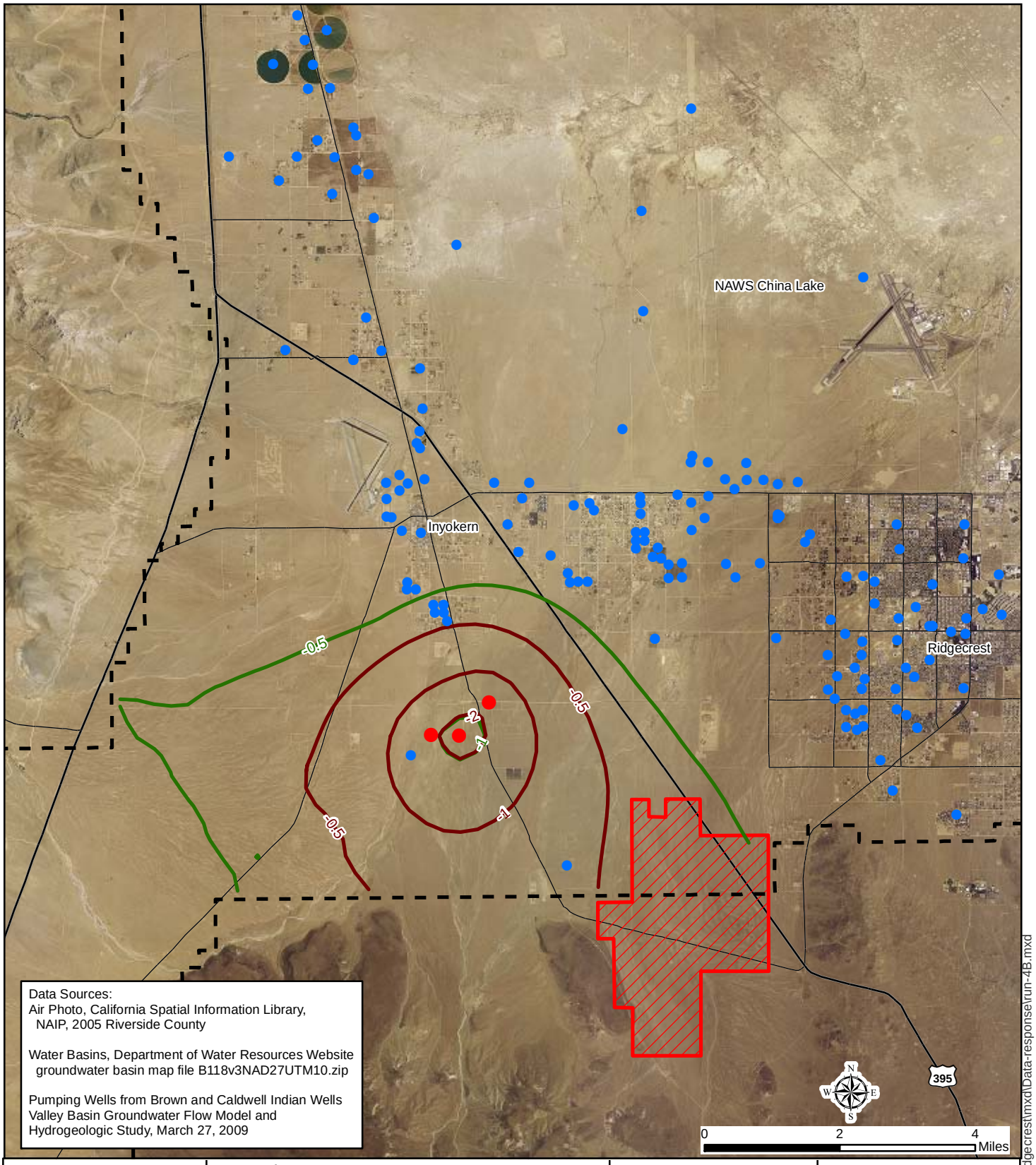


Data Sources:
Air Photo, California Spatial Information Library, NAIP, 2005 Riverside County

Water Basins, Department of Water Resources Website groundwater basin map file B118v3NAD27UTM10.zip

Pumping Wells from Brown and Caldwell Indian Wells Valley Basin Groundwater Flow Model and Hydrogeologic Study, March 27, 2009

Map Location

Legend

- Project Right-of-Way
- Model Boundary
- Pumping Well Locations based on Brown and Caldwell Pumping Well Database
- Pumping Wells used in the Simulation (Well No. 18, 33 & 34)

Water Level Difference in Feet

- 2013
- 2043

Simulation with Dry Years at 15% of Recharge

Ridgecrest Solar Power Plant

Figure DR-S&W-133-3 Predicted Water Difference 2013 and 2043 Scenario(3b) and Project (4b)

Solar Millennium

AECOM

Project: 60139696
Date: January 2010

J:\GIS\Projects\SolarMillinneum\Ridgecrest\mxd\Data-response\run-4B.mxd

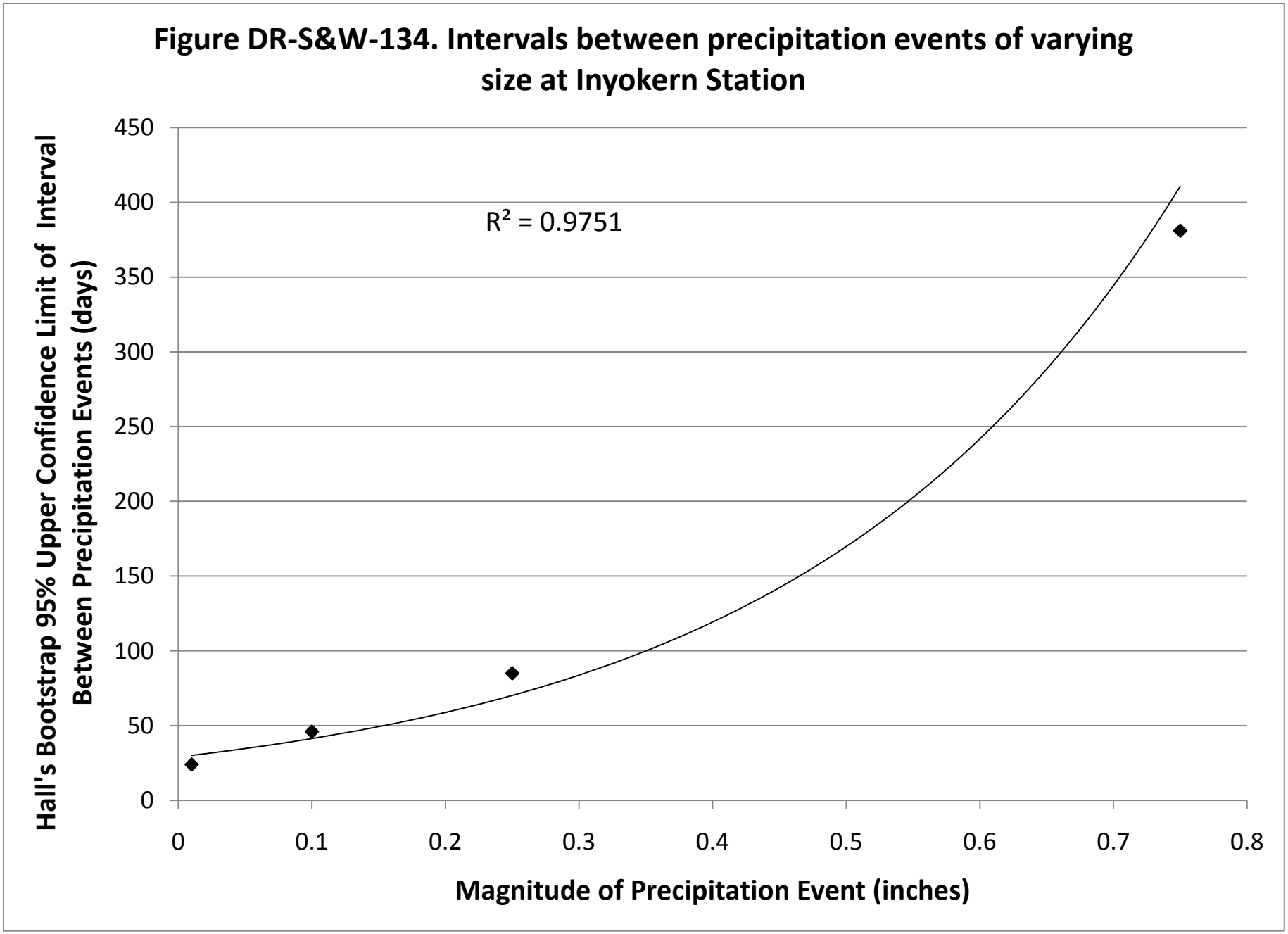


Figure DR-S&W-134. Intervals between precipitation events of varying size at Inyokern Station
Hall's Bootstrap 95% Upper Confidence Limit of Interval Between Precipitation Events (days)
450
400
350
300
250
200
150
100
50
0
R² = 0.9751
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Magnitude of Precipitation Event (inches)

Attachment DR-SW-133

Indian Wells Valley Water District
Domestic Water System
Production Demands and Production Capacity

Attachment DR - S&W - 133

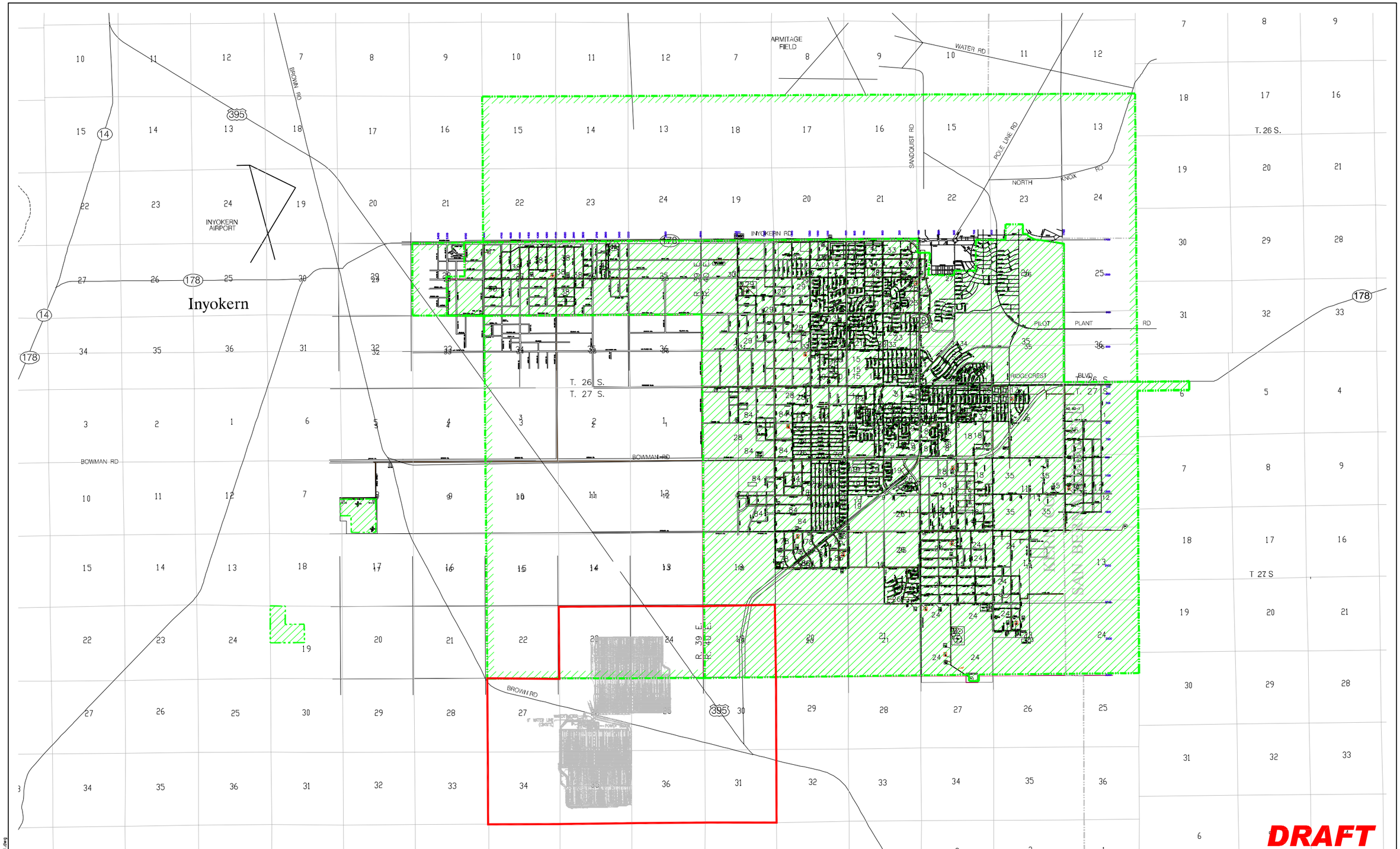
INDIAN WELLS VALLEY WATER DISTRICT
DOMESTIC WATER SYSTEM
PRODUCTION DEMANDS AND PRODUCTION CAPACITY

YEAR	Historical Production Demand Acre-Feet	Projected Base Demand By Least Squares Acre-Feet (1)	Navy Connections		Navy Connections with 1.7 Service Multiplier		Navy Non-BRAC Demand Acre-Feet	BRAC Demand Acre-Feet	Average Annual Demand	
			Non-BRAC	BRAC	Non-BRAC	BRAC			w/o BRAC Acre-Feet	w/BRAC Acre-Feet
1997	8336								8336	8336
1998	8699								8699	8699
1999	8154								8154	8154
2000	8331								8331	8331
2001	8447								8447	8447
2002	8865								8865	8865
2003	8605								8605	8605
2004	8992								8992	8992
2005	8543								8543	8543
2006	8865								8865	8865
2007	9077								9077	9077
2008	8496								8496	8496
2009	8413 (2)								8413	8413
2010		8800	100	500	170	850	120	590	8920	9510
2011		8820	100	500	170	850	240	1180	9060	10240
2012		8850	100		170		360	1180	9210	10390
2013		8880					360	1180	9240	10420
2014		8910					360	1180	9270	10450
2015		8940					360	1180	9300	10480
2016		8960					360	1180	9320	10500
2017		8990					360	1180	9350	10530
2018		9020					360	1180	9380	10560
2019		9050					360	1180	9410	10590
2020		9070					360	1180	9430	10610
TOTALS					510	1700				

NOTES
(1) Slope = 27.815, Intercept=-47112
(2) Production for December 2009 based on average of December production from 2006 – 2008

Attachment DR-S&W-153

Potential Annexation Map



LEGEND

IWVWD BOUNDARY

IWVWD SPHERE OF INFLUENCE LIMITS

POTENTIAL ANNEXATION FOR SOLAR MILLENNIUM

SCALE: 1"=3000'

KRIEGER & STEWART INCORPORATED
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900

INDIAN WELLS VALLEY WATER DISTRICT

DISTRICT BOUNDARY
POTENTIAL ANNEXATION FOR SOLAR MILLENNIUM

FIGURE 1 OF 1

SCALE: 1"=3000' | DATE: 01/13/10 | DRAWN BY: SPK/ERB | CHECKED BY: CAK | W.O. 78-1.32

\178\1-32\Figures\178-1-32f1.dwg

Attachment DR-S&W-158

Indian Wells Valley
Cooperative Water Management Group Working Group
2010/2011 Objectives

INDIAN WELLS VALLEY

COOPERATIVE WATER MANAGEMENT GROUP

WORKING GROUP 2010/2011 OBJECTIVES

Planning Objective No. 1
Limit additional large scale pumping in areas that appear to be adversely impacted.

- Continue to measure water quality and level changes throughout the basin and produce an annual summary document that can be used as a tool for future planning.

Planning Objective No. 2
Distribute new groundwater extraction within the Valley in a manner that will minimize adverse effects to existing groundwater conditions (levels and quality), and maximize the long-term supply within the Valley.

- Collect baseline data for new pumping areas and continue monitoring for changes.
- TAC will be available to assist major producers in the location of new wells.

Planning Objective No. 3
Aggressively pursue the development and implementation of water conservation policy and education programs.

- Continue development and support of the Cooperative Groundwater Management Group's website.
- Conservation tips and new information pertaining to water resources in the Indian Wells Valley will continue to be part of the Working Group's website.
- Continue annual support of the SEEP Program.
- Encourage the use of drip irrigation systems.
- Publicize and distribute resources including the booklet on Xeriscape landscaping, the Working Group's water conservation policy, and the pamphlet on re-use of gray water.
- The Indian Wells Valley Water District (Water District) will:
    - Hold Xeriscape workshops.
    - Continue the Xeric Ambassador program for educational outreach.
    - Participate in public events such as the Home and Leisure Show to distribute water saving devices (shower heads, hose nozzles, and faucet aerators) and conservation information.
    - Recognize xeriscape landscapes.
    - Publish a quarterly newsletter with conservation page for its customers.
    - Provide assistance for water use and leak detection.
    - Evaluate SmartSet timers for large area applications that will adjust landscape watering based on weather conditions.
- The Navy will:
    - Continue to implement their Water Conservation Policy (revised in 2008).
    - Continue to replace older irrigation systems with SmartSet timers that adjust to local weather conditions.

- Continue to educate the NAWS-China Lake community and residents with water conservation information and newletters/articles.
- Continue to support the Cooperative Groundwater Management Group's website with water conservation tips and information.
- Continue its leak detection and storage reservoir rehabilitation program.
- Recognize Xeriscape landscape and replace turf with low-water use, drought-tolerant plants where practical.
- Support the Indian Wells Valley Water District Xeriscape workshops.
- Continue to submit quarterly reports to NAVFAC in support of the Environmental Management System (Significant Aspect-Natural Resource Consumption (potable water)).

- Searles Valley Minerals will:
  - Replace a significant portion of their Westend system potable water production line between China Lake Boulevard and their storage tank east of Ridgecrest along Highway 178. This portion of the system has been prone to frequent failure due to the age of the pipeline.
  - Review their metering system for potable water production and use and update the weekly production and use report to improve accountability for water use.
- The Water District and the City of Ridgecrest, with the involvement of Kern County, will develop a landscape ordinance for new development that meets or exceeds State requirements.
- Recognize and target State mandates for water conservation.

Planning Objective No. 4
Encourage the use of treated water, reclaimed water, recycled, gray and lower quality water where appropriate and economically feasible.

- Explore the feasibility of transferring water from the treatment facility operated by the City of Ridgecrest for beneficial use within the Indian Wells Valley or at Searles Valley Minerals' facilities in Searles Valley to possibly offset existing production.
- The Naval Air Weapons Station (NAWS) continues to use reclaimed water from the wastewater treatment facility to water the golf course.
- NAWS will continue to explore projects to re-use additional water from the wastewater treatment facility.
- Develop a plan to comply with SBX7-7 regarding water conservation.

Planning Objective No. 5
Explore the potential for other types of water management programs that are beneficial to the Valley.

- The Water District is exploring an aquifer storage and recovery project.
- Continue to pursue funding for a Watershed Coordinator.
- Continue participation in and support for development of the Integrated Regional Water Management Plan.

Planning Objective No. 6

Continue cooperative efforts to develop information and data which contributes to further defining and better understanding the groundwater resource in the Indian Wells Valley.

- With completion of the second AB303 Grant, pursue implementation of recommendations for future potential grant proposals for acquisition of drilling sites, installation of monitoring wells in the major canyons, chemical and isotope analysis of canyon groundwater systems, development of representative chemical/isotope flow paths in the canyon groundwater systems, development of a lithologic model for the entire basin, regular chemical samples of water wells and increased groundwater level monitoring.
- Work toward standardization of data reporting that will facilitate establishing and maintaining a basin-wide database.
- Continue aquifer data collection to support further refinement of the groundwater flow model for the basin developed in 2009.
- Continue support of Remote Automated Weather Stations (RAWS) to collect weather/climate data and evaluate installation and support for additional sites.
- Continue to compile annual production information.
- Develop a map with well locations to indicate production areas and intensity of pumping.
- Continue to evaluate water quality and level changes throughout the Valley as resources allow.
- Formalize the groundwater monitoring program to comply with SBX7-6.

Planning Objective No. 7
Develop an inter-agency management framework to implement and enforce the objectives of this Plan.

- This objective was achieved with the drafting and acceptance of the Steering Committee Operating Guidelines in January 1997.