RIDGECREST SOLAR POWER PROJECT (09-AFC-9)
DATA ADEQUACY SUPPLEMENT

Technical Area: Water Resources **Response Date: October 26, 2009**

Following are additional information and/or clarifications in response to the specific issues raised in the CEC staff Data Adequacy review. For each specific area where the questions were raised by CEC staff, the applicable section of the CEC Siting Regulations is identified, followed by the "Information Required to Make AFC Conform with Regulations," followed by the supplemental/clarifying information.

DA-WATER-1. Appendix B (g) (14) (A) (i)

Information Required:

Please provide the information necessary for the US Army Corp of Engineers (USACE) to make a determination indicating whether the drainages on the project site are waters of the United States.

Response:

A Jurisdictional Delineation Report of the Project site including the water pipeline route, was prepared by the Applicant and has been provided to the USACE (October 23, 2009). It is provided in Attachment BIO-F of the Biological Resources response.

DA-WATER-2. Appendix B (g) (14) (A) (ii)

Information Required:

Please provide the information necessary for the USACE to make a determination indicating whether the drainages on the project site are "waters of the United States."

Response:

See the response to DA WATER-1 above.

DA-WATER-3. Appendix B (g) (14) (C) (ii)

Information Required:

Provide copies of background material used to create this description (e.g. laboratory analysis). Please provide detailed water quality characteristics associated with water supply source water and reverse osmosis (RO) reject water.

Response:

The following table provides detailed water quality characteristics associated with water supply source water and RO reject water. Table 5.17-6, "Summary of Water Quality Data", is attached showing the water quality data provided by the Indian Well Valley Water District (IWVWD) for the source water that will be piped from the proposed water supply wells to the Project.

Table 5.17-6
Summary of Water Quality Data
(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
NS – not sampled
[1] IWVWD, 2008 (Annual Water Quality Report).
[2] IWVWD, 2009 (personal communication with IWVWD onsite-specific well data).

The general water chemistry was provided from information published in the IWVWD Annual Report for 2008. The reference to this report is provided below:

- Indian Wells Valley Water District (IWVWD), 2008, Annual Water Quality Report - Water Testing Performed in 2008, PWS ID# 1510017.

Well specific data was transmitted by the IWVWD and are from groundwater samples collected in April 2008 (Well No. 18 and No.33) and February 2007 (Well No. 34). Certified analytical laboratory reports are provided in Attachment WATER-A.

Table WATER-3 below presents the estimates of effluent water quality for the RO reject. The estimates on water chemistry were provided using an estimate of influent water chemistry as shown on Table 3 in the Water/Wastewater Report (Appendix J).

Table WATER-3
Supplemental Data[1]
Predicted Reverse Osmosis Effluent Water Quality
(all values reported in mg/L)

Analyte	General Water Quality
Bicarbonate (HCO_3)	1,170
Boron (B)	3.6
Calcium (Ca)	669
Chloride (Cl)	2,448
Fluoride (F)	8.5
Magnesium (Mg)	0
Nitrate (NO_3)	0
Potassium (K)	0
Sodium (Na)	1,593
Sulfate (SO_4)	354
TDS	6,782

Key:
mg/L – milligrams per liter
ND – not detected at the practical quantitation limit (PQL) shown
NS – not sampled
1 Estimated from influent water quality data shown on Table 3 in the Water/Wastewater report (Appendix J of the AFC).

Discussion of Drainage Questions

The existing drainage channels on the Ridgecrest site and their extensions in down slope areas will be directly or indirectly affected by on-site improvements and site drainage diversions, and the Applicant recognizes that the resource agencies have a high level of interest in understanding both pre-existing and post-construction surface flow regimes on the sites. Anticipating this interest, Solar Millennium and AECOM have performed significant hydrologic modeling for the RSPP site as input to the civil design development provided in the Plan of Development (POD) and Application for Certification (AFC), and currently being refined in response to comments from Psomas (July 9, 2009). The initial results of this planning effort are reflected in the drainage report that was prepared for the RSPP and included in Appendix L of the AFC. In accordance with discussions to date with CEC staff, the following items for the RSPP will be submitted on the dates noted herewith:

Data to be supplied with the Data Adequacy Response Submittal - October 26, 2009

- A brief narrative for the Ridgecrest site summarizing the existing 100-year flows across the sites (DA-WATER-4).
- The Ridgecrest site has FEMA-defined channels that either cross the site or are adjacent to the site with mapped 100-year floodplains. These pre-development 100-year flow boundaries will be shown on a site map (Attachment WATER-C).
- A map for the Ridgecrest site showing the post-development 100-year flow paths will be provided (Attachment WATER-C). The map provided will reflect Federal and state waters jurisdictional delineation work and associated mapping performed to date.
- The drainage report for each site has already been provided as Appendix L in the AFC submittal documents
- The assumptions, references, evidence, and calculations associated with the proposed 100-year flows are currently identified in the Drainage Report. A summary of these items are provided with references back to the existing Drainage Report (DA WATER-7).

Data to be supplied by November 25, 2009

- The HEC RAS input files will be provided for Ridgecrest

DA WATER-4. Appendix B (g) (14) (D) (i)

Information Required:

Please provide mapping showing the pre- and post-development 100-year floodplains.

Response:

The Ridgecrest site has Federal Emergency Management Agency (FEMA) defined channels that either cross the site or are adjacent to the site with mapped 100-year floodplains. These existing 100-year flow boundaries are shown on a pre-development map in Attachment WATER-C. Post-development 100-year flow paths for the RSPP is provided in Attachment WATER-C. The maps provided reflect channel Federal and state delineation work and associated mapping performed to date.

Drainage Summary of Existing Site Area

The existing pre-development drainage flows on the Ridgecrest site are primarily 'concentrated' type flows within one well defined wash and two wide shallow depressions. The primary drainage feature on the site is the El Paso Wash, which is a south to north trending, well-defined and incised channel. This channel carries water primarily from upstream off-site properties as far as six miles to the south. The El Paso Wash has been categorized as a California Department of Fish and Game (CDFG) jurisdictional wash (see Attachment BIO-F for the Jurisdictional Delineation report). The wash currently cuts across the northeast corner of Solar Field #2 (south of Brown Road) and partially curves into the westerly edge and southwesterly corner of Solar Field #1 (north of Brown Road). The El Paso Wash has been mapped by FEMA and has boundaries noted in the

Flood Insurance Rate Maps (FIRMs). This channel provides the drainage outlet for approximately 70% of the southerly solar field and approximately 50% of the northerly field.

A second wash located primarily offsite and west of Solar Field #1 is an un-named wash but has also been mapped by FEMA. This wash has also been categorized as a CDFG jurisdictional wash per the mapping provided in the Jurisdictional Delineation Report (see Attachment BIO-F). This wash is also a south to north tending flow and receives approximately 30% of the drainage that currently flows from the existing area of the south field. This existing wash connects to El Paso Wash approximately one mile northwest of Solar Field #1.

A third wash, located primarily in the center of the proposed north field, is an un-named wash and has also been mapped by FEMA. This wash is only marginally definable at this time and has not been categorized as having any jurisdictional impact. This wash is also a south to north tending flow and receives approximately 50% of the drainage that currently flows from the existing area of Solar Field #1.

Existing Onsite Flows

The drainage flows that currently exist on the areas of the proposed solar fields are basically wide very shallow overland flows that do not concentrate to any degree until they flow into one of the three aforementioned washes. The existing 100-year flow boundaries of the washes on the Project site are provided in Attachment WATER-C. The existing ground is highly consolidated throughout the site (near, or at maximum density per the geotechnical report) and very little water infiltrates into the ground. The percolation tests that have been performed on this site generally average 60-90 minutes per inch. The rainfall that falls on the surface of the site appears to all drain to the existing washes with little to no infiltration due to surface densities and the type of soil material throughout the site and the high evapotranspiration rate for the area. The drainage water that reaches the three drainage washes under current conditions is contained in the washes as noted by the maps (Attachment WATER-C), and there is no uncontrolled spreading of drainage across the site into adjacent properties.

Proposed Onsite Flows

The drainage flows that are expected from this site in the post-development condition are generally anticipated to be the same or slightly less than the existing flows. The site will contain rows of concave mirrors, but the area below the mirrors will remain as natural soil and capable of acting in the same fashion as the existing condition. The volume of runoff from the sites is anticipated to remain basically unchanged or slightly less than current conditions, primarily due to the fact that the current site is nearly impermeable. The proposed site development will disturb the existing soils and will compact the soils as part of the re-grading effort to approximately 95% of maximum density. The current densities are nearly at 100% of maximum density, thus leading to a post-development condition where the soils are less dense and slightly more permeable than the existing condition.

The site is intended to be graded such that drainage is collected in areas between the solar collector arrays and then channelized to secondary drainage channels, which will ultimately discharge to one of the existing washes at the site. The post-development drainage flows onsite will be directed to the existing channels in very close proportion of flows to the existing conditions. These flows are noted in Tables E1 to E3 in the Drainage Report.

The solar field sites must be protected from random, uncontrolled flows entering the fields from the upstream side of the site, and therefore new channels will be placed along the upstream edge of each solar field that connect to the proposed perimeter channels at the site. Uncontrolled flows across the site would have the potential to erode the soils around the structural supports for the arrays, create depressions that would preclude weekly access to the mirrors by the mirror-washing crews, and erode and compromise the supports for the pipe networks of heat transfer fluids. The upstream channels or embankments will allow the upstream flow toward the site to be controlled and routed to the primary directional channels as shown on the attached map.

The post-development condition of the site requires some minor re-direction of the existing El Paso Wash as shown on the attached plans. The new channels will be designed with appropriate side slopes, drop structures, and ground slopes to minimize erosion and to provide for tortoise movement. A new box culvert will be added so that the flows can pass below Brown's Road rather than crest over and undermine the existing road.

Alternative Site Drainage Considerations

The design of a solar field for the parabolic mirrors requires long distances of level terracing in a north-south direction so that the mirrors can operate and track the sun. The design criteria set the constraints on how drainage can flow through the site. The two fields as currently designed provide for overland flow from the site to the existing drainage washes very similar to the overland flow conditions that exist on the pre-development condition of the site.

The site drainage conditions have been extensively studied and a variety of locations for the proposed facilities have been considered prior to developing the existing design layout in its current location. Solar Field #1 was previously considered in a location further to the west than currently designed, but the impact to El Paso Wash was greater than the proposed condition and thus the site was pushed east and south to mitigate the impact. Solar Field #2 is constrained on the east by private property and on the west by the railroad tracks and the SCE transmission line. The field was previously located further south and was designed with a different field geometry, but the field was moved slightly north to minimize the effect on the sensitive habitat to the south of Solar Field #2. The northern half of Solar Field #2 was offset from the rest of the field to minimize the impact to El Paso Wash. The site drainage has been approached with the design intent of minimizing changes to the existing flow patterns and flow volumes associated with the washes adjacent to and downstream of the site.

DA WATER-5. Appendix B (g) (14) (E) (i)

Information Required:

Please provide information on the physical and chemical water quality impacts associated with discharge of RO reject water for dust control.

Response:

The RSPP proposes to control dust generated by site activities by application of RO concentrate (brine) water to unpaved road surfaces in the Project area (see Table WATER-3 above). A total of about 61,300 linear feet of unpaved road are planned where brine water will be applied for dust control. These roads are planned to be about 24 feet wide and as such represent about 1,471,200 square feet or about 1.9 percent of the operational Project area. To estimate water quality impacts from the discharge of brine, it was assumed that dust control using brine water would not include unpaved surfaces between the solar panels, as these areas will be routinely wetted through application of high quality water for mirror washing. A total of 10 acre-feet annually of brine water are expected to be needed for dust suppression (see page 2-3, Project Description).

High rates of evaporation at the site coupled with an assumption of minimal soil erosion are expected to result in the deposition of brine salts on the unpaved road surfaces. The brine salts have a potential to impact either underlying groundwater quality or surface water quality through runoff from the site. Groundwater could be impacted if the brine salts infiltrate though the unsaturated zone to the groundwater. Surface water could be impacted if the brine salts accumulated at the surface then dissolved into stormwater that leaves the site.

The following steps were used to develop an initial assessment of the potential impact groundwater from application of RO brine water on unpaved roads.

- Determine the annual evaporation rate for the site in inches per year.
- Sum the precipitation and the application rate of brine water applied on an annual basis.

A comparison of these two rates was performed to determine if there could be any significant infiltration of brine water into the unsaturated zone. Underlying groundwater has been measured at a depth of about 450 feet below the ground surface.

The following steps were used to analyze the impact to surface water from the application of RO brine water for dust suppression.

- Determine the concentration of the brine salts in the RO brine water using the effluent TDS concentration from the RO unit.
- Determine the mass of brine salts to be applied to an unpaved road annually.
- Determine the brine salt concentration in the stormwater that falls on an unpaved road.
- Determine the brine salt concentration in the stormwater leaving the solar field into the facility drainage system (under an assumption that water on areas applied with brine combines with the stormwater that falls on the other parts of the solar field).
- Determine the brine salt concentration contribution in the stormwater leaving the Project outfalls (as stormwater that runs off the solar fields combines with the stormwater in the Project storm drain system from up stream sources, as applicable).

To evaluate the impact to surface water quality, the brine salt concentration contribution to the stormwater leaving the site at the outfall was compared to the regional groundwater concentrations from well data in the Indian Wells Valley Groundwater Basin and State of California Drinking Water Quality secondary maximum contaminant levels (State of California, Title 22 CCR, Article 16, Section 64449 [Table 64449 A/B] - Secondary Maximum Contaminant Levels) as a relative measure to determine if the application of RO brine water to the unpaved road would have an impact to surface water quality. TDS concentrations in groundwater in the Indian Wells Valley Groundwater Basin range from 220 to 720 milligrams per liter (mg/L) (see Table 5.17-6 above). Based on currently available data on the quality of the source water and resultant brine, TDS was used as the primary indicator of water quality.

For the analysis of concentration contribution in stormwater runoff, it was assumed that all the salts soluble in water applied over an annual period would be completely dissolved in the runoff, that no metals (i.e., arsenic, chromium) would be entrained in the fluid flow, and that there would be minimal erosion of the sediments on the unpaved roads given their compaction, frequent watering, low annual precipitation and generally flat grade. These assumptions are conservative as it is likely that over the course of the year and at the frequency of watering some of the salts would seep to some degree into the upper soil zone and through compaction of the unpaved road surfaces from frequent truck trips, become less available to dissolve into run off during storm events.

Groundwater

As the brine is applied to the roads, the water associated with the brine will begin to evaporate. The analysis of potential groundwater impacts consisted of a comparison of the volume of water potentially deposited on the road surface through brine application and precipitation compared to the annual evaporation rate for the area.

Annual average precipitation for the area was based on data from the National Oceanographic and Atmospheric Agency (NOAA). For the RSPP, the annual average precipitation is about 4 inches per year (see Table 5.17-4 in the AFC). The brine application rate was calculated from the amount of water allocated for dust suppression and road area and was estimated to be 3.6 inches per year. The evaporation rate for the area was taken from measurements at the Mojave Station and was an average of the years from 1948-2005. For the RSPP, the annual evaporation is approximately 111 inches per year.

Since the RO water application rate plus the annual average precipitation (sum of ~7.6 inches) is much less than the annual average evaporation rate, as such, there is a very low potential for net infiltration of brine salts into the soil zone below the site on an annual basis. Without significant infiltration, there is no complete pathway to groundwater through application of brine at the site. Given the sparse precipitation and high evaporation rates, the brine salts will be expected to precipitate and generally remain on the surface of the unpaved roads, until they are potentially mobilized by stormwater.

Surface Water

During a stormwater event, the residual brine salts in the road surface will dissolve into the stormwater that falls on the unpaved road and comes in contact with the salts. Stormwater containing brine salts will then mix with the other stormwater on the solar field (i.e., first mixing). Subsequently, the stormwater from the solar field will drain into the stormwater conveyance system, combining with runoff from up stream sources,

and the combined stormwater will discharge from the Project at an outfall (i.e., second mixing). In the case of the RSPP, there are a total of three outfalls for the Project with the stormwater from the solar fields discharging only to one, the center channel, which will combine with stormwater from the El Paso Wash.

The predicted TDS concentration of the brine, as shown in Table WATER-3, and the amount of water applied (3.6 inches) per year (based on AFC reported volumes evenly distributed by road area) were used to calculate the unit mass loading of brine salts applied to the unpaved roads (grams per square foot of road), Table B1 (Attachment WATER-B) presents these calculations. Through the year, about 57 grams per square foot of salts would be applied to the unpaved roads.

The total mass of brine salts applied annually to the unpaved roads for each solar field was calculated from the area of the unpaved roads in each solar field area times the calculated unit mass loading of brine salts. The dimensional data for the unpaved roads was determined from the 30% design conceptual drawings. The 24-hour duration, mean precipitation storm event with a one year frequency was then used to determine the concentration of salts in the stormwater leaving the unpaved roads. The baseline TDS concentration in the stormwater running off the remainder of the solar field excluding the roads was estimated to be 200 mg/L (USGS, Water Resources Investigation Report 2003-4326)[1]. Table B1 concludes with the predicted concentration of TDS in the stormwater from the solar fields to be 757 mg/L as a result of the mixing of the stormwater from the unpaved road surfaces with the stormwater from the remainder of the solar field and both entering the stormwater conveyance system (i.e., first mixing concentration).

To determine the incremental brine salt concentration contribution to the stormwater at the outfall for the Project, the Drainage Report (Appendix L of the AFC) for the site was consulted to understand the conceptual drainage design for the site. The runoff from each solar field or unit drains into a specific channel that in turn drains off the site through a specific outfall at the Project boundary. These channels have been designed to convey both stormwater running on to the Project from up stream watershed areas (as needed) and to convey stormwater running off the solar fields. Therefore, the stormwater from each solar field is mixed with stormwater from up stream watershed areas before discharging at an outfall (i.e., second mixing). For the RSPP, the contribution of the solar field stormwater run off is 14.2% of the total stormwater flow for the central channel outfall. Table B2 describes the conceptual drainage design for each solar field and associated conveyance channel/outfall and estimates stormwater contribution from each solar field to the total storm flow discharged for the associated channel/outfall discharged from the Project.

The TDS concentration in the stormwater discharged for each site outfall (i.e., second mixing) is provided in Table B2. The TDS concentration in the outfall is calculated by determining a weighted average of the TDS the concentration in the solar field runoff mixing with that from the up stream source of stormwater. For the RSPP, the TDS concentration in the stormwater at the central channel outfall is estimated to be 279 mg/L. This concentration is well within the regional groundwater concentrations and below State of California Secondary Drinking Water Standards (State of California, Title 22 CCR, Article 16, Section 64449 [Table 64449 A/B] - Secondary Maximum Contaminant Levels) of 500 mg/L.

1. Kent, R., and Belitz, K., 2003, Concentrations of dissolved solids and nutrients in water sources and Selected streams of the Santa Ana Basin, California, October 1998-2001: USGS Water Resources Investigation Report Number 2003-4326.

Conclusions

Because the annual evaporation rate (~111 inches/year) in the area of the Project site greatly exceeds the planned volume of water applied to the unpaved roads plus the average annual precipitation, minimal to no infiltration is expected in these areas. As such, there is not a complete path for the brine salts to reach groundwater and groundwater quality is not expected to be impacted by the practice of applying RO brines for dust suppression. There is thus, no potential form impact to groundwater through direct infiltration below the site.

The accumulation of brine salts on unpaved road surfaces has been conservatively modeled based on assumptions of rapid dissolution and transport without infiltration during storm events. Assuming that the annual deposition of salts from the brine water is completely dissolved in a one year storm event, the resulting TDS concentration at the RSPP outfall from the solar fields mixing with the run on stormwater is estimated to be 279 mg/L. This TDS concentration within the regional groundwater concentrations and is significantly below the State of California Drinking Water Standard, and is below the underlying groundwater concentrations reported for the Indian Wells Valley Groundwater Basin should water infiltrate downstream of the RSPP.

Discharge of the brine to the unpaved roads will require a report of waste discharge (ROWD) and waste discharge requirements (WDRs) through the Lahontan Regional Water Quality Control Board.

DA WATER-6. Appendix B (g) (14) (vi)

Information Required:

Please provide mapping showing the pre- and post-development 100-year floodplains. Please provide the HEC-RAS input files along with a copy of the drainage report.

Response:

The pre-development and post-development mapping showing the 100-year flood plains are attached to this narrative information per coordination and agreement with CEC staff (Attachment WATER-C). A narrative summary of the pre-development and post-development drainage flows onsite has also been provided as part of DA-WATER-4 above. The HEC RAS files for the channels will be provided as supplemental materials on November 25, 2009 per coordination and agreement with CEC staff. The drainage reports have been provided in Appendix L of the AFC.

DA WATER-7. Appendix B (g) (14) (vii)

Information Required:

Please provide all assumptions, evidence, references, and calculations used in the analysis to assess the effects of the project on the 100-year floodplain.

Response:

The hydrologic effects of the proposed development on the pre-existing site conditions and floodplain are primarily focused on relocation and flow associated with the existing washes. As previously noted in the narrative provided above (DA-WATER-4) there is a minor relocation of sections of El Paso Wash. The proposed relocations can be accomplished without impact to the flows in the existing channel inasmuch as the length of the proposed channel versus the existing channel is slightly longer and use of drop structures will be incorporated into the design to mitigate erosion within the new channel sections. The volume of drainage flow from the on-site post-development condition versus the pre-development condition will generally be equal or less; as previously noted by the narrative discussion in DA-WATER-4 above. The lack of impact to the flows in the existing channels is primarily a function of the fact that the pre-development and post-development flows from the onsite conditions remain relatively balanced.

The assumptions, evidence, references and calculations for the site hydrology and hydraulics are contained within the existing drainage report and includes source material such as the Kern County Hydrology Manual, U.S. Army Corp of Engineers and U.S. Geological Survey precipitation data, U.S. Soil Conservation Service and U.S. Department of Agriculture for storm pattern data, Soil Conservation Service for lag time calculations and loss methodologies, and the Site Geotechnical Report by Kleinfelder and Associates (see AFC Appendix B) documenting soil types and soil conditions.

Supplemental Information

The will-serve letter from Indian Wells Valley Water District, dated October 2, 2009, is provided in Attachment WATER-D at the end of this section.

Attachment WATER-A

Source Water Chemistry
Analytical Laboratory Reports
Indian Wells Valley Water District
Wells No. 18, 33 And 34

EX

CLINICAL LAB OF SAN BERNARDINO, INC
21881 BARTON ROAD
GRAND TERRACE, CA 92313

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 07/02/27 Sample ID No.M70703-1A
Laboratory Signature Lab
Name: CLINICAL LABORATORIES OF SAN BERNARDINO Director:
Name of Sampler:KRIEGER/STEWART Employed By: I.W.V.W.D.
Date/Time Sample Collected:07/02/13/0000 Date/Time Sample Received @ Lab:07/02/13/1215 Date Analyses Completed:07/02/22

System Name:INDIAN WELLS VALLEY W.D. System Number: 1510017
Name or Number of Sample Source:WELL 34

User ID: CYA Station Number:
Date/Time of Sample: |07|02|13|0000| YY MM DD TTTT Laboratory Code: 3761
Date Analysis completed: |07|02|22| YY MM DD
Submitted by: Phone #:

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900	120	5.0
	mg/L	Calcium (Ca) (mg/L)	00916	38	1.0
	mg/L	Magnesium (Mg) (mg/L)	00927	6.3	1.0
	mg/L	Sodium (Na) (mg/L)	00929	49	1.0
	mg/L	Potassium (K) (mg/L)	00937	2.8	1.0
Total Cations		Meq/L Value: 4.62			
	mg/L	Total Alkalinity (as CaCO3) (mg/L)	00410	120	5.0
	mg/L	Hydroxide (OH) (mg/L)	71830	ND	5.0
	mg/L	Carbonate (CO3) (mg/L)	00445	ND	5.0
	mg/L	Bicarbonate (HCO3) (mg/L)	00440	140	5.0
*	mg/L+	Sulfate (SO4) (mg/L)	00945	46	0.50
*	mg/L+	Chloride (Cl) (mg/L)	00940	31	1.0
45	mg/L	Nitrate (as NO3) (mg/L)	71850	8.9	2.0
2.0	mg/L	Fluoride (F) (Natural-Source)	00951	0.62	0.10
Total Anions		Meq/L Value: 4.30			
	Std.Units+	PH (Laboratory) (Std.Units)	00403	7.2	
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095	410	2.0
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300	290	5.0
15	Units	Apparent Color (Unfiltered) (Units)	00081	ND	3
3	TON	Odor Threshold at 60 C (TON)	00086	1	1
5	NTU	Lab Turbidity (NTU)	82079	0.1	0.1
0.5	mg/L+	MBAS (mg/L)	38260	ND	0.10

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

INORGANIC CHEMICALS

M70703-1A

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50
6	ug/L	Antimony (ug/L)	01097	ND	6.0
10	ug/L	Arsenic (As) (ug/L)	01002	4.0	2.0
1000	ug/L	Barium (Ba) (ug/L)	01007	ND	100
4	ug/L	Beryllium (ug/L)	01012	ND	1.0
5	ug/L	Cadmium (Cd) (ug/L)	01027	ND	1.0
50	ug/L	Chromium (Total Cr) (ug/L)	01034	ND	10
1000	ug/L+	Copper (Cu) (ug/L)	01042	ND	50
300	ug/L+	Iron (Fe) (ug/L)	01045	ND	100
	ug/L	Lead (Pb) (ug/L)	01051	ND	5.0
50	ug/L+	Manganese (Mn) (ug/L)	01055	ND	20
2	ug/L	Mercury (Hg) (ug/L)	71900	ND	1.0
100	ug/L	Nickel (ug/L)	01067	ND	10
50	ug/L	Selenium (Se) (ug/L)	01147	ND	5.0
100	ug/L+	Silver (Ag) (ug/L)	01077	ND	10
2	ug/L	Thallium (ug/L)	01059	ND	1.0
5000	ug/L+	Zinc (Zn) (ug/L)	01092	ND	50
		ADDITIONAL ANALYSES			
	C	Source Temperature C	00010	20	
		Langelier Index Source Temp.	71814	- 0.68	
		Langelier Index at 60 C	71813	0.02	
		Agressiveness Index	82383	11.25	
	ug/L	Boron (ug/L)	01020	290	100
10000	ug/L	Nitrate + Nitrite as Nitrogen(N) (ug/L)	A-029	2000	400
1000	ug/L	Nitrite as Nitrogen(N) (ug/L)	00620	ND	400
150	ug/L	Cyanide (ug/L)	01291	ND	100
	ug/L	Vanadium (ug/L)	01087	16	3.0

+ Indicates Secondary Drinking Water Standards

CLINICAL LAB OF SAN BERNARDINO, INC EDT
21881 BARTON ROAD
GRAND TERRACE, CA 92313

GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 08/04/25 Sample ID No.M81606-5A
Laboratory Signature Lab
Name: CLINICAL LABORATORIES OF SAN BERNARDINO Director: Bob Hu
Name of Sampler:KRAMER/SERNA Employed By: I.W.V.W.D.
Date/Time Sample Collected:08/04/01/0900 Date/Time Sample Received @ Lab:08/04/01/1630 Date Analyses Completed:08/04/23

==========

System Name:INDIAN WELLS VALLEY W.D. System Number: 1510017
Name or Number of Sample Source:WELL 18

User ID: CYA Station Number: 1510017-031
Date/Time of Sample: |08|04|01|0900| Laboratory Code: 3761
YY MM DD TTTT YY MM DD
Date Analysis completed: |08|04|23|
Submitted by:_____ Phone #:_____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900	110	5.0
	mg/L	Calcium (Ca) (mg/L)	00916	36	1.0
	mg/L	Magnesium (Mg) (mg/L)	00927	4.8	1.0
	mg/L	Sodium (Na) (mg/L)	00929	41	1.0
	mg/L	Potassium (K) (mg/L)	00937	1.7	1.0
Total Cations		Meq/L Value: 4.02			
	mg/L	Total Alkalinity (as CaCO3) (mg/L)	00410	120	5.0
	mg/L	Hydroxide (OH) (mg/L)	71830	ND	5.0
	mg/L	Carbonate (CO3) (mg/L)	00445	ND	5.0
	mg/L	Bicarbonate (HCO3) (mg/L)	00440	150	5.0
*	mg/L+	Sulfate (SO4) (mg/L)	00945	43	0.50
*	mg/L+	Chloride (Cl) (mg/L)	00940	25	1.0
45	mg/L	Nitrate (as NO3) (mg/L)	71850	7.5	2.0
2.0	mg/L	Fluoride (F) (Natural-Source)	00951	0.94	0.10
Total Anions		Meq/L Value: 4.23			
	Std.Units+	PH (Laboratory) (Std.Units)	00403	7.8	
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095	410	2.0
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300	290	5.0
15	Units	Apparent Color (Unfiltered) (Units)	00081		3
3	TON	Odor Threshold at 60 C (TON)	00086		1
5	NTU	Lab Turbidity (NTU)	82079		0.1
0.5	mg/L+	MBAS (mg/L)	38260	ND	0.10

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

INORGANIC CHEMICALS

M81606-5A

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50
6	ug/L	Antimony (ug/L)	01097	ND	6.0
1000	ug/L	Barium (Ba) (ug/L)	01007	ND	100
4	ug/L	Beryllium (ug/L)	01012	ND	1.0
5	ug/L	Cadmium (Cd) (ug/L)	01027	ND	1.0
50	ug/L	Chromium (Total Cr) (ug/L)	01034	ND	10
1000	ug/L+	Copper (Cu) (ug/L)	01042	ND	50
300	ug/L+	Iron (Fe) (ug/L)	01045	ND	100
	ug/L	Lead (Pb) (ug/L)	01051	ND	5.0
50	ug/L+	Manganese (Mn) (ug/L)	01055	ND	20
2	ug/L	Mercury (Hg) (ug/L)	71900	ND	1.0
100	ug/L	Nickel (ug/L)	01067	ND	10
50	ug/L	Selenium (Se) (ug/L)	01147	ND	5.0
100	ug/L+	Silver (Ag) (ug/L)	01077	ND	10
2	ug/L	Thallium (ug/L)	01059	ND	1.0
5000	ug/L+	Zinc (Zn) (ug/L)	01092	ND	50
		ADDITIONAL ANALYSES			
	ug/L	Boron (ug/L)	01020	260	100
10000	ug/L	Nitrate + Nitrite as Nitrogen(N) (ug/L)	A-029	1700	400
1000	ug/L	Nitrite as Nitrogen(N) (ug/L)	00620	ND	400
150	ug/L	Cyanide (ug/L)	01291	ND	100
	ug/L	Vanadium (ug/L)	01087	14	3.0

+ Indicates Secondary Drinking Water Standards

CLINICAL LAB OF SAN BERNARDINO, INC EDT
21881 BARTON ROAD
GRAND TERRACE, CA 92313
GENERAL MINERAL & PHYSICAL & INORGANIC ANALYSIS (9/99)

Date of Report: 08/04/25 Sample ID No.M81606-9A
Laboratory Signature Lab
Name: CLINICAL LABORATORIES OF SAN BERNARDINO Director: Bob Thuy
Name of Sampler:KRAMER/SERNA Employed By: I.W.V.W.D.
Date/Time Sample Date/Time Sample Date Analyses
Collected:08/04/01/0830 Received @ Lab:08/04/01/1630 Completed:08/04/23

System System
Name:INDIAN WELLS VALLEY W.D. Number: 1510017
Name or Number of Sample Source:WELL 33

User ID: CYA Station Number: 1510017-035
Date/Time of Sample: |08|04|01|0830| Laboratory Code: 3761
YY MM DD TTTT YY MM DD
Date Analysis completed: |08|04|23|
Submitted by:_____ Phone #:_____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3) (mg/L)	00900	110	5.0
	mg/L	Calcium (Ca) (mg/L)	00916	36	1.0
	mg/L	Magnesium (Mg) (mg/L)	00927	5.1	1.0
	mg/L	Sodium (Na) (mg/L)	00929	41	1.0
	mg/L	Potassium (K) (mg/L)	00937	1.5	1.0
Total Cations		Meq/L Value: 4.04			
	mg/L	Total Alkalinity (as CaCO3) (mg/L)	00410	120	5.0
	mg/L	Hydroxide (OH) (mg/L)	71830	ND	5.0
	mg/L	Carbonate (CO3) (mg/L)	00445	ND	5.0
	mg/L	Bicarbonate (HCO3) (mg/L)	00440	140	5.0
*	mg/L+	Sulfate (SO4) (mg/L)	00945	43	0.50
*	mg/L+	Chloride (Cl) (mg/L)	00940	30	1.0
45	mg/L	Nitrate (as NO3) (mg/L)	71850	8.0	2.0
2.0	mg/L	Fluoride (F) (Natural-Source)	00951	0.73	0.10
Total Anions		Meq/L Value: 4.20			
	Std.Units+	PH (Laboratory) (Std.Units)	00403	7.9	
***	umho/cm+	Specific Conductance (E.C.) (umhos/cm)	00095	410	2.0
****	mg/L+	Total Filterable Residue@180C(TDS)(mg/L)	70300	280	5.0
15	Units	Apparent Color (Unfiltered) (Units)	00081		3
3	TON	Odor Threshold at 60 C (TON)	00086		1
5	NTU	Lab Turbidity (NTU)	82079		0.1
0.5	mg/L+	MBAS (mg/L)	38260	ND	0.10

* 250-500-600 ** 0.6-1.7 *** 900-1600-2200 **** 500-1000-1500

INORGANIC CHEMICALS

M81606-9A

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al) (ug/L)	01105	ND	50
6	ug/L	Antimony (ug/L)	01097	ND	6.0
1000	ug/L	Barium (Ba) (ug/L)	01007	ND	100
4	ug/L	Beryllium (ug/L)	01012	ND	1.0
5	ug/L	Cadmium (Cd) (ug/L)	01027	ND	1.0
50	ug/L	Chromium (Total Cr) (ug/L)	01034	ND	10
1000	ug/L+	Copper (Cu) (ug/L)	01042	ND	50
300	ug/L+	Iron (Fe) (ug/L)	01045	ND	100
	ug/L	Lead (Pb) (ug/L)	01051	ND	5.0
50	ug/L+	Manganese (Mn) (ug/L)	01055	ND	20
2	ug/L	Mercury (Hg) (ug/L)	71900	ND	1.0
100	ug/L	Nickel (ug/L)	01067	ND	10
50	ug/L	Selenium (Se) (ug/L)	01147	ND	5.0
100	ug/L+	Silver (Ag) (ug/L)	01077	ND	10
2	ug/L	Thallium (ug/L)	01059	ND	1.0
5000	ug/L+	Zinc (Zn) (ug/L)	01092	ND	50
		ADDITIONAL ANALYSES			
	ug/L	Boron (ug/L)	01020	290	100
10000	ug/L	Nitrate + Nitrite as Nitrogen(N) (ug/L)	A-029	1800	400
1000	ug/L	Nitrite as Nitrogen(N) (ug/L)	00620	ND	400
150	ug/L	Cyanide (ug/L)	01291	ND	100
	ug/L	Vanadium (ug/L)	01087	12	3.0

+ Indicates Secondary Drinking Water Standards

Attachment WATER-B

Evaluation of the Discharge of Reverse-Osmosis Reject Water for Dust Control

Table B 1
Estimate of TDS Concentration in Solar Field Storm Water Runoff from Brine Water used for Dust Suppression
Ridgecrest Solar Power Plant

North and South Field Contributions to Center Outfall			
		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	
Mass Applied	57.0	g/ ft^2/ yr	
Area Ratio Dilution in Solar Field	53.816	dilution factor	
Annual Rainfall event	0.800	inches	NOAA Atlas 14
Amount of water in Annual Rain event	1.889	liters in a one year rain event / year/ ft2	
TDS Conc in water -Unpaved Road	30.179	g/L	
Predicted TDS leaving Solar Field Roads	0.561	g/l TDS if all dissolves in 1 year 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	0.757	g/L TDS weighted average for solar field	

Table B 2- Estimate of TDS Contribution to Storm Water Runoff in Outfalls from Brine Water usage in Solar Fields
Ridgecrest Solar Power Plant

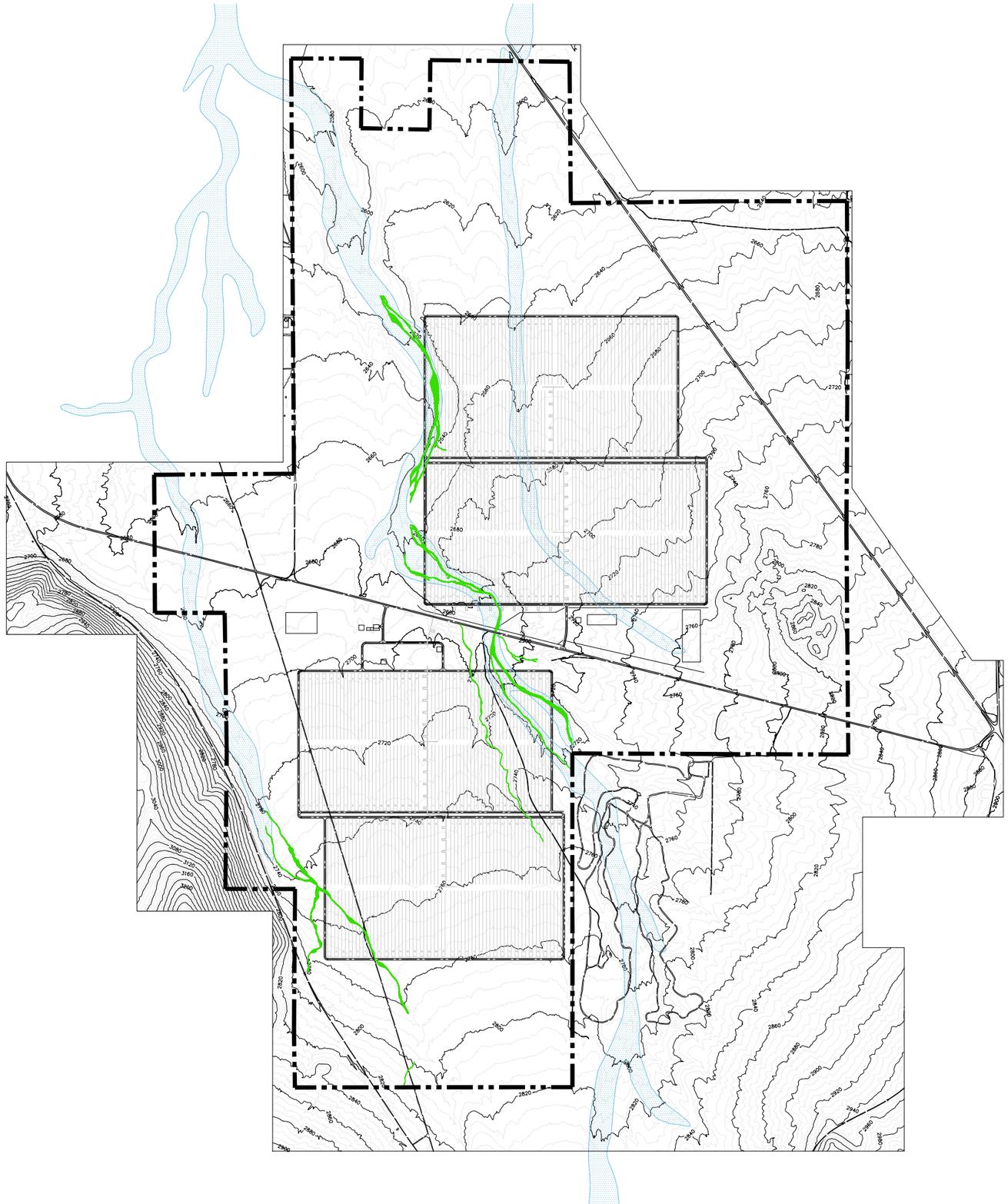
Objective
Estimate the % contribution of the stormwater flow running off each solar field to the appropriate stormwater channel flow discharging from project
Procedure
From the Drainage Report (AECOM, August 7, 2009) find the peak flow discharge for each solar field
From the Drainage Report (AECOM, August 7, 2009) find 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 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 in the are proportionally similar to a storm event with any frequency.
Site Data
Ridgecrest Solar Farm has 3 channels proposed for stormwater conveyance; Drainage Report (AECOM, August 7, 2009)
One channel (#2) will collect runoff from the solar field & convey off site with off site water,
The other two channels divert off site water around the units
The south solar unit will be graded so that it will flows into the center Channel #2
The north solar unit will be graded so that it will flows into the center Channel #2

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		757	mg/L TDS	14.2%
	TDS conc. contribution in the up stream source (est)		**200**	**mg/L TDS**	85.8%
	TDS weighted average for Outfall		**279**	**mg/L TDS**	

Attachment WATER-C

100-Year Flood Plan
Pre- and Post-Project Development



800 400 0 800 1600
SCALE IN FEET

AECOM

AECOM
5001 E. Commercenter Dr.
Bakersfield, Ca 93309
Phone 661.325.7253
www.aecom.com

REGISTERED PROFESSIONAL ENGINEER
ALAN CHARLES BLACK
No. C31465
EXP. 12-31-10
CIVIL
STATE OF CALIFORNIA

Designed:	W. BLACK
Checked:	W. BLACK
Drawn:	K. S. BEDFORD
Record Drawing by/date:	

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

- EXISTING FEMA ZONE A 100 YEAR FLOODPLAIN
- CDFG JURISDICTIONAL WATERS
- PROPERTY BOUNDARY

NOTES:

1. FLOOD PLAIN INFORMATION DISPLAYED ON THIS DRAWING IS FROM PANELS 1575E AND 1600E OF THE FLOOD INSURANCE RATE MAP, DATED SEPTEMBER 26, 2008 FEDERAL EMERGENCY MANAGEMENT AGENCY.
2. THE FLOOD PLAIN AREAS MAPPED BY FEMA MAY BE OVERSTATED ON THE FLOOD INSURANCE RATE MAP (FIRM), DUE TO HISTORICAL WIDENING OF THE CHANNELS AS A RESULT OF EROSION AND SCOUR.

Ridgecrest Solar Power Project

Kern County, California

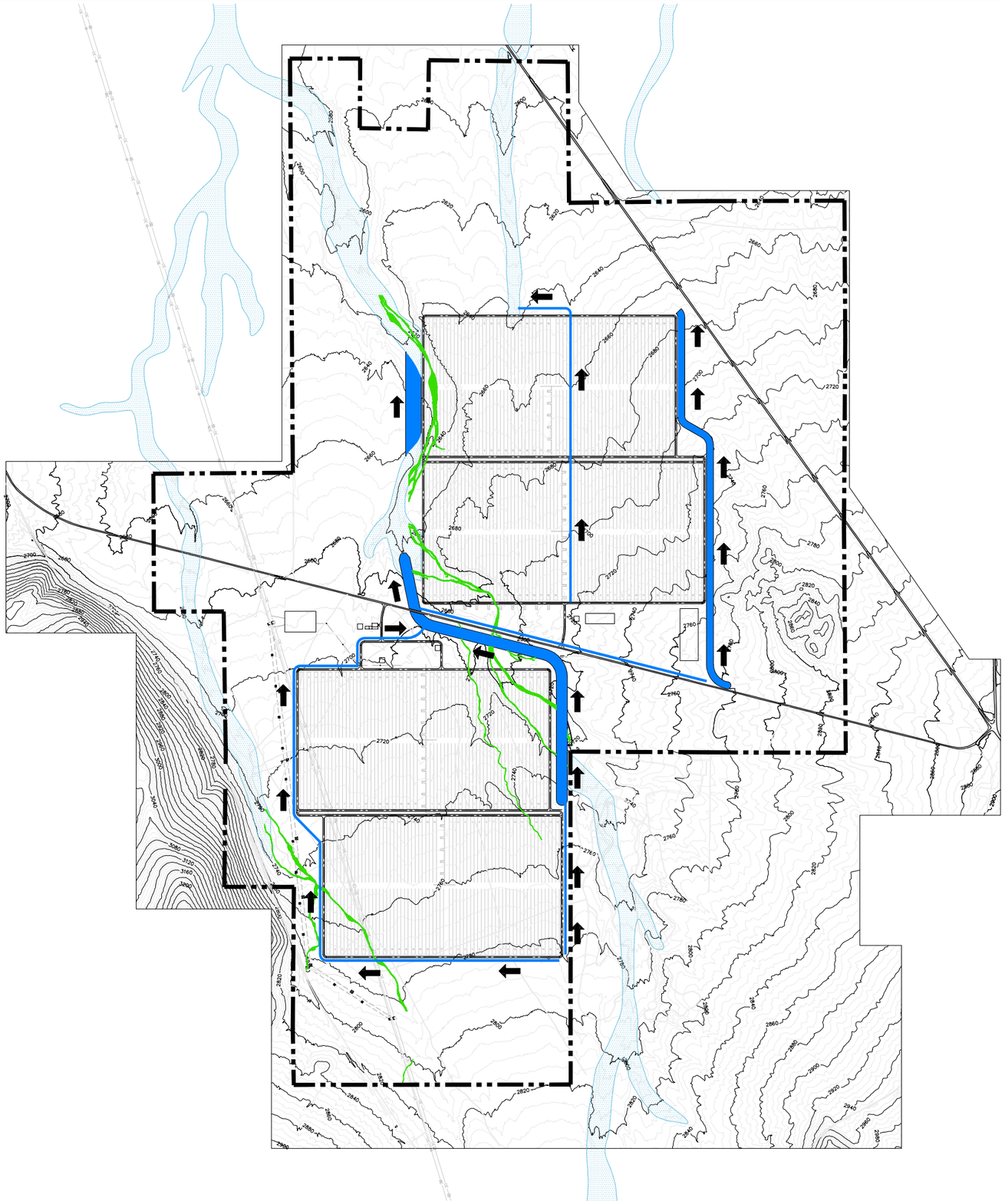
FIGURE 5.17-7a

FLOWPATHS / 100 YEAR FLOOD PLAINS / JURISDICTIONAL WATERS

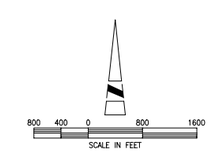
PRE-DEVELOPMENT CONDITION

Date: **10/13/09**
Sheet: **5.17-7a**

DWG: S:\Solar Millennium LLC\60208337\CADD\CIVIL\PHASE 02 a - LUMY\DESIGN\FEMA 5.17-7a.dwg Layout Name: a Plotted by: Bedford, Kevin Date: 10/22/2009 - 4:05 PM
XREFS: SMP-02117 - SMP-CP001 - cut for construction 1a - SMP-HS001 001 - SMP-HS004 005 - Ridgecrest_Title - SMP-CS001 - SMP-CS002 - Stationing_Ridgecrest_Zone1 IMAGES:



NOTE: JURISDICTIONAL WATERS SHOWN HERE-ON ARE PRE-DEVELOPMENT DESIGNATIONS AND ARE PROVIDED FOR REFERENCE ONLY.



30% Conceptual Engineering Plans
NOT FOR CONSTRUCTION

AECOM

AECOM
5001 E. Commercenter Dr.
Bakersfield, Ca 93309
Phone 661.325.7253

www.aecom.com

REGISTERED PROFESSIONAL ENGINEER
WILLIAM CHARLES BLACK
No. C31465
EXP. 12-31-10
CIVIL
STATE OF CALIFORNIA

Designed:	W. BLACK
Checked:	W. BLACK
Drawn:	K. S. BEDFORD
Record Drawing by/date:	

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

- EXISTING FEMA ZONE A 100 YEAR FLOODPLAIN
- PROPOSED NEW CHANNELS AND FLOW DIRECTION
- CDFG JURISDICTIONAL WATERS
- PROPERTY BOUNDARY

NOTES:

1. FLOOD PLAIN INFORMATION DISPLAYED ON THIS DRAWING IS FROM PANELS 1575E AND 1600E OF THE FLOOD INSURANCE RATE MAP, DATED SEPTEMBER 26, 2008 FEDERAL EMERGENCY MANAGEMENT AGENCY.
2. THE FLOOD PLAIN AREAS MAPPED BY FEMA MAY BE OVERSTATED ON THE FLOOD INSURANCE RATE MAP (FIRM), DUE TO HISTORICAL WIDENING OF THE CHANNELS AS A RESULT OF EROSION AND SCOUR.
3. ONSITE CHANNELS ARE DESIGNED TO INTERCEPT, CONVEY, AND FULLY CONTAIN WITH FREEBOARD, THE 100 YEAR FREQUENCY STORM IN ACCORDANCE WITH COUNTY OF KERN DESIGN STANDARDS, AND AS REQUIRED BY FEMA FOR A LETTER OF MAP REVISION (LOMR).

Ridgecrest Solar Power Project

Kern County, California

FIGURE 5.17-7b

100 YEAR FLOOD PLAIN / JURISDICTIONAL WATERS

POST-DEVELOPMENT CONDITION

Date: 10/13/09
Sheet: 5.17-7b

DWG: S:\Solar Millennium LLC\60203533\CADD\DWG\PHASE 02 ■ USMR\RESORA\FIGA\17-7b.dwg Layout Name: 2 - Plotted by: Bedford, Kevin Date: 10/22/2009 - 4:27 PM
XREFS: USMR-CS001 - USMR-CS101 - USMR-CS201 - sb ■ compassline int - USMR-VB201 - USMR-VB203 - USMR-VB301 - Regpoints.Pos - USMR-CS201 - USMR-CS301 IMAGES:

Attachment WATER-D

Indian Wells Valley Water District
Will-Serve Letter

INDIAN WELLS VALLEY WATER DISTRICT

BOARD OF DIRECTORS

Leroy Corlett, President
Peter Brown, Vice President
Peggy Breeden
Donald J. Cortichiato
Harold W. Manning

Thomas F. Mulvihill
General Manager
Krieger & Stewart, Incorporated
Engineers
McMurtrey, Hartsock & Worth
Attorneys-at-Law

RECEIVED 10/5/09 rg

October 2, 2009

Solar Millennium, LLC
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709

ATTN: Josef Eichhammer, CEO

RE: Will Serve Letter for the Ridgecrest Solar Power Project

To Whom It May Concern:

The Indian Wells Valley Water District ("District") can provide potable water service, to the Ridgecrest Solar Power Project as described in and subject to that certain "Water Supply Agreement Between Indian Wells Valley Water District and Solar Millennium, LLC, dated October 2, 2009 ("Agreement"), subject to all District Ordinances, Rules and Policies, upon commencement of construction by Solar Millennium of the Project described in the Agreement and the deposit of applicable charges and fees for obtaining water service.

Pursuant to Section 2(h) of the Agreement, this offer of service shall be valid for a period of twelve (12) months following Solar Millennium's receipt of all necessary permits, consents, and approvals for the Project, including but not limited to, a right of way or lease with BLM, permit from CalTrans for the pipeline to cross Highway 395, and Certification and Verification of the Project by the California Energy Commission.

Sincerely,

Tom Mulvihill

Tom Mulvihill
General Manager

500 West Ridgecrest Boulevard - Mailing Address: P.O. Box 1329, Ridgecrest, California 93556-1329
(760) 375-5086 FAX (760) 375-3969
www.iwvwd.com E-mail: iwvwd@iwvwd.com