APPENDIX L

Drainage Plans

APPENDIX L.1

Conceptual Drainage Plan

AECOM

Ridgecrest Solar Power Plant

DRAINAGE REPORT

August 7, 2009

AECOM

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EXECUTIVE SUMMARY

Solar Millennium proposes to locate a solar power plant near Ridgecrest, in Kern County, California, on land administered by the Bureau of Land Management (BLM). The total proposed developed area is 3920 acres with a total disturbed area of 1760 acres.

The project site lies on the southern edge of the Indian Wells Valley and north of the El Paso Mountains. The general stormwater flow pattern is from the higher elevations in the mountains located approximately 6 miles south to the lower elevations in Indian Wells Valley to the north. The stormwater from the project site flows northeast to China Lake which is a depression in the Indian Wells Valley with no identifiable outlet.

The major watercourse in the project area is El Paso Wash which drains approximately 20 square miles from the El Paso Mountains and exits the mountains to the south of the site. Flows from El Paso Wash and adjacent unnamed watersheds are conveyed over the proposed Southern Solar Field over top of South Brown Road and then over the Northern Solar Field, ultimately to China Lake.

The site hydrology was analyzed using a 100 year storm and the channels which convey this water adjacent to or through this site are sized for this 100 year storm event. The site will be substantially occupied by long rows of concave mirrors, but these mirrors will be elevated above the ground and thus the ground below the mirrors remains as a pervious surface. The amount of impervious area being created as a result of this project is less than 1% difference from the existing condition.

The proposed drainage modifications to this site seek to replicate the existing flow patterns as nearly as possible. For this reason, three channels have been proposed adjacent to or across the site: Channels 1, 2, and 3. These channels intercept the flows prior to their entry to the site and convey them in natural re-aligned channels to approximately the same locations where they exit the site under existing conditions. These channels are designed using native material with 4:1 sideslopes. On-site flows are directed to these receiving water channels just as the stormwater from this is directed to the existing channels. The design conditions (100-year) and more frequent hydrologic conditions for the three channels are presented in Tables E1 through E3. See Figure 1, Figure 2 and Appendix I for site layout, existing flow paths and proposed channels.

TABLE E1 10-Yr CHANNEL DESIGN & HYDRAULICS SUMMARY							
(See Appendix I for Channel Locations)							
Watercourse	Existing Flow Rate at the Outlet of the Site (cfs)	Proposed Flow Rate at Outlet of the Site (1) (cfs)	Average Channel Depth (ft)	Average Flow Depth (ft)	Average Channel Velocity (ft/s)	Average Top Width (ft)	Channel Length (ft)
Channel 1	726.6	618.9	5.5	1.7	4.6	45.5	6329.2
Channel 2	2650.7	2655.6	7.7	2.7	7.0	94.2	14351.5
Channel 3	1615.3	1527.8	8.8	3.0	8.9	69.0	9852.5

TABLE E2 25-Yr CHANNEL DESIGN & HYDRAULICS SUMMARY							
(See Appendix I for Channel Locations)							
Watercourse	Existing Flow Rate at the Outlet of the Site (cfs)	Proposed Flow Rate at Outlet of the Site (1) (cfs)	Average Channel Depth (ft)	Average Flow Depth (ft)	Average Channel Velocity (ft/s)	Average Top Width (ft)	Channel Length (ft)
Channel 1	1220.0	1085.6	5.5	2.3	5.5	50.3	6329.2
Channel 2	4706.1	4733.3	7.7	3.7	8.5	102.2	14351.5
Channel 3	2691.9	2541.2	8.8	4.1	10.0	77.8	9852.5

TABLE E3 100-Yr CHANNEL DESIGN & HYDRAULICS SUMMARY							
(See Appendix I for Channel Locations)							
Watercourse	Existing Flow Rate at the Outlet of the Site (cfs)	Proposed Flow Rate at Outlet of the Site (1) (cfs)	Average Channel Depth (ft)	Average Flow Depth (ft)	Average Channel Velocity (ft/s)	Average Top Width (ft)	Channel Length (ft)
Channel 1	2269.6	2101.0	5.5	3.3	6.7	58.1	6329.2
Channel 2	9166.1	9293.0	7.7	5.5	10.1	116.4	14351.5
Channel 3	4952.2	4650.7	8.8	5.8	11.7	91.4	9852.5

(1) The changes in peak flow rates in the three channels are attributed to the difference in time of concentrations between the existing condition and the proposed condition and slight shifting in contributing drainage areas from the existing to the proposed condition. The proposed flow rates leaving the site are generally lower than the existing flow rates, due to the fact that the times of concentrations for the proposed on-site drainage areas are longer than the existing times of concentrations for the existing overland flow.

1. PROJECT DESCRIPTION

1.1 Introduction

Solar Millennium proposes to locate a solar power plant near Ridgecrest, in Kern County, California, on land administered by the Bureau of Land Management (BLM). The proposed power plant consists of one 250 MW parabolic trough solar thermal power plants, each of which has a "solar field" comprised of rows of parabolic mirrors focusing solar energy on collector tubes. These collector tubes carry heated oil to a boiler which sends live steam to a Rankine – Cycle reheat steam turbine. The boiler turbine, and other associated equipment are located at the power block in the center of each solar field. The solar field and power generation equipment would be put into operation each morning after sunrise and insolation build-up, and shut down in the evening when insolation drops. Electricity would be produced by each plant's solar receiver boiler and the steam turbine generator.

1.2 Site Description

The proposed project site consists of approximately 3920 acres with a total disturbed area of 1760 acres and is located 6 miles southwest of Ridgecrest, California and immediately west of U.S. Route 395. Access to the site is from the South Brown Road exit on U.S. Route 395. The 250 MW facility will occupy approximately 1440 acres. Figure 1 shows the site layout.

1.3 Existing Condition Flow Patterns

Offsite Flow Patterns

Offsite hydrology drains a combined set of distinct watersheds totaling approximately 37 square miles, which generally drains from local topographic highs located south of the project site northward to relatively more gradual-sloped areas at the southern and northern solar fields. See the existing condition hydrology map in Appendix A for the location and extent of the drainage areas. Natural vegetation within the watersheds can be described as sporadic scrub brush typical of the local high desert conditions.

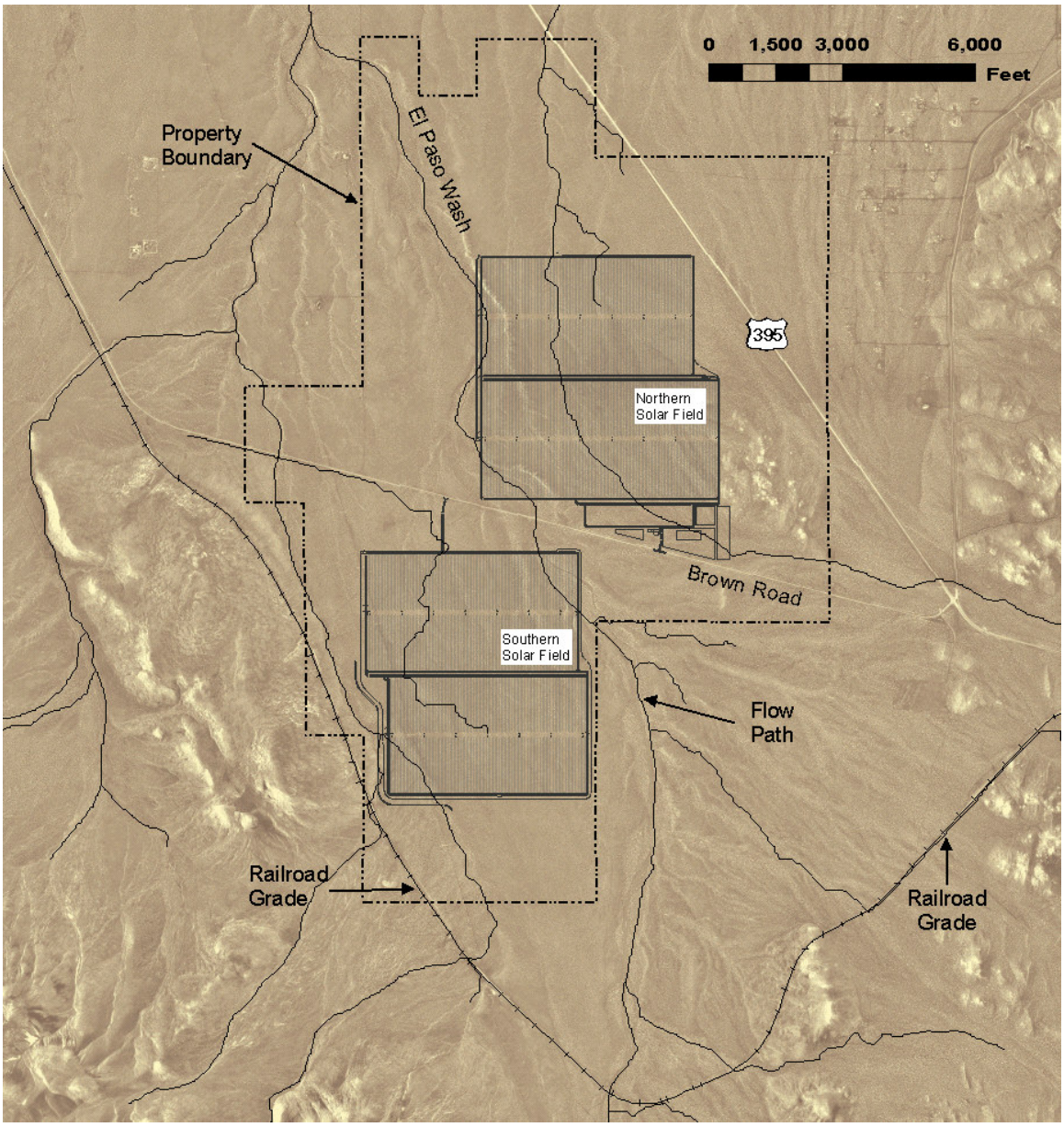


Figure 1: Site Layout

There are three watercourses that run through the Project site. El Paso Wash, which drains 22 square miles upstream of the Project site (Area E2), runs approximately through the center of the Project site. This wash drains water from the south hills and crosses Brown Road inside the property boundary. Currently, El Paso Wash flows over Brown Road at a low point in the road and continues sloping in a northwest direction along the Project site. An unnamed water course drains 4 square miles (Area E1) southwest of the Project site. This watercourse crosses the southwest section of the Project area continuing in the northwest direction toward Brown Road. A small water course drains 0.8 square miles toward the center of the southern field area (Area E1b). Collected water on this drainage area flows westward along the road moving water away from the project site. The eastern

drainage area (Area E3) extends east and west of the U.S. Route 395 (Three Flags Highway) covering 10 square miles. Drained water crosses U.S. route 395 at several points in both east-west and west-east direction, hydraulically connecting all the catchments in this drainage area. Water collected in this eastern drainage area flows westward toward the project site from near the intersection of Brown Road and U.S. Route 395. This water course crosses the project site changing flow direction from the westward direction to a more northward direction midway through the project site.

An elevated railroad grade is located south of the project site (See Figure 2). The railroad grade interrupts several natural drainage paths concentrating flows to several water courses that cross the railroad grade through pipes, concrete culverts and timber bridges. Existing flow patterns in the project site drainage area and water crossings beneath U.S. Route 395 and the railroad are illustrated in Appendix A.

Onsite Flow Patterns

Aerial photography and vegetation patterns indicate that the overall drainage pattern inside the project area concentrates flows in several well defined washes through the area. Storm flows generated by the existing site itself generally sheet to washes in the northeast and northwest directions. See Figure 2 for the flow paths and flow spread across the site.

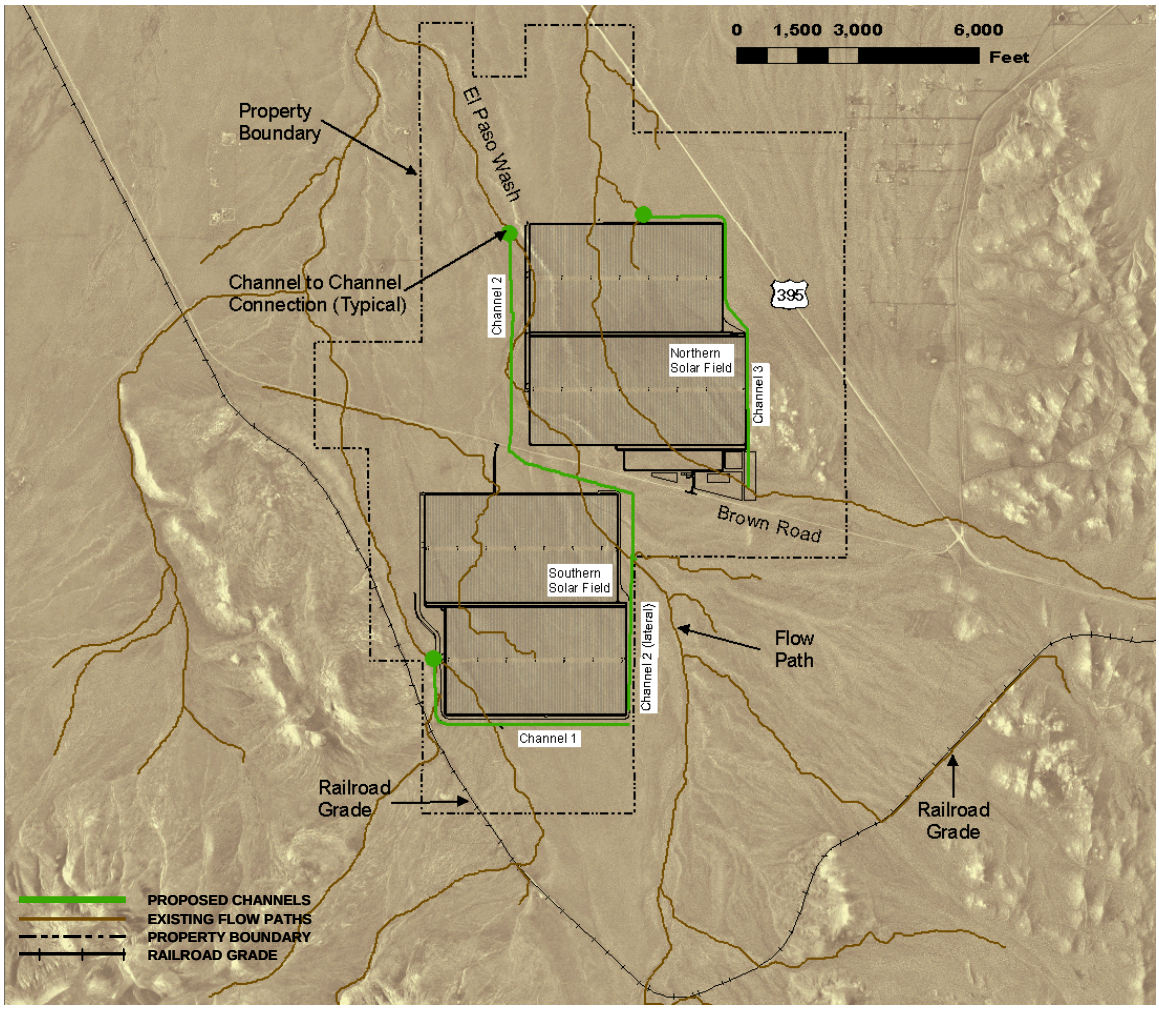


Figure 2: Existing Flow Paths and Proposed Channels

1.4 Proposed Condition Flow Patterns

Offsite Flow Patterns

The proposed solar field improvements will not change the existing upstream offsite drainage patterns. The existing downstream drainage patterns and flow rates will be slightly changed due to minor changes in contributing drainage areas and times of concentration. The earth disturbing activities will minimize impact to the existing channels to the extent possible.

Onsite Flow Patterns

The proposed onsite drainage improvements seek to replicate the existing flow patterns as nearly as possible. For this reason, a set of channels and structures have been proposed across the site: Channels 1, 2 and 3 (see Appendix I). Three primary proposed channels divert and direct natural watershed flow from existing natural channels around the solar

fields and back into the same natural channels down-slope of the solar fields, which does not substantially add or subtract natural flow amounts as it simply routes natural drainage around the fields (See Figure 2 for existing flow paths and proposed channels). Each of the proposed offsite channels are being sized to contain the peak flow of the 100-year, 24-hour storm event, calculated from the Kern County Hydrology Manual (KCHM) [1] and will include necessary earth compaction and riprap side-slope protection along key reaches (e.g., directional transitions, natural-to-proposed channel transitions, proposed-to-natural channel transitions, and reaches with significant design velocities).

Channel 1 re-directs southwestern runoff around the southwest corner of the proposed southern solar field and back into the natural channel at a point where the natural water course leaves the solar field (Point 1 - Appendix A). This channel also receives concentrated drainage that underpasses the railroad at a point close to the southwest corner of the southern solar field.

El Paso Wash is re-directed by Channel 2 around the east side of the southern solar field, then across Brown Road through a proposed concrete box culvert, and along the west side of the northern solar field back into the natural channel at a point near the northwest corner of the proposed northern solar field (Point 2 – Appendix A). The box culvert, proposed to improve transfer of the channelized flows from the southern side to the northern side of Brown Road, is located west of the Brown Road's low point, where El Paso Wash currently crosses the road. Channel 2 collects additional onsite runoff from the northern solar field. See the hydrology and hydraulic sections for more detail on the proposed channel concepts.

Channel 3 intercepts the natural water course that conveys drainage from the east side of the project site, re-directing flows northward along the east side of the proposed northern solar field and back into the natural channel at a point just north of the proposed northern solar field (Points 3 and 5 – Appendix A).

[1] Kern County. http://www.co.kern.ca.us/flood/pdfs/NewHydrologyManual/KCHydrologyManual.zip.

2. EXISTING CONDITION HYDROLOGY

2.1 Precipitation Data

Statistical representation of precipitation data for this study has been obtained from the Kern County Hydrology Manual (KCHM). Sources of precipitation data referred in the KCHM include the National Oceanic and Atmospheric Administration (NOAA) - National Weather Service, U.S. Army Corps of Engineer, U.S. Geological Survey, and other private and governmental cooperative weather observers. Precipitation data include the 100, 10 and 25 year events to illustrate a range of hydrologic conditions, with 10 and 25 year events being the more probable storm events on the site.

Isohyetal maps of point precipitation values for different return periods are provided by Kern County. Digital versions of the isohyetal maps were obtained through the Kern County GIS Online Mapping System for the 100-yr-24-h and 10-yr-24-h. The 100-yr-24-hour point precipitation in the project drainage area ranges from 3.5 inches in the upper part of the catchment to 2.8 inches the lower part of the catchment while the 10-yr-24-hour point precipitation ranges between 2.0 inches and 1.8 inches. The area-averaged precipitation over the studied drainage area for 100-yr-24-h was computed as 3.22 inches and for the 10-y-24-h event was 1.99 inches. KCHM propose an adjustment of the point precipitation values for area of catchments. The areal adjustment for 24-hour events and catchment areas smaller than 20 square mile ranges from 98% to 100% of the average point precipitation (Kern County Hydrology Manual – Figure E-4). A factor of 99% was used in the representative precipitation calculation.

A representative 25-yr-24-h point precipitation was computed for additional illustration of more frequent events. The KCHM methodology was used to estimate the point precipitation value based on the 100 year and 10 year isohyets. The 25-yr-24-h precipitation was estimated as 2.43 inches using the KCHM Figure D-3 (Appendix B) with the area weighted 100-yr-24-h and 10-yr-24-h point precipitation.

Appendix B shows the spatially interpolated precipitation for the project site drainage area for the 100-yr 24-h and the 10-yr-24-h precipitation events, the KCHM areal adjustment guideline, as well as the KCHM rainfall-return period relationship (Figure D-3).

The U.S. Soil Conservation Service (now NRCS), U.S. Department of Agriculture (USDA) in June 1986 Technical Release 55: Urban Hydrology for Small Watersheds recommends a SCS Type II storm pattern for extreme eastern California. Four storm patterns Type I, IA, II and III were developed by NRCS based on geographic regions of the United States and based on the synthetic 24-hour rainfall distributions from available National Weather Service (NWS) duration-frequency data or local storm data. Type IA is the least intense and Type II is the most intense short duration rainfall. This document can be found at:
http://directives.sc.egov.usda.gov

2.2 Flood Wave Routing

The Soil Conservation Service (SCS) equation (as outlined in the KCHM – Section E) was used for the lag time calculations. The equation is as follows:

$$Lag(hours) = 24n\left(\frac{L * L_{ca}}{S^{0.5}}\right)^{0.38}$$

Where: L = length of the longest watercourse (miles)

L_{ca} = length of the longest watercourse to a point opposite the centroid of the area (miles)

S = overall slope of drainage area between the headwaters and the collection point (feet per mile)

n = average Manning's "n" for the basin watercourses (estimated from field observations).

0.38 is the regional regression coefficient for Southern California

Catchment overall slope and lengths of the longest watercourse and watercourse to the point close to the centroid were calculated based on USGS digital elevation map. Manning's *n* basin factors were estimated based on visual inspection of collection streams and watershed channels in the drainage area, using guidelines in Kern County Hydrology Manual Figure E-2 (Appendix C).

2.3 Loss

SCS loss methodologies were used for the basin loss calculations. This method requires entry of the soil Curve Number (CN). The Curve Numbers for the catchments were selected using guidelines published in the Kern Count Hydrology Manual Section C, including loss rates for desert hydrology. Curve Numbers per soil group (Figure C-2 of the KCHM) can be found in Appendix D. The Natural Resources Conservation Service (NRCS) land use map and the STATGO soils database was used in the selection of the catchments CN values. Soils data available for this study area did not have enough detail for hydrologic group determination; therefore, engineering judgment was used to select a representative combination of hydrologic soil types for the different soil type zones of the study area. The catchment CN computation uses a representative hydrologic soil type, assumed as a prorated combination of potential hydrologic group in each soil type based on typical basin characteristics for the upper and lower parts of the drainage area. Areal averaged CN

values were computed for catchments with more that one representative soil type and land use combination.

The initial abstraction (I_a) for an area is a function of land use, treatment, and condition; interception; depression storage; and antecedent soil moisture. An estimate for I_a is given by the SCS as:

$$I_a = 0.2 * S$$

Where: S = basin storage computed as: $\frac{1000}{CN} - 10$

2.4 Catchment Data

Drainage areas were delineated using a 33-ft digital elevation map (DEM) interpolated from the USGS 7.5 minute quad sheet (shown in Appendix E). Catchment delineation was performed following the natural confluences and modeling guidelines Kern County Hydrology manual - Section K, having a minimum lag of 20 minutes, a maximum lag of 2.5 hours and limiting the areas such that the largest area is not more than four times the smallest. The four to one size relationship between the smaller and larger areas is maintained for the most part with exception of cases where consolidating drainage area would result in losing points of interest or would end up in atypical shape catchments. As discussed in section 2.3, CN values were computed using a prorated combination of expected hydrologic soil types in the STATGO soil group and a land use map, assuming *Chaparral* (KCHM Figure C-2) as dominant cover type in the studied drainage area. Sub-basins and prorated hydrologic soil types are shown on the existing hydrology map in Appendix A. Table 1 shows the drainage basin sizes and other hydrologic parameters.

TABLE 1
EXISTING HYDROLOGY CATCHMENT DATA

Sub Basin	Area (mi^2)	Length (mi)	L_{ca} (mi)	Cover	CN	Lag Time (mins)	Initial Abstraction I_a
W660	0.53	2.41	1.21	Chaparral	76	24.7	0.62
W740	1.76	3.83	1.91	Chaparral	79	36.4	0.55
W770	1.28	3.35	1.67	Chaparral	77	30.2	0.59
W950	0.79	3.41	1.71	Chaparral	77	31.3	0.59
W5420	0.25	1.34	0.67	Chaparral	75	19.9	0.65
W5460	0.89	1.97	0.99	Chaparral	75	20.4	0.65

TABLE 1
EXISTING HYDROLOGY CATCHMENT DATA

Sub Basin	Area (mi^2)	Length (mi)	L_{ca} (mi)	Cover	CN	Lag Time (mins)	Initial Abstraction I_a
W5480	0.85	1.73	0.87	Chaparral	77	19.2	0.59
W5300	2.49	4.52	2.26	Chaparral	78	37.8	0.57
W5320	0.72	1.71	0.85	Chaparral	80	20.0	0.51
W5330	1.07	2.73	1.37	Chaparral	77	29.8	0.61
W5350	1.30	2.66	1.33	Chaparral	77	28.2	0.60
W5370	1.28	2.72	1.36	Chaparral	81	24.2	0.48
W5430	1.09	3.27	1.64	Chaparral	78	32.5	0.58
W6880	0.67	2.98	1.49	Chaparral	79	26.0	0.54
W1090	1.19	3.04	1.52	Chaparral	75	31.0	0.65
W1140	0.75	3.64	1.82	Chaparral	75	37.8	0.65
W6900	0.84	2.79	1.39	Chaparral	78	25.4	0.55
W6920	0.57	1.69	0.84	Chaparral	77	17.7	0.61
W12240	2.18	2.43	1.22	Chaparral	76	25.8	0.62
W6890	3.13	3.50	1.75	Chaparral	76	33.0	0.63
W240	0.95	3.07	1.53	Chaparral	81	34.6	0.46
W250	2.80	3.16	1.58	Chaparral	81	29.1	0.46
W260	0.71	1.92	0.96	Chaparral	81	26.1	0.46
W270	1.53	2.62	1.31	Chaparral	81	28.1	0.46
W430	0.45	1.66	0.83	Chaparral	75	18.2	0.65
W2490	0.66	3.01	1.51	Chaparral	81	29.9	0.46
W2550	0.62	3.28	1.64	Chaparral	76	30.5	0.64
W2560	1.74	2.77	1.39	Chaparral	81	25.1	0.46
W2500	0.77	2.56	1.28	Chaparral	81	28.8	0.46

2.5 Reach Parameters

Reach lengths were taken from the USGS National Hydrologic Dataset NHD plus (stream flow lines shown in Appendix A). The Muskingum Cunge method was selected for reach routing. Manning's "n" values for reach routing were established based on field observation using Kern County guidelines (Appendix C). Photographs of representative sections of typical reaches have been included in Appendix F.

The USGS topography used for this study was not sufficiently detailed to show the dimensions of the actual channels in the watershed and field measurements showed a significant range of variation depending on where in the reach they were taken. For these

reasons, idealized typical trapezoidal sections were estimated for the steeper and flatter portions of the watershed. A typical section of 20 feet wide with 4:1 side slopes was used for lower reaches and a typical 5 feet wide section with 4:1 side slopes was used for upper reaches. Table 2 presents the reach parameters used in the routing for the respective alignment for existing condition.

TABLE 2
CONCEPTUAL EXISTING HYDROLOGY WATER COURSE DATA

Sub Basin	Hydrologic Element	Length (ft)	Slope	n	Shape	Bottom Width (ft)	Side Slope (xH:1V)
W660	W_R110	4004.2	0.016	0.030	Trapezoid	5	4
W740	W_R230	14400.9	0.021	0.040	Trapezoid	5	4
W770	W_R280	12062.6	0.049	0.040	Trapezoid	5	4
W950	W_R420	7034.0	0.040	0.040	Trapezoid	5	4
W5420	W_R290	3374.4	0.014	0.040	Trapezoid	20	4
W5460	W_R140	1869.4	0.012	0.030	Trapezoid	5	4
W5480	W_R260	1277.5	0.012	0.040	Trapezoid	5	4
W5490	W_R350	12609.5	0.038	0.040	Trapezoid	5	4
W5300	W_R460	17026.8	0.027	0.040	Trapezoid	5	4
W5320	W_R410	3689.1	0.031	0.040	Trapezoid	5	4
W5330	W_R320	2493.4	0.015	0.040	Trapezoid	20	4
W5330	W_R340	1899.4	0.013	0.040	Trapezoid	20	4
W5330	W_R360	1508.1	0.018	0.040	Trapezoid	20	4
W5330	W_R390	9680.0	0.037	0.040	Trapezoid	5	4
W5350	W_R310	2067.4	0.030	0.040	Trapezoid	5	4
W5350	W_R330	4173.2	0.034	0.040	Trapezoid	5	4
W5350	W_R300	2552.7	0.015	0.040	Trapezoid	5	4
W5370	W_R440	1560.9	0.060	0.040	Trapezoid	5	4
W5370	W_R470	4103.4	0.067	0.040	Trapezoid	5	4
W5370	W_R430	4227.2	0.046	0.040	Trapezoid	5	4
W5430	W_R270	10812.4	0.034	0.040	Trapezoid	5	4
W5470	W_R120	1491.1	0.013	0.030	Trapezoid	20	4
W5470	W_R150	1569.4	0.015	0.035	Trapezoid	20	4
W5470	W_R250	6105.4	0.012	0.035	Trapezoid	20	4
W6880	W_R450	8432.2	0.046	0.040	Trapezoid	5	4
W1090	W_R1110	10008.6	0.009	0.030	Trapezoid	20	4
W1140	W_R1160	7656.3	0.008	0.030	Trapezoid	5	4
W6900	W_R540	9515.3	0.068	0.040	Trapezoid	5	4
W6920	W_R500	3414.9	0.034	0.040	Trapezoid	5	4

TABLE 2
CONCEPTUAL EXISTING HYDROLOGY WATER COURSE DATA

Sub Basin	Hydrologic Element	Length (ft)	Slope	n	Shape	Bottom Width (ft)	Side Slope (xH:1V)
W12240	W_R510	4378.6	0.016	0.040	Trapezoid	5	4
W6890	W_R400	1515.4	0.028	0.040	Trapezoid	5	4
W6890	W_R370	629.3	0.010	0.040	Trapezoid	5	4
W6890	W_R480	6664.5	0.013	0.040	Trapezoid	20	4
W6890	W_R490	973.0	0.020	0.040	Trapezoid	5	4
W6890	W_R380	1799.4	0.008	0.040	Trapezoid	20	4
W240	E_R90	8633.8	0.032	0.040	Trapezoid	5	4
W250	E_R100	9907.7	0.013	0.035	Trapezoid	5	4
W260	E_R130	928.7	0.011	0.040	Trapezoid	5	4
W260	E_R110	3110.4	0.003	0.040	Trapezoid	5	4
W260	E_R120	70.0	-0.001	0.040	Trapezoid	5	4
W270	E_R150	7804.8	0.022	0.040	Trapezoid	5	4
W430	E_R440	1320.7	0.015	0.030	Trapezoid	5	4
W2490	E_R160	6263.7	0.022	0.040	Trapezoid	5	4
W2550	E_R400	15187.7	0.016	0.030	Trapezoid	20	4
W2560	E_R80	2137.4	0.013	0.035	Trapezoid	5	4
W2560	E_R70	1583.7	0.016	0.035	Trapezoid	5	4
W2560	E_R2570	7061.8	0.016	0.035	Trapezoid	20	4
W2500	E_R140	2587.4	0.013	0.040	Trapezoid	5	4

These bottom widths are conservative in that the actual channels will be wider and shallower which would lead to a slower velocity.

2.6 HMS Program and Runs

Hydrology calculations were performed using USACOE's Hydrological Modeling System (HMS 3.3.0). Documentation and program downloads for HMS 3.3.0 can be found online at: http://www.hec.usace.army.mil/software/hec-hms/documentation.html.

Guidelines provided in the Kern County Hydrology Manual for hydrologic analysis studies using computer models were used in this study, including effective rainfall, catchment delineation and unit hydrograph development. A user defined S graph was implemented in HMS for the unit hydrograph analysis. The selected S graph corresponds to the curve developed for the foothills in the Kern County (Appendix G).

The watershed input parameters for the program can be found in Appendix G.

2.7 Existing Condition Hydrology – Results

As discussed in Section 2.1, the USACOE HMS 3.3.0 was loaded with the watershed parameter and reach data and run for the project. Tables 3 through 5 give the resulting offsite and onsite peak flow rates for 10-yr, 25-yr and 100-yr storm depths for the existing condition. The flow rates and key point locations can be found on the existing condition hydrology map in Appendix A.

The generated flow rates were compared to Caltrans regional regression equations (region 10) in Chapter 810 of the Caltrans Highway Design Manual (HDM). For peak discharges larger than 2000-cfs Caltrans peak discharge showed better correlation than smaller flows, resulting in Caltrans flows within ±20% of the calculated volumes in this study. Figure 819.2D from the HDM can be found in Appendix H.

TABLE 3
10-Yr EXISTING HYDROLOGY HMS OUTPUT

Hydrologic Element (Sub Area)	Node	Sub Area Flow Rate (cfs)	Time of Peak*	Total Flow Rate (cfs)	Total Volume (Ac-Ft)
E1	1	727	12:21	727	101
E1b	4	93	12:27	93	16
E2	2	2,651	13:00	2,651	530
E3	3	1,553	12:57	1,553	311
E3b	5	83	12:12	83	9

** Time of Peak is based on the initial calculation run start time which is 00:00hrs*

TABLE 4
25-Yr EXISTING HYDROLOGY HMS OUTPUT

Hydrologic Element (Sub Area)	Node	Sub Area Flow Rate (cfs)	Time of Peak*	Total Flow Rate (cfs)	Total Volume (Ac-Ft)
E1	1	1,220	12:21	1,220	158
E1b	4	166	12:27	166	25
E2	2	4,706	12:51	4,706	831
E3	3	2,582	12:51	2,582	464
E3b	5	148	12:09	148	15

** Time of Peak is based on the initial calculation run start time which is 00:00hrs*

TABLE 5
100-Yr EXISTING HYDROLOGY HMS OUTPUT

Hydrologic Element (Sub Area)	Node	Sub Area Flow Rate (cfs)	Time of Peak*	Total Flow Rate (cfs)	Total Volume (Ac-Ft)
E1	1	2,270	12:18	2,270	276
E1b	4	323	12:27	323	45
E2	2	9,166	12:45	9,166	1,455
E3	3	4,736	12:45	4,736	771
E3b	5	288	12:09	288	27

** Time of Peak is based on the initial calculation run start time which is 00:00hrs*

3. PROPOSED CONDITION HYDROLOGY

3.1 Precipitation Data

For detailed discussion of precipitation data refer to Section 2.1.

3.2 Catchment Data

The proposed improvements do not change the conditions upstream of the project site. For detailed discussion of offsite catchment data refer to Section 2.4. Table 6 shows the revised drainage basin sizes and other hydrologic parameters as they would exist in the proposed condition. The catchments for proposed hydrology, node locations and spatially varied CN can be found on the proposed condition hydrology map in Appendix I.

TABLE 6
PROPOSED HYDROLOGY CATCHMENT DATA

Sub Basin	Area (mi^2)	Length (mi)	L_{ca} (mi)	Cover	CN	Lag Time (mins)	Initial Abstraction I_a
SSF_Basin	0.08	0.87	0.43	Chaparral	75	13.2	0.65
SSF_2	0.55	1.71	0.86	Chaparral	75	28.9	0.65
SSF_1	0.46	1.85	0.93	Chaparral	75	29.3	0.65
W660	0.52	2.38	1.19	Chaparral	77	24.4	0.62
W5460	0.88	1.97	0.99	Chaparral	75	27.2	0.65
W5470	1.17	2.59	1.29	Chaparral	75	29.0	0.65
W740	1.76	3.83	1.91	Chaparral	79	36.4	0.55
SSF_Channel1Trib	1.26	3.11	1.56	Chaparral	77	28.5	0.59
SSF_SIntercept_2	0.06	0.65	0.32	Chaparral	75	12.0	0.65
W5490	1.56	3.43	1.72	Chaparral	79	28.9	0.55
W5480	0.85	1.73	0.87	Chaparral	77	19.2	0.59
W5420	0.25	1.34	0.67	Chaparral	75	19.9	0.65
W5430	1.09	3.26	1.63	Chaparral	78	32.4	0.58
W5350	1.30	2.66	1.33	Chaparral	77	28.2	0.60
W5300	2.49	4.53	2.26	Chaparral	78	37.8	0.57
W5330	1.09	2.72	1.36	Chaparral	77	29.8	0.62
W950	0.79	3.41	1.71	Chaparral	77	31.3	0.59
W5320	0.72	1.71	0.85	Chaparral	80	20.0	0.51

TABLE 6
PROPOSED HYDROLOGY CATCHMENT DATA

Sub Basin	Area (mi^2)	Length (mi)	L_{ca} (mi)	Cover	CN	Lag Time (mins)	Initial Abstraction I_a
W5370	1.28	2.72	1.36	Chaparral	81	24.2	0.48
W1170	0.22	1.08	0.54	Chaparral	75	18.6	0.65
W6890	3.12	3.38	1.69	Chaparral	77	32.2	0.61
W6900	0.84	2.79	1.39	Chaparral	78	25.4	0.55
W12240	2.18	2.43	1.22	Chaparral	76	25.8	0.62
W6920	0.57	1.69	0.84	Chaparral	77	17.7	0.61
W6880	0.67	2.98	1.49	Chaparral	79	26.0	0.54
W210	0.39	1.49	0.74	Chaparral	75	18.9	0.65
NSF_2	0.61	1.82	0.91	Chaparral	75	23.9	0.65
NSF_1	0.48	1.30	0.65	Chaparral	75	16.4	0.65
W270	1.79	2.88	1.44	Chaparral	81	25.8	0.46
W280	0.95	3.07	1.53	Chaparral	81	34.6	0.46
W290	2.80	3.16	1.58	Chaparral	81	29.1	0.46
W310	1.53	2.62	1.31	Chaparral	81	28.1	0.46
W330	0.71	1.92	0.96	Chaparral	81	26.1	0.46
W340	0.66	3.01	1.51	Chaparral	81	29.9	0.46
W350	0.77	2.56	1.28	Chaparral	81	28.8	0.46
NSF_Lateral Channel	0.28	1.97	0.98	Chaparral	75	19.3	0.65

3.3 Reach Parameters

For detailed discussion of reach parameters refer to Section 2.5. Table 7 presents the conceptual reach parameters used in the routing for the respective alignment for proposed condition.

TABLE 7
PROPOSED HYDROLOGY WATER COURSE DATA

Sub Basin	Hydrologic Element	Length	Slope	n	Shape	Bottom Width (ft)	Side Slope (xH:1V)
SSF_DetBasin	W_R68	4168.4	0.006	0.030	Trapezoid	5	4
SSF_2	W_R70	3186.9	0.010	0.040	Trapezoid	5	4
SSF_1	W_R71	1977.2	0.002	0.040	Trapezoid	5	4

TABLE 7
PROPOSED HYDROLOGY WATER COURSE DATA

Sub Basin	Hydrologic Element	Length	Slope	n	Shape	Bottom Width (ft)	Side Slope (xH:1V)
W660	W_R110	3891.6	0.016	0.030	Trapezoid	5	4
W5460	W_R76	49.5	0.020	0.040	Trapezoid	5	4
W5460	W_R140	899.7	0.011	0.030	Trapezoid	5	4
W5460	W_R160	969.7	0.013	0.030	Trapezoid	5	4
W5470	W_R250	6105.4	0.012	0.035	Trapezoid	20	4
W5470	W_R77	1384.1	0.014	0.030	Trapezoid	5	4
W5470	W_R150	1569.4	0.015	0.035	Trapezoid	20	4
W740	W_R230	14400.9	0.021	0.040	Trapezoid	5	4
SSF_Channel1Trib	W_R280	10930.2	0.051	0.040	Trapezoid	5	4
SSF_SIntercept_2	W_SSF_ SIntercept_3	2118.1	0.002	0.040	Trapezoid	15	4
W5490	W_R350	12642.5	0.038	0.040	Trapezoid	5	4
W5480	W_R260	1277.5	0.012	0.040	Trapezoid	5	4
W5420	W_R290	3374.4	0.014	0.040	Trapezoid	20	4
W5430	W_R270	10721.5	0.035	0.040	Trapezoid	5	4
W5350	W_R310	2067.4	0.030	0.040	Trapezoid	5	4
W5350	W_R330	4173.2	0.034	0.040	Trapezoid	5	4
W5350	W_R300	2552.7	0.015	0.040	Trapezoid	5	4
W5300	W_R460	17146.4	0.027	0.040	Trapezoid	5	4
W5330	W_R320	2493.4	0.015	0.040	Trapezoid	20	4
W5330	W_R340	1899.4	0.013	0.040	Trapezoid	20	4
W5330	W_R360	1508.1	0.018	0.040	Trapezoid	20	4
W5330	W_R370	629.3	0.010	0.040	Trapezoid	20	4
W5330	W_R390	9680.0	0.037	0.040	Trapezoid	5	4
W950	W_R420	7034.0	0.040	0.040	Trapezoid	5	4
W5320	W_R410	3689.1	0.031	0.040	Trapezoid	5	4
W5370	W_R470	4103.4	0.067	0.040	Trapezoid	5	4
W5370	W_R440	1560.9	0.060	0.040	Trapezoid	5	4
W5370	W_R430	4227.2	0.046	0.040	Trapezoid	5	4
W1170	W_SSF_NatTo Improved	3629.4	0.012	0.040	Trapezoid	15	4
W6890	W_R400	1515.4	0.028	0.040	Trapezoid	5	4
W6890	W_R380	1799.4	0.008	0.040	Trapezoid	20	4
W6890	W_R480	6664.5	0.013	0.040	Trapezoid	20	4
W6890	W_R490	973.0	0.020	0.040	Trapezoid	20	4

TABLE 7
PROPOSED HYDROLOGY WATER COURSE DATA

Sub Basin	Hydrologic Element	Length	Slope	n	Shape	Bottom Width (ft)	Side Slope (xH:1V)
W6900	W_R540	9515.3	0.068	0.040	Trapezoid	5	4
W12240	W_R550	843.4	0.016	0.040	Trapezoid	20	4
W12240	W_R520	4825.0	0.018	0.040	Trapezoid	5	4
W12240	W_R510	3535.2	0.009	0.040	Trapezoid	5	4
W6920	W_R500	3414.9	0.034	0.040	Trapezoid	5	4
W6880	W_R450	8432.2	0.046	0.040	Trapezoid	5	4
W210	E_R30	5819.6	0.014	0.030	Trapezoid	20	4
NSF_2	E_R70	3079.8	0.012	0.035	Trapezoid	5	4
NSF_1	E_R60	261.2	0.004	0.030	Trapezoid	5	4
NSF_Alter_1	E_R80	10041.1	0.021	0.030	Trapezoid	20	4
W270	E_R650	7644.5	0.016	0.035	Trapezoid	20	4
W270	E_R90	1583.7	0.016	0.035	Trapezoid	5	4
W270	E_R100	2137.4	0.013	0.035	Trapezoid	20	4
W280	E_R110	8680.5	0.031	0.040	Trapezoid	5	4
W290	E_R120	9907.7	0.013	0.035	Trapezoid	20	4
W310	E_R170	7804.8	0.022	0.040	Trapezoid	5	4
W330	E_R130	3110.4	0.003	0.040	Trapezoid	5	4
W330	E_R140	70.0	-0.001	0.040	Trapezoid	5	4
W330	E_R150	928.7	0.011	0.040	Trapezoid	5	4
W340	E_R180	6376.4	0.022	0.040	Trapezoid	5	4
W350	E_R160	2587.4	0.013	0.040	Trapezoid	5	4
NSF_DetBasin	E_R440	2287.4	0.005	0.035	Trapezoid	5	4
NSF_AddDrain_Alt_2	E_R500	79.7	0.003	0.035	Trapezoid	5	4
NSF_LateralChannel	E_R560	9831.1	0.016	0.030	Trapezoid	5	4
NSF_Alter_2	E_R580	173.0	0.025	0.030	Trapezoid	5	4
NSF_Alter_2	E_R540	192.3	0.026	0.030	Trapezoid	5	4
NSF_Alter_2	E_R600	79.7	0.009	0.030	Trapezoid	5	4

3.4 HMS Program and Runs

For detailed discussion refer to section 2.6. The watershed input parameters for the program can be found in Appendix G. The flow rates and node locations can be found on the proposed condition hydrology map in Appendix I. Tables 8 through 10 present the

summary of the HMS results, including peak flow rates at key points for 100, 25 and 10-year storms.

TABLE 8
10-Yr PROPOSED HYDROLOGY HMS OUTPUT

Hydrologic Element (Sub Area)	Node	Sub Area Flow Rate (cfs)	Time of Peak*	Total Flow Rate (cfs)	Total Volume (Ac-Ft)
O1c	1B	42.9	12:24	42.9	6.5
O1	1C	470.9	12:24	512.2	72.8
O1b	1D	223.1	12:30	618.9	104.2
O2	2B	2,598.4	12:42	2,598.4	506.2
O2b	2C	168.5	12:51	2,584.2	506.1
O2c	2D	209.0	12:57	2,655.6	536.5
O3	3A	1,518.9	12:54	1,518.9	300.0
O3b	3B	49.9	13:03	1,527.8	305.8

** Time of Peak is based on the initial calculation run start time which is 00:00hrs*

TABLE 9
25-Yr PROPOSED HYDROLOGY HMS OUTPUT

Hydrologic Element (Sub Area)	Node	Sub Area Flow Rate (cfs)	Time of Peak*	Total Flow Rate (cfs)	Total Volume (Ac-Ft)
O1c	1B	75.8	12:21	75.8	10.5
O1	1C	787.1	12:21	858.2	113.4
O1b	1D	380.8	12:24	1,085.6	162.7
O2	2B	4,648.5	12:39	4,648.5	791.4
O2b	2C	302.1	12:45	4,619.0	791.2
O2c	2D	377.6	12:51	4,733.3	840.0
O3	3A	2,524.8	12:45	2,524.8	446.7
O3b	3B	88.0	12:54	2,541.2	456.0

** Time of Peak is based on the initial calculation run start time which is 00:00hrs*

TABLE 10
100-Yr PROPOSED HYDROLOGY HMS OUTPUT

Hydrologic Element (Sub Area)	Node	Sub Area Flow Rate (cfs)	Time of Peak*	Total Flow Rate (cfs)	Total Volume (Ac-Ft)
O1c	1B	148.5	12:21	148.5	19.0
O1	1C	1,445.8	12:21	1,592.1	197.7
O1b	1D	708.7	12:24	2,101.0	284.3
O2	2B	9,170.5	12:33	9,170.5	1,383.2
O2b	2C	594.0	12:39	9,041.5	1,382.8
O2c	2D	743.4	12:42	9,293.0	1,470.9
O3	3A	4,611.1	12:42	4,611.1	740.9
O3b	3B	168.6	12:48	4,650.7	757.6

** Time of Peak is based on the initial calculation run start time which is 00:00hrs*

3.5 Proposed Condition Hydrology – Results

As stated in Section 1.4, the offsite upstream flow rates do not change in the proposed condition. However the resultant downstream off-site flow rates change slightly. These upstream offsite flows are intercepted by the three proposed channels: 1, 2 and 3. The southern solar field will be graded to two east-west collector channels, located in the upper and lower half of the solar field. Flows in these channels will be conveyed to the north end of the field and returned to improved channel (Channel 2) upstream of Brown Road. The northern field will also convey water to two east-west collector channels, located in the upper and lower half of the solar fields respectively. These collectors convey collected flows to Channel 2. The 100-year peak discharges of the HMS runoff hydrographs were used as the design flow rates for the set of proposed channels in the project site. Table 11 gives the design flow rates for the channels reaches, which correspond to the maximum peak discharge in each reach.

As discussed in the executive summary, the changes in peak flow rates in the three channels are attributed to the difference in time of concentrations between the existing condition and the proposed condition and slight shifting in contributing drainage areas from the existing to the proposed condition. In the existing condition the flows are sheeting across the desert more slowly resulting in a longer time of concentration. In the proposed condition the onsite flows are routed to the channel in secondary channels which are shorter than the existing channels and result in a shorter time of concentrations. This change in time of concentration results in changes in peak flows. Depending on the shape and characteristics of the drainage area, the peak flows can increase or decrease according

with the timing of the proposed off-site and on-site peaks. For a detailed proposed hydrology map refer to Appendix I.

TABLE 11
CHANNEL DESIGN FLOW RATES

Channel Reach	Total Flow Rate (cfs)
1A - 1B	148.5
1C - 1D	1592.1
1D - 1E	2101.0
2A - 2B	586.7
2B - 2C	9170.5
2C - 2D	9293.0
3A - 3B	4611.1

4. CHANNEL HYDRAULICS

4.1 Methodology

The design flow rates for the proposed channels were calculated as the maximum peak discharge that reaches the channel head. Spreadsheet calculations carried the hydraulic characteristics computations toward the conservative design of the typical channels cross section.

4.2 Channel Design Approach

The following considerations were used to develop the proposed cross sections for the channels.

- Bottom Width (b) – The channel bottom widths were set to promote relatively shallow flows. This was done to minimize erosive forces and to shorten the required daylight length required at the downstream end of the channel.
- Side slope (Z) – The side slopes of the channel banks were set at 4:1 to insure slope stability, reduce toe erosion, and to allow for ready maintenance access to all points on the channel.
- Manning's Roughness Coefficient – Due to the sandy nature of the existing soils, partial armoring of banks and sections of the channels and anticipated vegetation in the proposed channels a representative Manning's "n" of 0.035 was selected.
- Slope – The slope was set by the horizontal alignment through the site and the existing ground lines at the upstream and downstream ends of the channel.
- A conservative design water depth was selected as the maximum of the critical and normal depth computed for the proposed channels with the natural slope and the 100-year peak discharge.

Table 12 provides the channel design summary for typical cross section in the proposed channels (see Appendix I for location of the channel sections).

Freeboard was added to the proposed channels following requirements stated in the Kern County Division Four Standards for Drainage, considering that the designed water surface is within the embankments area. A 3-ft freeboard was added to the proposed channels that are with in the embankment of existing water courses. In addition, the 3-ft freeboard was considered for instability waves in proposed channels that due to natural topography and flows result in channels flowing within ±20% of the critical slope.

TABLE 12
CHANNEL DESIGN SUMMARY

Channel Reach	Bottom Width (ft)	Side Slope (H:V)	Manning's Roughness Coefficient (n)
1A - 1B	10.0	4:1	0.035
1C - 1D	35.0	4:1	0.035
1D - 1E	50.0	4:1	0.035
2A - 2B	10.0	4:1	0.035
2B - 2C	110.0	4:1	0.035
2C - 2D	100.0	4:1	0.035
3A - 3B	45.0	4:1	0.035

4.3 Brown Road Crossing

A concrete box culvert is proposed to convey re-directed flows from El Paso Wash (Channel 2) under Brown road. This will be dimensioned to avoid overtopping of the road for the 100-yr storm taking into consideration the proposed channel conditions upstream and downstream of the structure.

4.4 Channel Hydraulics – Results

The channel hydraulic characteristics used for dimensioning each of the proposed channels can be found in Appendix J. Tables 13 though 15 give a summary of representative channel hydraulic characteristics for 100-yr, 10-yr and 25-yr storm events based on the selected geometry and physical characteristics of each channel reach.

TABLE 13
10-Yr CHANNEL HYDRAULICS SUMMARY

Channel Reach	Channel Depth (ft)	Flow Depth (ft)	Channel Velocity (ft/s)	Top Width (ft)
1A - 1B	2.7	2.2	1	27.6
1C - 1D	6.9	3.9	2.6	66.2
1D - 1E	6.8	3.8	2.5	80.4
2A - 2B	3.9	3.2	2.3	35.6
2B - 2C	9.8	6.8	2.8	164.4
2C - 2D	9.1	6.1	3.5	148.8
3A - 3B	8.8	5.8	3.8	91.4

TABLE 14
25-Yr CHANNEL HYDRAULICS SUMMARY

Channel Reach	Channel Depth (ft)	Flow Depth (ft)	Channel Velocity (ft/s)	Top Width (ft)
1A - 1B	2.7	2.2	1.8	27.6
1C - 1D	6.9	3.9	4.3	66.2
1D - 1E	6.8	3.8	4.4	80.4
2A - 2B	3.9	3.2	4.1	35.6
2B - 2C	9.8	6.8	5	164.4
2C - 2D	9.1	6.1	6.2	148.8
3A - 3B	8.8	5.8	6.4	91.4

TABLE 15
100-Yr CHANNEL HYDRAULICS SUMMARY

Channel Reach	Channel Depth (ft)	Flow Depth (ft)	Channel Velocity (ft/s)	Top Width (ft)
1A - 1B	2.7	2.2	3.6	27.6
1C - 1D	6.9	3.9	8.1	66.2
1D - 1E	6.8	3.8	8.5	80.4
2A - 2B	4	3.2	8	35.6
2B - 2C	9.8	6.8	9.8	164.4
2C - 2D	9.1	6.1	12.2	148.8
3A - 3B	8.8	5.8	11.7	91.4

Calculations indicate the there might be erosive effects at the 100-yr event. The channels will be designed with 4:1 side slopes to help mitigate the erosion of the banks rather than designing them with a 2:1 side slope. Channels will be constructed with native material, and erosion control for the 100-year event is proposed for the channels stress areas, as defined in Kern County, California, Division Four, Standards for Drainage. A stress area is defined as a location where the erosion potential is greater than a straight, uniform channel reach, and includes junctions, transitions and curves. The extent of the channel bank protections will be at least a distance equal to ten (10) times the design water depth[2] and will be extended into the channel bottom to provide for potential bottom scour. Stress areas with erosion potential in the proposed set of channels include: (1) major changes of direction in proposed channel, (2) three transitions from natural to improved channels, i.e., 1A, 2A and 3A, (3) three junctions where

[2] Kern County, Division Four Standards for Drainage, *https://www.co.**kern**.ca.us/ESS/DEV_STDS/**DIVISION**_FOUR.pdf*

solar fields collectors drain to the improved channels, and (4) three transitions from improved to natural channel. No scour protection is proposed for the channel bottom in the straight sections of the channels. This is to allow the low flows to meander across the bottom replicating as nearly as possible the flow regimes under current conditions.

Further guidance for riprap protection of transitions in size or shape will be provided by EM 1110-2-1601[3] and the Hydraulic Design Criteria (HDC) 712-1. HDC 712-1 provides guidance for the selection of rock sizes using the Isbash Theory[4]. The Isbash theory (commonly used in Kern County Hydrology) and Caltrans Chapter 870[5] will be used for energy dissipation and in areas of transition.

The outfall (downstream) end of the channels will be established such that flow is returned to the down stream offsite condition as close as possible to that which existed prior to the project. At the improved channel to natural channel connections the flow velocity will be reduced by widening the cross section and/or using rip-rap size material prior to the discharge to the existing channel to minimize erosion.

[3] Engineering and Design - Hydraulic Design of Flood Control Channels. Publication Number: EM 1110-2-1601. Proponent: CECW-EH-D, June 1994.
[4] Hydraulic Design Criteria 712-1, Stone Stability, September 1970
[5] CalTrans Highway Design Manual, Chapter 870, Channel and Shore protection - Erosion Control, September 1, 2006

APPENDIX A: EXISTING HYDROLOGY MAP

Sub Basin	Area (mi^2)	10-yr			25-yr			100-yr		
		Peak Discharge (cfs)	Node Total		Peak Discharge (cfs)	Node Total		Peak Discharge (cfs)	Node Total	
			Node No.	Peak Discharge (cfs)		Node No.	Peak Discharge (cfs)		Node No.	Peak Discharge (cfs)
E1	4.11	727	1	727	1,220	1	1,220	2,270	1	2,270
E1b	0.75	92.5	4	92.5	165.9	4	165.9	322.6	4	322.6
E2	22.01	2650.7	2	2650.7	4706.1	2	4706.1	9166.1	2	9166.1
E3	9.78	1552.7	3	1552.7	2582.4	3	2582.4	4735.8	3	4735.8
E3b	0.45	82.6	5	82.6	147.9	5	147.9	287.5	5	287.5

Q=9166.1 cfs
V=1455.2 AF
2

Q=4735.8 cfs
V=771.3 AF
3

Q=287.5 cfs
V=27.1 AF
5

Q=322.6 cfs
V=45.3 AF
4

Q=2269.6 cfs
V=275.8 AF
1

E3b
0.45

E1b
0.75

E1
4.11

E2
22.01

E3
9.78

Brown Road

Three Flags Hwy (395)

MOUNTAINS

SEARLES VALLEY

FLOW CROSSING
DRAINAGE AREA
FLOWLINE
SubBasinsWest
PROPERTY BOUNDARY
RAILROAD

0 1,600 3,200 6,400
Feet

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

Designed:
Checked:
Drawn:
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION

Prepared for:

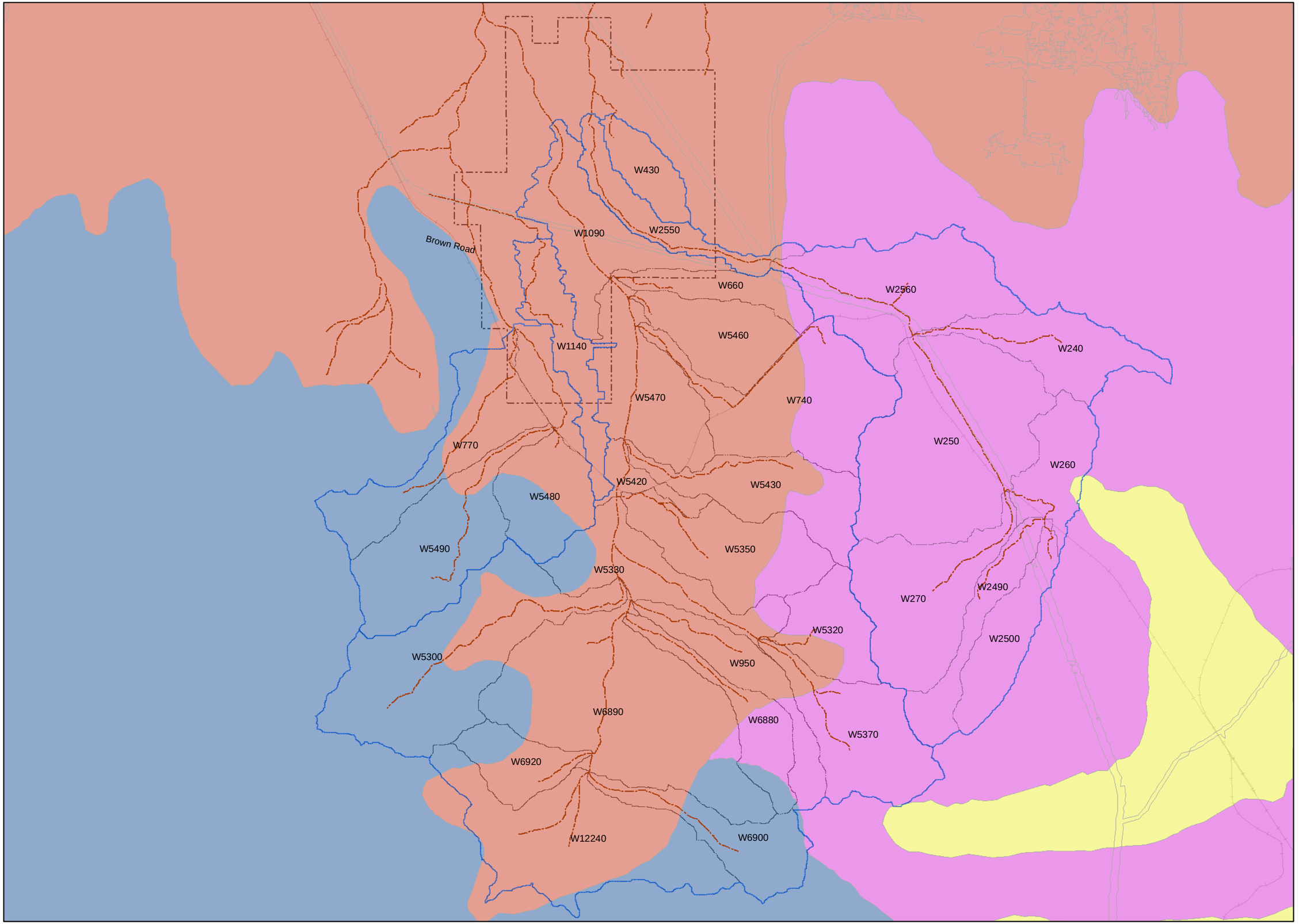
Solar Millennium LLC

Ridgecrest Solar Energy Project

Kern County, California

Existing Hydrology Map

Date: 3/16/09
Sheet: 1 of 2



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Bakersfield, Ca 93309
Phone 661.325.7253

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Designed:
Checked:
Drawn:
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

PRORATED SOIL GROUP
%B, %C, %D

- 25, 25, 50
- 33, 0, 67
- 34, 0, 66
- 50, 25, 25
- 67, 0, 33
- 67, 0, 34
- 70, 15, 15
- RAILROAD
- FLOWLINE
- PROPERTY BOUNDARY
- DRAINAGE AREA BOUNDARY

0 1,450 2,900 5,800 Feet

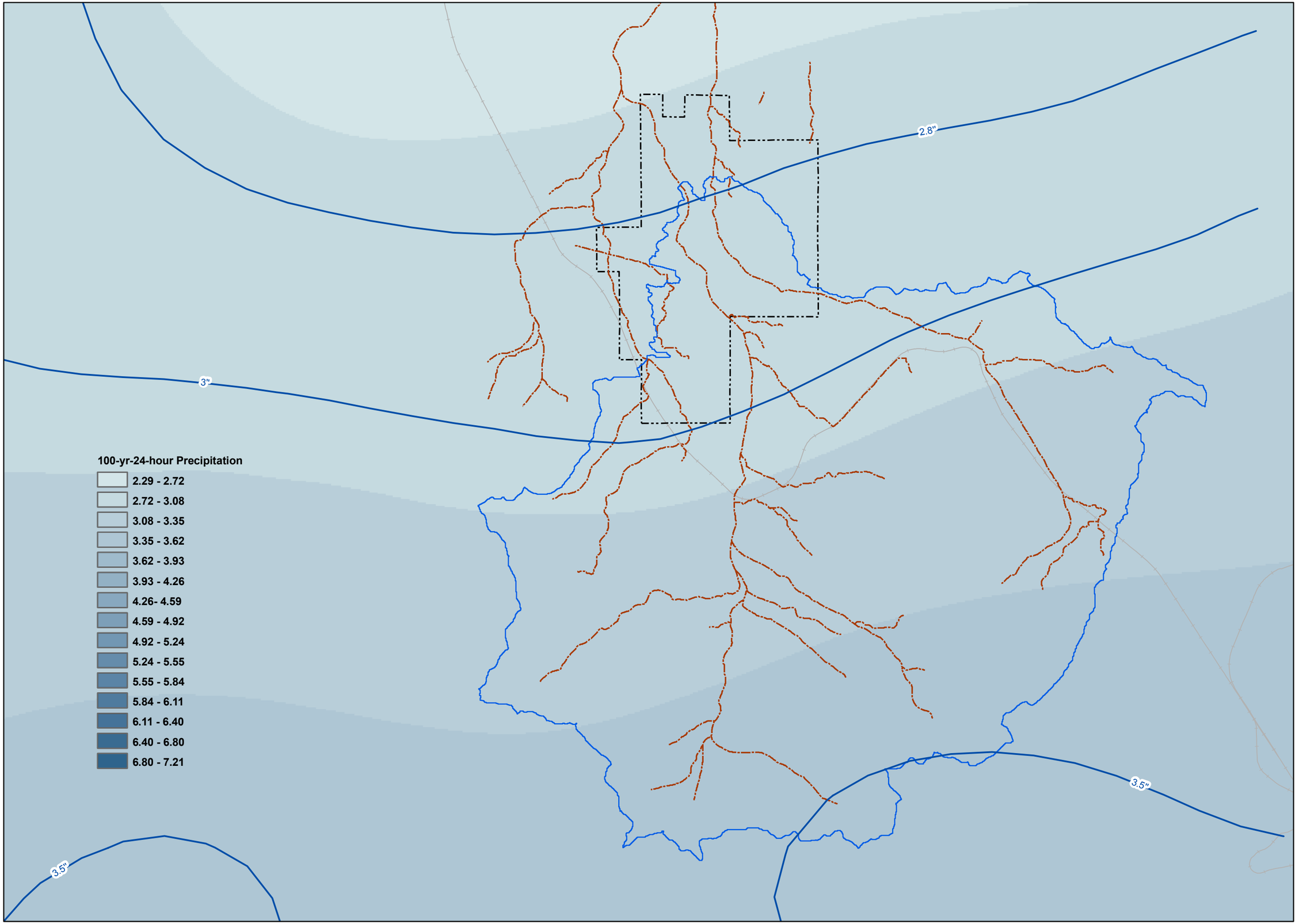
Ridgecrest Solar Energy Project

Kern County, California

Existing Hydrology Map

Date: 3/16/09
Sheet: 2 of 2

APPENDIX B: PRECIPITATION DATA



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Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

- 100-yr-24-hour ISOHYET
- PROPERTY BOUNDARY
- RAILROAD
- FLOWLINE

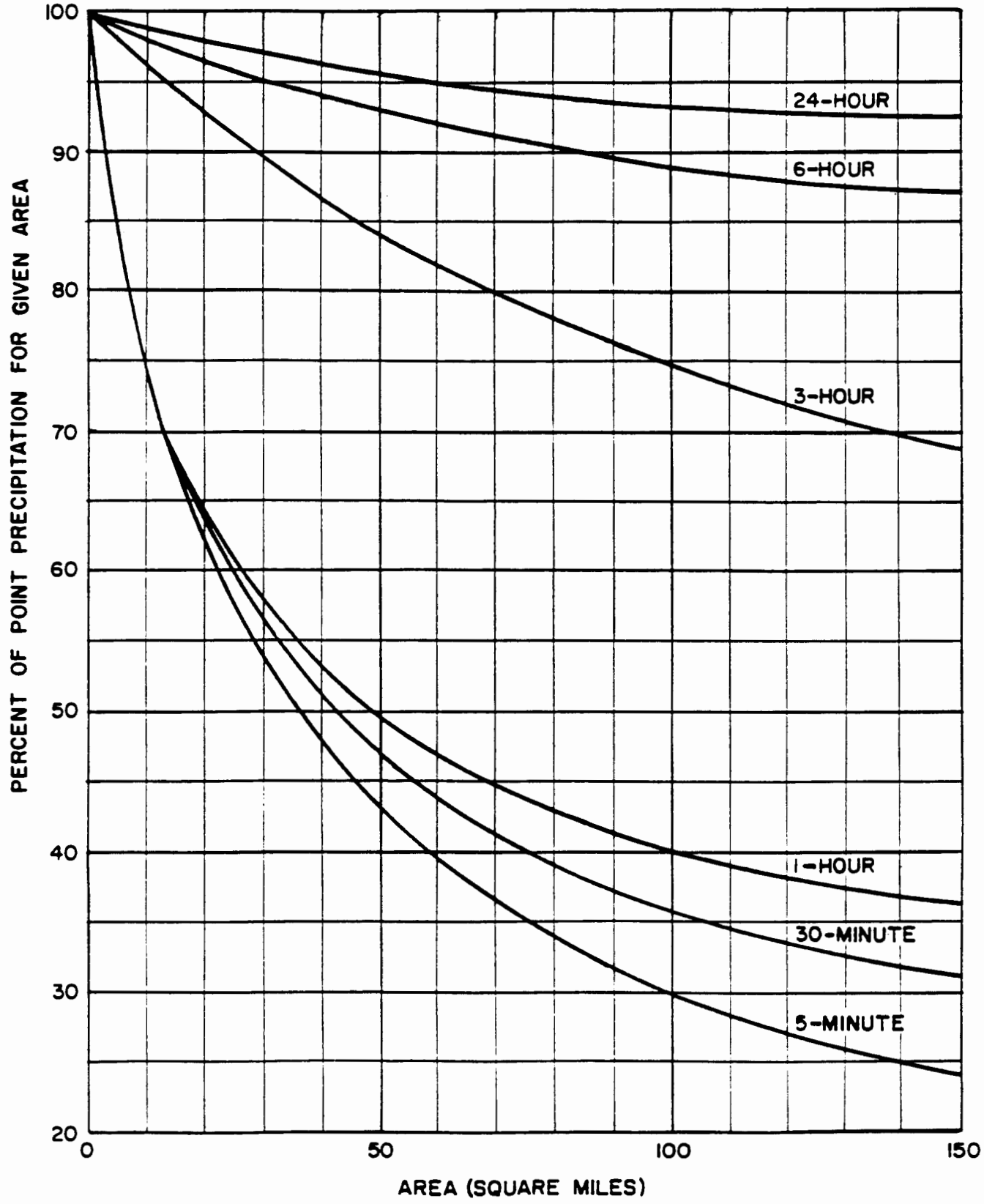
0 1,450 2,900 5,800 Feet

Ridgecrest

Kern County, California

Precipitation Map 100 year 24 hour

Date: 4/28/09
Sheet: 1 of 2

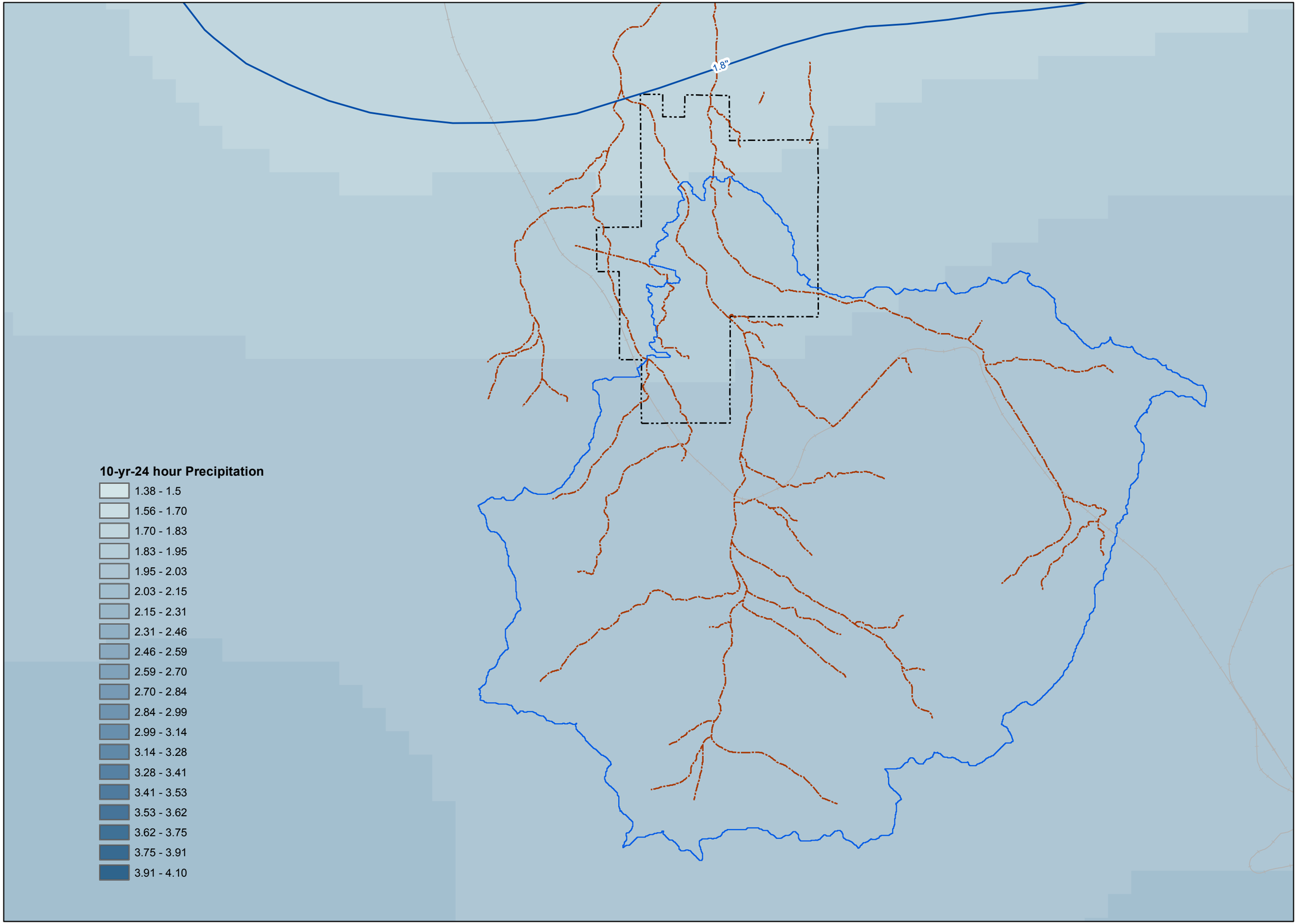


KERN COUNTY

HYDROLOGY MANUAL

DESIGN STORM
DEPTH AREA
CURVES

Figure E-4



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Designed:

Checked:

Drawn:

Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar
Millennium LLC

LEGEND:

- 10-yr-24-hour ISOHYET
- PROPERTY BOUNDARY
- RAILROAD
- FLOWLINE

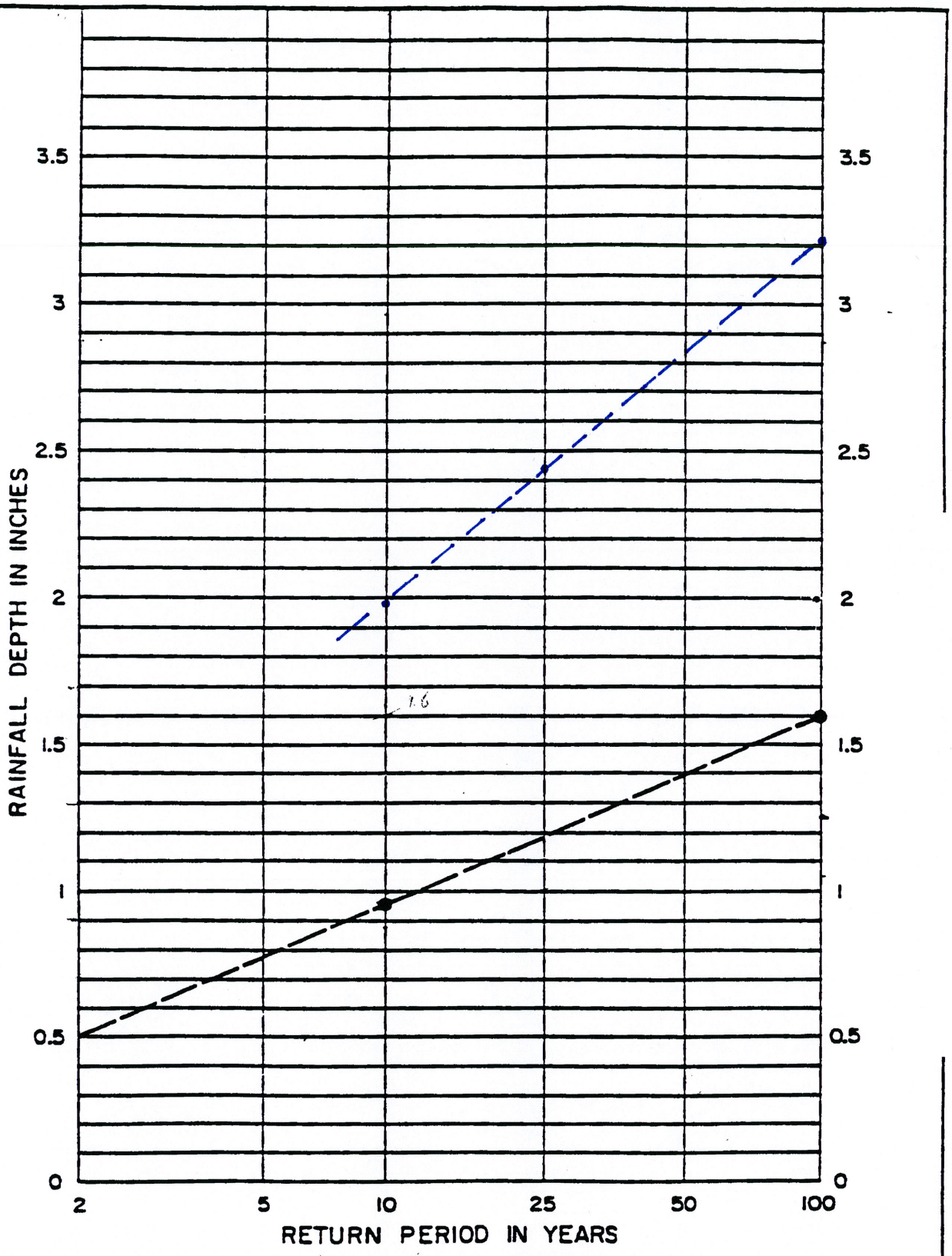
0 1,450 2,900 5,800
Feet

Ridgecrest

Kern County,
California

Precipitation Map
10 year 24 hour

Date: 4/28/09
Sheet: 2 of 2



NOTE:

1. FOR INTERMEDIATE RETURN PERIODS PLOT 10-YEAR AND 100-YEAR ONE HOUR VALUES FROM MAPS, THEN CONNECT POINTS AND READ VALUE FOR DESIRED RETURN PERIOD. FOR EXAMPLE GIVEN 10-YEAR ONE HOUR = 0.95" AND 100-YEAR ONE HOUR = 1.60", 25-YEAR ONE HOUR = 1.18".

REFERENCE: NOAA ATLAS 2, VOLUME XI - CAL., 1973

KERN COUNTY

HYDROLOGY MANUAL

RAINFALL DEPTH VERSUS RETURN PERIOD FOR PARTIAL DURATION SERIES

FIGURE D-3

APPENDIX C: BASIN ROUGHNESS DESCRIPTION

$\bar{n}$ = **0.015**

1. Drainage area has fairly uniform, gentle slopes
2. Most watercourses either improved or along paved streets
3. Groundcover consists of some grasses - large % of area impervious
4. Main water course improved channel or conduit

$\bar{n}$ = **0.020**

1. Drainage area has some graded and non-uniform, gentle slopes
2. Over half of the area watercourses are improved or paved streets
3. Groundcover consists of equal amount of grasses and impervious area
4. Main watercourse is partly improved channel or conduit and partly greenbelt (see n = 0.025)

$\bar{n}$ = **0.025**

1. Drainage area is generally rolling with gentle side slopes
2. Some drainage improvements in the area - streets and canals
3. Groundcover consists mostly of scattered brush and grass and small % impervious
4. Main watercourse is straight channels which are turfed or with stony beds and weeds on earth bank (greenbelt type)

$\bar{n}$ = **0.030**

1. Drainage area is generally rolling with rounded ridges and moderate side slopes
2. No drainage improvements exist in the area
3. Groundcover includes scattered brush and grasses
4. Watercourses meander in fairly straight, unimproved channels with some boulders and lodged debris

$\bar{n}$ = **0.040**

1. Drainage area is composed of steep upper canyons with moderate slopes in lower canyons
2. No drainage improvements exist in the area
3. Groundcover is mixed brush and trees with grasses in lower canyons
4. Watercourses have moderate bends and are moderately impeded by boulders and debris with meandering courses

$\bar{n}$ = **0.050**

1. Drainage area is quite rugged with sharp ridges and steep canyons
2. No drainage improvements exist in the area
3. Groundcover, excluding small areas of rock outcrops, includes many trees and considerable underbrush
4. Watercourses meander around sharp bends, over large boulders and considerable debris obstruction

$\bar{n}$ = **0.200**

1. Drainage area has comparatively uniform slopes
2. No drainage improvements exist in the area
3. Groundcover consists of cultivated crops or substantial growths of grass and fairly dense small shrubs, cacti, or similar vegetation
4. Surface characteristics are such that channelization does not occur

KERN COUNTY

HYDROLOGY MANUAL

BASIN FACTOR DESCRIPTIONS

Figure E-2

APPENDIX D: RUNOFF INDEX NUMBERS

Residential Landscaping (Lawn, Shrubs, etc.) - The pervious portions of commercial establishments, single and multiple family dwellings, trailer parks and schools where the predominant land cover is lawn, shrubbery and trees.

Row Crops - Lettuce, tomatoes, beets, tulips or any field crop planted in rows far enough apart that most of the soil surface is exposed to rainfall impact throughout the growing season. At plowing, planting and harvest times it is equivalent to fallow.

Small Grain - Wheat, oats, barley, flax, etc. planted in rows close enough that the soil surface is not exposed except during planting and shortly thereafter.

Legumes - Alfalfa, sweetclover, timothy, etc. and combinations are either planted in close rows or broadcast.

Fallow - Fallow land is land plowed but not yet seeded or tilled.

Woodland - grass - Areas with an open cover of broadleaf or coniferous trees usually live oak and pines, with the intervening ground space occupied by annual grasses or weeds. The trees may occur singly or in small clumps. Canopy density, the amount of ground surface shaded at high noon, is from 20 to 50 percent.

Woodland - Areas on which coniferous or broadleaf trees predominate. The canopy density is at least 50 percent. Open areas may have a cover of annual or perennial grasses or of brush. Herbaceous plant cover under the trees is usually sparse because of leaf or needle litter accumulation.

Chaparral - Land on which the principal vegetation consists of evergreen shrubs with broad, hard, stiff leaves such as manzonita, ceanothus and scrub oak. The brush cover is usually dense or moderately dense. Diffusely branched evergreen shrubs with fine needle-like leaves, such as chamise and redchank, with dense high growth are also included in this soil cover.

Annual Grass - Land on which the principal vegetation consists of annual grasses and weeds such as annual bromes, wild barley, soft chess, ryegrass and filaree.

Irrigated Pasture - Irrigated land planted to perennial grasses and legumes for production of forage and which is cultivated only to establish or renew the stand of plants. Dry land pasture is considered as annual grass.

Meadow - Land areas with seasonally high water table, locally called cienegas. Principal vegetation consists of sod-forming grasses interspersed with other plants.

Orchard (Deciduous) - Land planted to such deciduous trees as apples, apricots, pears, walnuts, and almonds.

Orchard (Evergreen) - Land planted to evergreen trees which include citrus and avocados and coniferous plantings.

Turf - Golf courses, parks and similar lands where the predominant cover is irrigated mowed close-grown turf grass. Parks in which trees are dense may be classified as woodland.

KERN COUNTY

HYDROLOGY MANUAL

SCS
COVER TYPE
DESCRIPTIONS

FIGURE C-1

Curve[1] Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		77	86	91	94
Chaparral, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparral, Narrowleaf (Chamise and Redskank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadows or Cienagas (Areas with seasonally high water table, principal vegatation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	71	78
Open Brush (Soft wood shrubs-buckwheat,sage,etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (4) (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawns, shrubs, etc.)	Good	39	61	74	80
Turf (Irrigated and mowed grass)	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80

KERN COUNTY
Hydrology Manual

CURVE NUMBERS FOR PERVIOUS AREAS

FIGURE C-2 (1 of 2)

Curve[1] Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
AGRICULTURAL COVERS -					
Fallow (Bare Soil)		77	86	91	94
Close Seeded (alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Evergreen (Citrus, avacodos, etc.)	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Pasture (Grassland or range, continuos forage for grazing)	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Row Crops (Straight row, non-contoured)	Poor	72	81	88	91
	Good	67	78	85	89
Small Grain (Straight row, non-contoured)	Poor	65	76	84	88
	Good	63	75	83	87

Notes:

1. Average runoff condition, Ia = 0.2(S)

2. Poor: Heavily grazed, regularly burned areas, or areas of high burn potential. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.

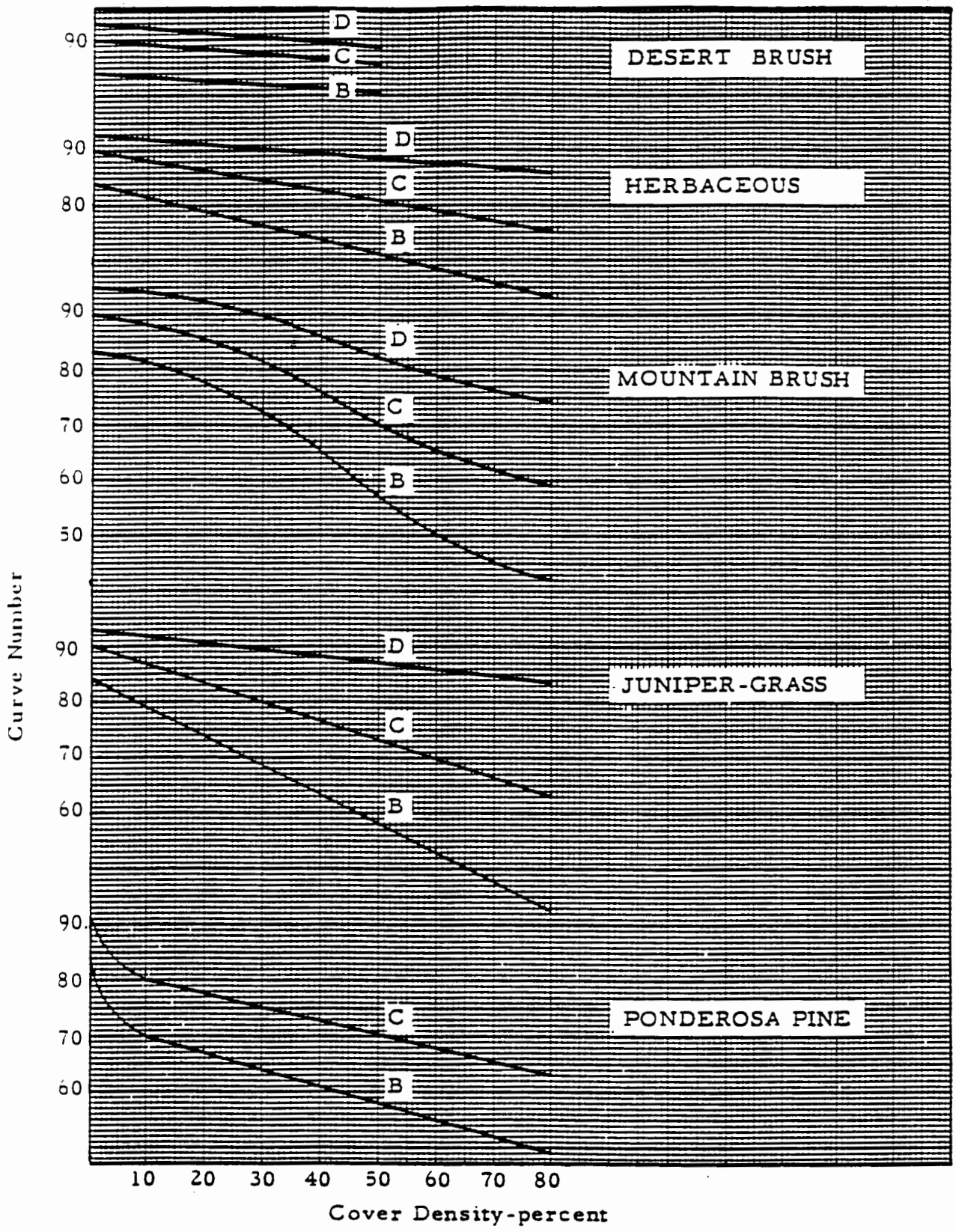
   Fair: Moderate cover with 50 percent to 75 percent of the ground surface protected. In wooded areas the woods are grazed but not burned, and some forest litter covers the soil.

   Good: Heavy or dense cover with more than 75 percent of the ground surface protected. In wooded areas the woods are protected from grazing, litter and brush adequately cover soil.

3. See Figure C-1 for definition of cover types.

KERN COUNTY
Hydrology Manual

CURVE NUMBERS FOR PERVIOUS AREAS



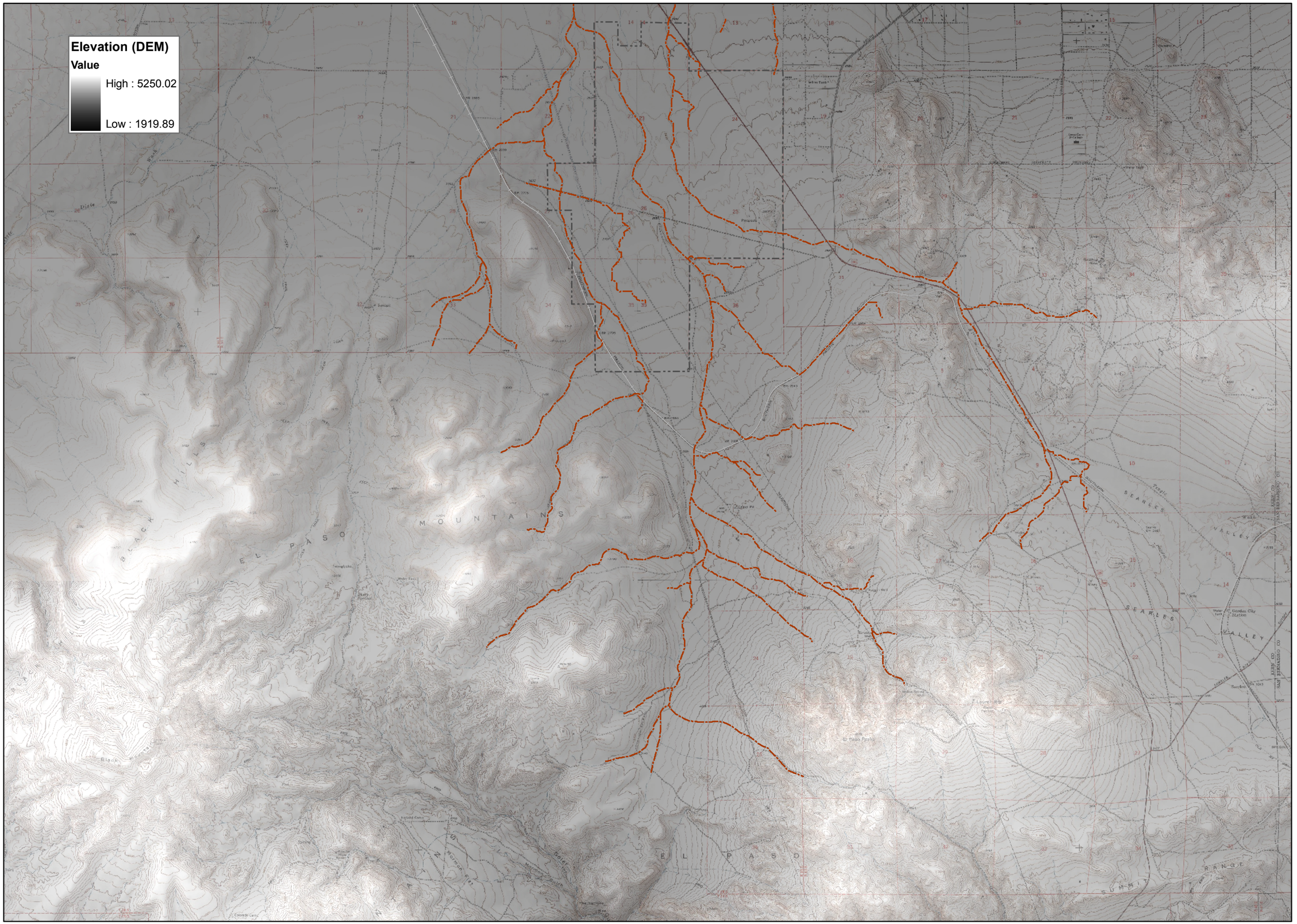
KERN COUNTY

HYDROLOGY MANUAL

HYDROLOGIC SOIL COVER COMPLEXES AND ASSOCIATED CURVE NUMBERS

FIGURE C-7

APPENDIX E: USGS QUAD SHEET



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Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

- PROPERTY BOUNDARY
- RAILROAD
- FLOWLINE

0 1,750 3,500 7,000 Feet

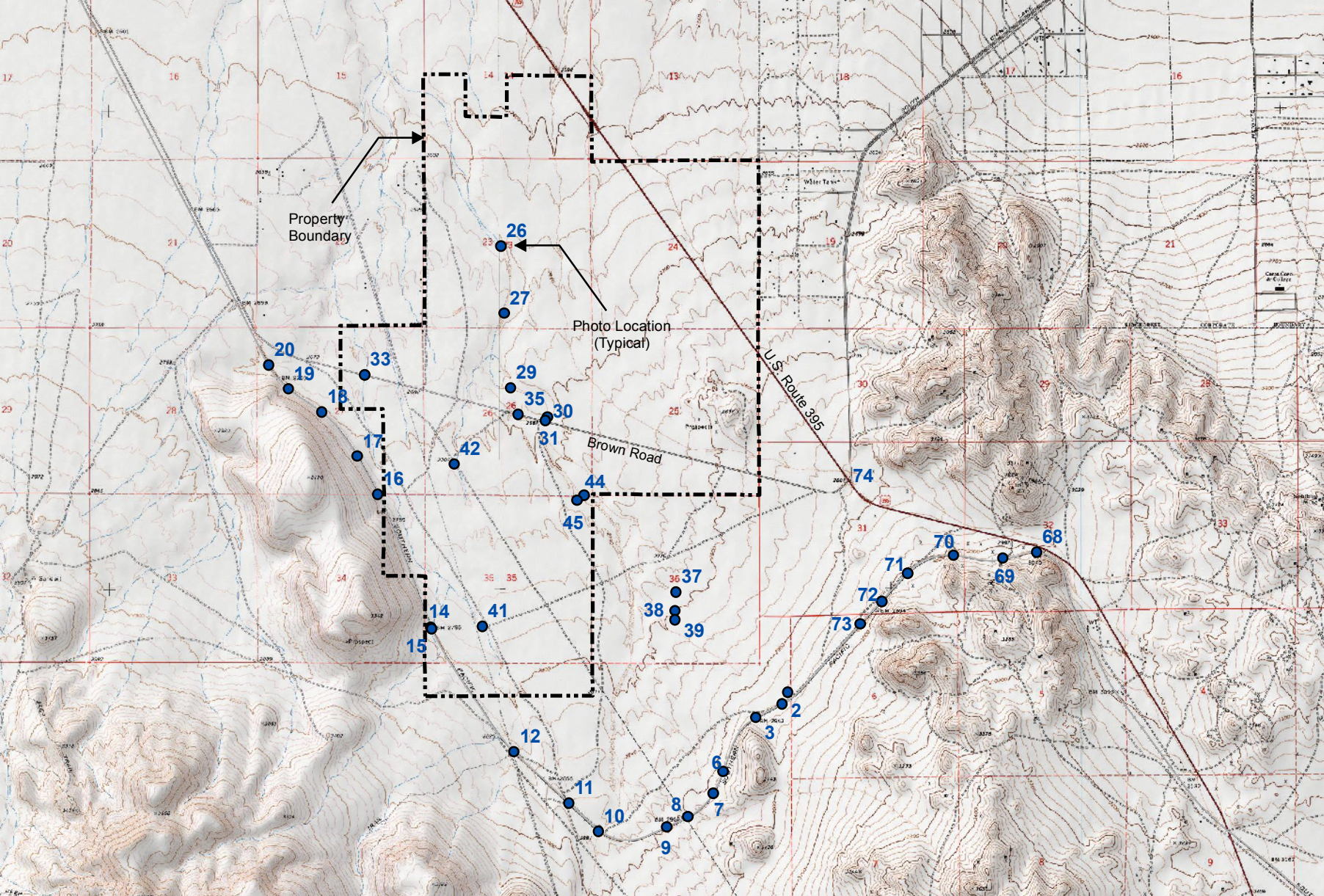
Ridgecrest

Kern County, California

USGS Quad and DEM

Date: 3/16/09
Sheet: 1 of 1

APPENDIX F: PROPOSED SITE REPRESENTATIVE WATER COURSE PHOTOGRAPHS


Property Boundary
Photo Location (Typical)
U.S. Route 395
Brown Road
20
19
18
17
16
33
42
26
27
29
35
30
31
44
45
14
15
41
12
11
10
9
8
7
6
3
2
37
38
39
74
70
71
72
73
68
69

Point 2 looking southeast – 12’6”W x 3’H timber bridge (outlet)

Point 2 looking northwest – 12’6”W x 3’H timber bridge (outlet)

Point 3 looking southeast - 12’6”W x 3’8”H timber bridge (outlet)

Point 3 looking northwest - 12’6”W x 3’8”H timber bridge (outlet)

Point 6 looking southeast – 4’W x 5’H concrete culvert (outlet)

Point 6 looking northwest – 4’W x 5’H concrete culvert (outlet)

Point 7 looking northwest – 6’W x 5’6”H timber bridge (inlet)

Point 7 looking northwest – 6’W x 5’6”H timber bridge (outlet)

Point 8 looking southeast – 12’6”W x 2’6”H timber bridge (outlet)

Point 8 looking northwest – 12’6”W x 2’6”H timber bridge (outlet)

Point 9 looking southeast – 12’6”W x 3’H timber bridge (outlet)

Point 9 looking northwest – 12’6”W x 3’H timber bridge (outlet)

Point 10 looking north – 170’W x 8’6”H timber bridge (downslope)

Point 10 looking south – 170’W x 8’6”H timber bridge (upslope)

Point 10 looking north – 170’W x 8’6”H timber bridge (left downslope)

Point 10 looking north – 170’Wx8’6”H timber bridge (right downslope)

Point 10 looking south – 170’W x 8’6”H timber bridge (upslope)

Point 10 looking north – 170’W x 8’6”H timber bridge (downslope)

Point 11 looking southwest – 6’W x 3’H timber bridge (outlet)

Point 11 looking northeast – 6’W x 3’H timber bridge (outlet)

Point 12 looking northeast – three 60” diameter CSPs (inlet)

Point 12 looking southwest – three 60” diameter CSPs (inlet)

Point 12 looking southwest – 3 @ 60” diameter CSPs (outlet)

Point 12 looking northeast – 3 @ 60” diameter CSPs (outlet)

Point 14 looking southwest – 2 @ 11’6”W x 9’H timber bridge (outlet)

Point 14 looking northeast – 2 @ 11’6”W x 9’H timber bridge (outlet)

Point 15 looking northeast – 18” CIP (inlet)

Point 15 looking northeast – 18” CIP (outlet)

Point 16 looking northeast – 18” CIP (inlet)

Point 16 looking northeast – 18” CIP (outlet)

Point 17 looking northeast – 18” CIP (inlet)

Point 17 looking south – 18” CIP (upslope)

Point 18 looking northeast – 18” CIP (inlet)

Point 18 looking northeast – 18” CIP (outlet)

Point 19 looking northeast – 18” CIP (inlet)

Point 19 looking northeast – 18” CIP (outlet)

Point 20 looking northeast – concrete culvert (inlet)

Point 20 looking northeast – concrete culvert (outlet)

Point 26 looking southeast – wash

Point 26 looking northwest – wash

Point 27 looking southwest – wash

Point 27 looking northeast – wash

Point 29 looking southeast – wash

Point 29 looking northwest – wash

Point 30 looking south – wash immediately north of Brown Road

Point 30 looking north – wash immediately north of Brown Road

Point 31 looking south – wash immediately south of Brown Road

Point 31 looking north – wash immediately south of Brown Road

Point 31 looking north – wash crossing Brown Road

Point 31 looking east – wash crossing Brown Road

Point 33 looking south – wash crossing Brown Road

Point 33 looking north – wash crossing Brown Road

Point 33 looking north – wash crossing Brown Road

Point 33 looking east – wash crossing Brown Road

Point 35 looking north – drainage chute along Brown Road

Point 35 looking west – drainage chute location along Brown Road

Point 37 looking east – small wash along private property line

Point 37 looking west – small wash along private property line

Point 38 looking east – small wash along private property line

Point 38 looking west – small wash along private property line

Point 39 looking east – small wash along private property line

Point 39 looking west – small wash along private property line

Point 41 looking northwest – wash

Point 41 looking southeast – wash

Point 42 looking northwest – small wash crossing trail

Point 42 looking southeast – small wash crossing trail

Point 44 looking southeast – wash

Point 44 looking northwest – wash

Point 45 looking southeast – wash

Point 45 looking northwest – wash

Point 68 looking south – 4’W x 5’H concrete culvert (outlet)

Point 68 looking north – 4’W x 5’H concrete culvert (outlet)

Point 69 looking south – 12’W x 5’6”H timber bridge (outlet)

Point 69 looking north – 12’W x 5’6”H timber bridge (outlet)

Point 70 looking south – 5’8”W x 7’H timber bridge (outlet)

Point 70 looking north – 5’8”W x 7’H timber bridge (outlet)

Point 71 looking southeast – 6’W x 7’H concrete culvert (outlet)

Point 72 looking southeast – 6’W x 2’6”H timber bridge (outlet)

Point 73 looking southeast – 4’W x 5’H concrete culvert (outlet)

Point 73 looking northwest – 4’W x 5’H concrete culvert (outlet)

Point 74 looking west – 24” CMP crossing U.S. 395 (inlet)

Point 74 looking west – 24” CMP crossing U.S. 395 (outlet)

APPENDIX G: HMS INPUT DATA

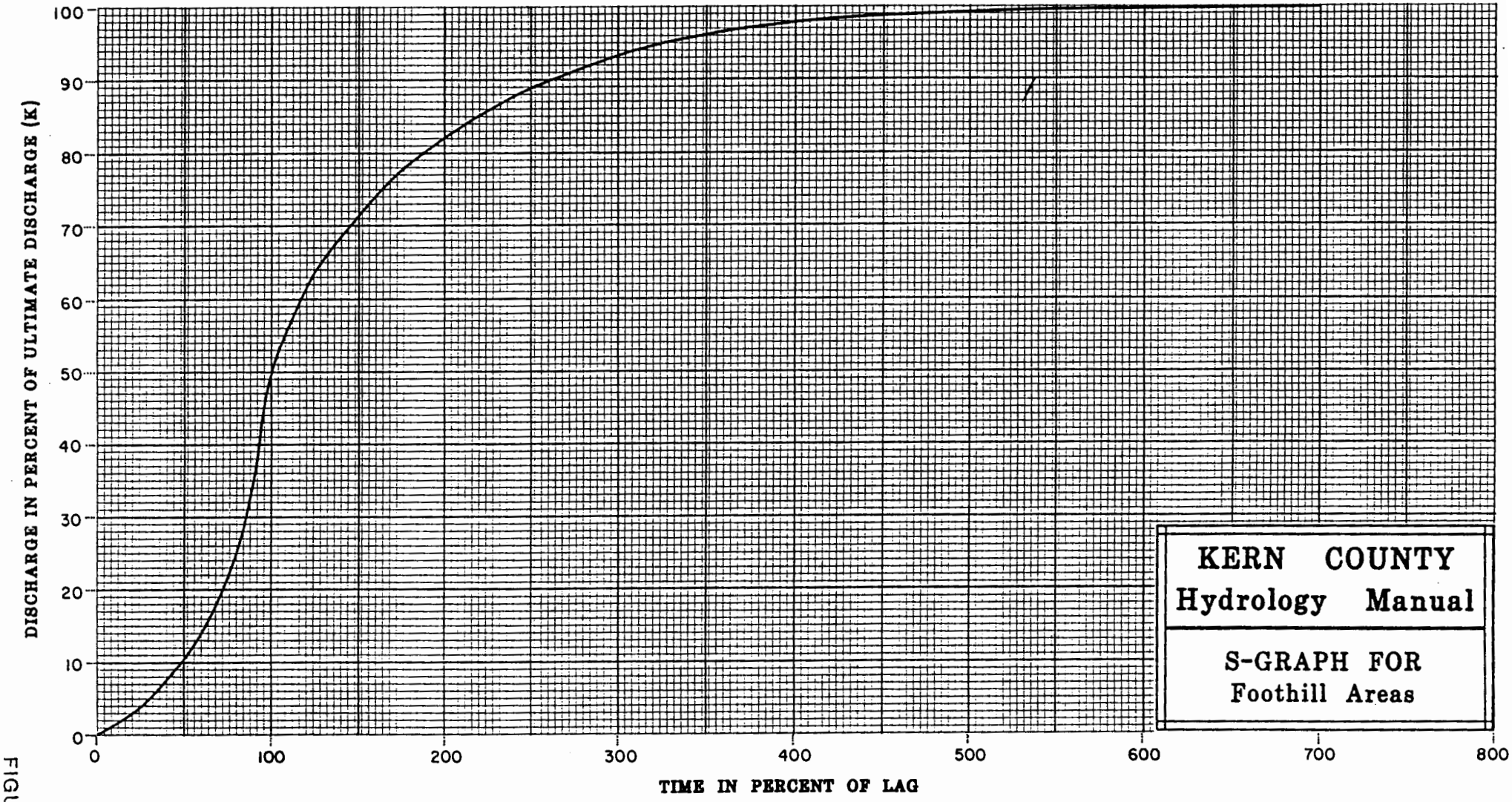

DISCHARGE IN PERCENT OF ULTIMATE DISCHARGE (K)
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
700
800
TIME IN PERCENT OF LAG
KERN COUNTY
Hydrology Manual
S-GRAPH FOR
Foothill Areas

FIGURE E-3b

Ridgecrest Solar Plant
HMS Input Parameters

Existing Hydrology

Western Drainage Area

Sub Basin	Area (mi^2)	Length (mi)	L_{ca} (mi)	Basin Slope (ft/mi)	n	CN	S = (1000/CN) - 10	T_{lag}(hours) = $24n(L*L_{ca}/S^{0.5})^{0.38}$	T_{lag}(mins) = $24n(L*L_{ca}/S^{0.5})^{0.38}$	IA
W660	0.53	2.41	1.21	3.04	0.03	76.49	3.07	0.41	24.71	0.62
W740	1.76	3.83	1.91	11.30	0.04	78.63	2.72	0.61	36.43	0.55
W770	1.28	3.35	1.67	17.90	0.04	77.25	2.94	0.50	30.18	0.59
W950	0.79	3.41	1.71	15.95	0.04	77.31	2.93	0.52	31.29	0.59
W5420	0.25	1.34	0.67	4.04	0.04	75.45	3.25	0.33	19.91	0.65
W5460	0.89	1.97	0.99	3.74	0.03	75.46	3.25	0.34	20.38	0.65
W5480	0.85	1.73	0.87	14.04	0.04	77.20	2.95	0.32	19.17	0.59
W5300	2.49	4.52	2.26	18.20	0.04	78.00	2.82	0.63	37.77	0.57
W5320	0.72	1.71	0.85	10.49	0.04	79.87	2.52	0.33	20.00	0.51
W5330	1.07	2.73	1.37	8.48	0.04	76.53	3.07	0.50	29.78	0.61
W5330	1.07	2.73	1.37	8.48	0.04	76.53	3.07	0.50	29.78	0.61
W5330	1.07	2.73	1.37	8.48	0.04	76.53	3.07	0.50	29.78	0.61
W5330	1.07	2.73	1.37	8.48	0.04	76.53	3.07	0.50	29.78	0.61
W5350	1.30	2.66	1.33	10.18	0.04	77.06	2.98	0.47	28.17	0.60
W5350	1.30	2.66	1.33	10.18	0.04	77.06	2.98	0.47	28.17	0.60
W5350	1.30	2.66	1.33	10.18	0.04	77.06	2.98	0.47	28.17	0.60
W5370	1.28	2.72	1.36	25.05	0.04	80.59	2.41	0.40	24.18	0.48
W5370	1.28	2.72	1.36	25.05	0.04	80.59	2.41	0.40	24.18	0.48
W5370	1.28	2.72	1.36	25.05	0.04	80.59	2.41	0.40	24.18	0.48
W5430	1.09	3.27	1.64	11.07	0.04	77.60	2.89	0.54	32.50	0.58
W6880	0.67	2.98	1.49	24.39	0.04	78.70	2.71	0.43	26.05	0.54
W1090	1.19	3.04	1.52	2.33	0.03	75.45	3.25	0.52	31.00	0.65
W1140	0.75	3.64	1.82	1.67	0.03	75.45	3.25	0.63	37.80	0.65
W6900	0.84	2.79	1.39	21.39	0.04	78.31	2.77	0.42	25.36	0.55
W6920	0.57	1.69	0.84	19.03	0.04	76.63	3.05	0.30	17.73	0.61
W12240	2.18	2.43	1.22	11.30	0.04	76.30	3.11	0.43	25.81	0.62
W6890	3.13	3.50	1.75	13.25	0.04	76.20	3.12	0.55	33.04	0.63
W6890	3.13	3.50	1.75	13.25	0.04	76.20	3.12	0.55	33.04	0.63
W6890	3.13	3.50	1.75	13.25	0.04	76.20	3.12	0.55	33.04	0.63
W6890	3.13	3.50	1.75	13.25	0.04	76.20	3.12	0.55	33.04	0.63
W6890	3.13	3.50	1.75	13.25	0.04	76.20	3.12	0.55	33.04	0.63

Ridgecrest Solar Plant
HMS Input Parameters

Existing Hydrology **Eastern Drainage Area**

Sub Basin	Area (mi^2)	Length (mi)	L_{ca} (mi)	Basin Slope (ft/mi)	n	CN	S = (1000/CN) - 10	T_{lag}(hours) = $24n(L*L_{ca}/S^{0.5})^{0.38}$	T_{lag}(mins) = $24n(L*L_{ca}/S^{0.5})^{0.38}$	IA
W430	0.45	1.66	0.83	3.38	0.03	75.45	3.25	0.30	18.20	0.65
W2550	0.62	3.28	1.64	3.42	0.03	75.70	3.21	0.51	30.52	0.64
W2560	1.74	2.77	1.39	10.96	0.04	81.21	2.31	0.42	25.09	0.46
W2560	1.74	2.77	1.39	10.96	0.04	81.21	2.31	0.42	25.09	0.46
W2560	1.74	2.77	1.39	10.96	0.04	81.21	2.31	0.42	25.09	0.46
W240	0.95	3.07	1.53	6.16	0.04	81.25	2.31	0.58	34.58	0.46
W260	0.71	1.92	0.96	4.16	0.04	81.14	2.32	0.43	26.06	0.46
W260	0.71	1.92	0.96	4.16	0.04	81.14	2.32	0.43	26.06	0.46
W260	0.71	1.92	0.96	4.16	0.04	81.14	2.32	0.43	26.06	0.46
W250	2.80	3.16	1.58	8.54	0.04	81.25	2.31	0.48	29.08	0.46
W270	1.53	2.62	1.31	9.65	0.04	81.25	2.31	0.47	28.12	0.46
W2500	0.77	2.56	1.28	7.86	0.04	81.25	2.31	0.48	28.76	0.46
W2490	0.66	3.01	1.51	12.23	0.04	81.25	2.31	0.50	29.95	0.46

Ridgecrest Solar Plant
HMS Input Parameters

Proposed Hydrology **Western Drainage Area**

Sub Basin	Area (mi^2)	Length (mi)	L_{ca} (mi)	Basin Slope (ft/mi)	n	CN	S = (1000/CN) - 10	T_{lag}(hours) = $24n(L*L_{ca}/S^{0.5})^{0.38}$	T_{lag}(mins) = $24n(L*L_{ca}/S^{0.5})^{0.38}$	IA
SSF_1	0.46	1.85	0.93	1.98	0.04	75.45	3.25	0.49	29.27	0.65
SSF_WIntercept_1	0.26	2.04	1.02	2.36	0.03	75.45	3.25	0.38	22.78	0.65
W6460	0.37	3.06	1.53	2.24	0.03	75.45	3.25	0.52	31.38	0.65
SSF_DetBasin	0.08	0.87	0.43	1.35	0.03	75.45	3.25	0.22	13.24	0.65
W660	0.52	2.38	1.19	3.05	0.03	76.51	3.07	0.41	24.41	0.62
W5460	0.88	1.97	0.99	3.74	0.04	75.46	3.25	0.45	27.17	0.65
W5460	0.88	1.97	0.99	3.74	0.03	75.46	3.25	0.45	27.17	0.65
W5460	0.88	1.97	0.99	3.74	0.03	75.46	3.25	0.45	27.17	0.65
SSF_2	0.55	1.71	0.86	1.53	0.04	75.45	3.25	0.48	28.90	0.65
SSF_SIntercept_2	0.06	0.65	0.32	3.10	0.04	75.45	3.25	0.20	12.04	0.65
W740	1.76	3.83	1.91	11.30	0.04	78.63	2.72	0.61	36.43	0.55
W5470	1.17	2.59	1.29	3.89	0.04	75.45	3.25	0.48	28.98	0.65
W5470	1.17	2.59	1.29	3.89	0.04	75.45	3.25	0.48	28.98	0.65
W5470	1.17	2.59	1.29	3.89	0.03	75.45	3.25	0.48	28.98	0.65
W1170	0.22	1.08	0.54	2.50	0.04	75.45	3.25	0.31	18.61	0.65
W11700	0.31	2.08	1.04	1.90	0.04	75.45	3.25	0.54	32.20	0.65
W5420	0.25	1.34	0.67	4.04	0.04	75.45	3.25	0.33	19.92	0.65
W5480	0.85	1.73	0.87	14.04	0.04	77.20	2.95	0.32	19.17	0.59
SSF_Channel1Trib	1.26	3.11	1.56	18.16	0.04	77.29	2.94	0.47	28.47	0.59
W5350	1.30	2.66	1.33	10.18	0.04	77.06	2.98	0.47	28.17	0.60
W5350	1.30	2.66	1.33	10.18	0.04	77.06	2.98	0.47	28.17	0.60
W5350	1.30	2.66	1.33	10.18	0.04	77.06	2.98	0.47	28.17	0.60
W5430	1.09	3.26	1.63	11.07	0.04	77.60	2.89	0.54	32.39	0.58
W5330	1.09	2.72	1.36	8.43	0.04	76.51	3.07	0.50	29.76	0.62
W5330	1.09	2.72	1.36	8.43	0.04	76.51	3.07	0.50	29.76	0.62
W5330	1.09	2.72	1.36	8.43	0.04	76.51	3.07	0.50	29.76	0.62
W5330	1.09	2.72	1.36	8.43	0.04	76.51	3.07	0.50	29.76	0.62
W5330	1.09	2.72	1.36	8.43	0.04	76.51	3.07	0.50	29.76	0.62
W5490	1.56	3.43	1.72	24.95	0.04	78.55	2.73	0.48	28.86	0.55
W5300	2.49	4.53	2.26	18.20	0.04	78.00	2.82	0.63	37.82	0.57
W5320	0.72	1.71	0.85	10.49	0.04	79.87	2.52	0.33	20.00	0.51
W5370	1.28	2.72	1.36	25.05	0.04	80.59	2.41	0.40	24.18	0.48
W5370	1.28	2.72	1.36	25.05	0.04	80.59	2.41	0.40	24.18	0.48
W5370	1.28	2.72	1.36	25.05	0.04	80.59	2.41	0.40	24.18	0.48
W6880	0.67	2.98	1.49	24.39	0.04	78.70	2.71	0.43	26.05	0.54
W6900	0.84	2.79	1.39	21.39	0.04	78.31	2.77	0.42	25.36	0.55
W950	0.79	3.41	1.71	15.95	0.04	77.31	2.93	0.52	31.29	0.59
W6920	0.57	1.69	0.84	19.03	0.04	76.63	3.05	0.30	17.73	0.61
W6890	3.12	3.38	1.69	13.29	0.04	76.58	3.06	0.54	32.16	0.61
W6890	3.12	3.38	1.69	13.29	0.04	76.58	3.06	0.54	32.16	0.61
W6890	3.12	3.38	1.69	13.29	0.04	76.58	3.06	0.54	32.16	0.61
W6890	3.12	3.38	1.69	13.29	0.04	76.58	3.06	0.54	32.16	0.61
W12240	2.18	2.43	1.22	11.30	0.04	76.50	3.07	0.43	25.81	0.62
W12240	2.18	2.43	1.22	11.30	0.04	76.50	3.07	0.43	25.81	0.62
W12240	2.18	2.43	1.22	11.30	0.04	76.50	3.07	0.43	25.81	0.62

Ridgecrest Solar Plant
HMS Input Parameters

Proposed Hydrology **Eastern Drainage Area**

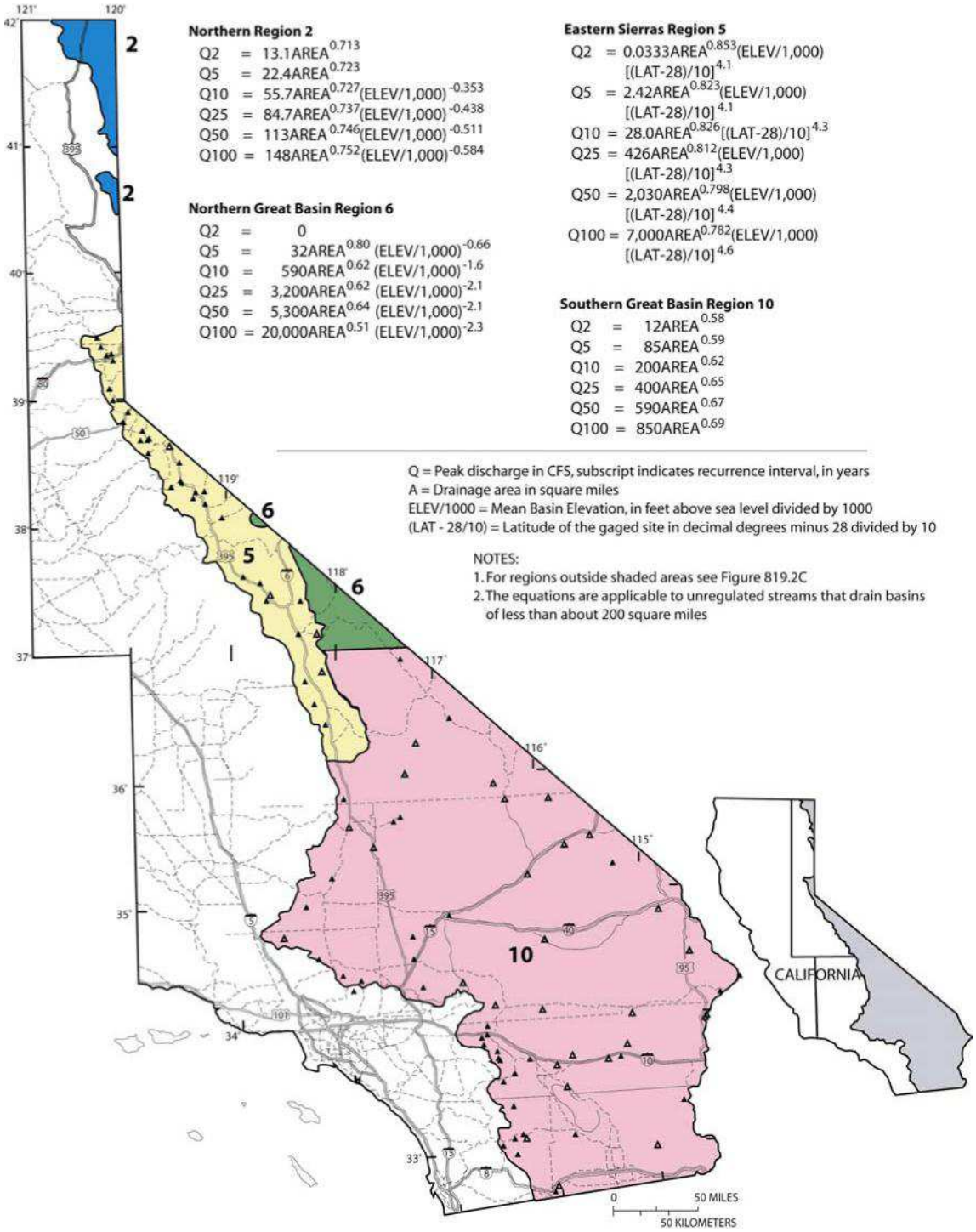
Sub Basin	Area (mi^2)	Length (mi)	L_{ca} (mi)	Basin Slope (ft/mi)	n	CN	S = (1000/CN) - 10	T_{lag}(hours) = $24n(L*L_{ca}/S^{0.5})^{0.38}$	T_{lag}(mins) = $24n(L*L_{ca}/S^{0.5})^{0.38}$	IA
W210	0.39	1.49	0.74	1.80	0.03	75.45	3.25	0.32	18.90	0.65
NSF_1	0.48	1.30	0.65	2.23	0.03	75.45	3.25	0.27	16.42	0.65
NSF_DetBasin	0.05	0.53	0.27	1.73	0.04	75.45	3.25	0.17	10.19	0.65
NSF_2	0.61	1.82	0.91	2.60	0.04	75.45	3.25	0.40	23.93	0.65
NSF_Alter_2	0.27	2.01	1.01	3.82	0.03	75.45	3.25	0.34	20.62	0.65
NSF_Alter_2	0.27	2.01	1.01	3.82	0.03	75.45	3.25	0.34	20.62	0.65
NSF_Alter_2	0.27	2.01	1.01	3.82	0.03	75.45	3.25	0.34	20.62	0.65
NSF_LateralChannel	0.28	1.97	0.98	4.90	0.03	75.45	3.25	0.32	19.33	0.65
NSF_Alter_1	0.09	1.93	0.97	2.48	0.03	75.45	3.25	0.36	21.66	0.65
NSF_AddDrain_Alt_2	0.07	0.64	0.32	2.13	0.04	75.45	3.25	0.19	11.22	0.65
W270	1.79	2.88	1.44	10.97	0.04	81.15	2.32	0.43	25.83	0.46
W270	1.79	2.88	1.44	10.97	0.04	81.15	2.32	0.43	25.83	0.46
W270	1.79	2.88	1.44	10.97	0.04	81.15	2.32	0.43	25.83	0.46
W280	0.95	3.07	1.53	6.16	0.04	81.25	2.31	0.58	34.58	0.46
W330	0.71	1.92	0.96	4.16	0.04	81.14	2.32	0.43	26.07	0.46
W330	0.71	1.92	0.96	4.16	0.04	81.14	2.32	0.43	26.07	0.46
W330	0.71	1.92	0.96	4.16	0.04	81.14	2.32	0.43	26.07	0.46
W290	2.80	3.16	1.58	8.54	0.04	81.25	2.31	0.48	29.08	0.46
W310	1.53	2.62	1.31	9.65	0.04	81.25	2.31	0.47	28.12	0.46
W350	0.77	2.56	1.28	7.86	0.04	81.25	2.31	0.48	28.76	0.46
W340	0.66	3.01	1.51	12.24	0.04	81.25	2.31	0.50	29.94	0.46

APPENDIX H: CALTRANS REGIONAL FLOOD FREQUENCY EQUATIONS

Figure 819.2D

Regional Flood Frequency Equations for California Regions within USGS Southwestern United States Study*

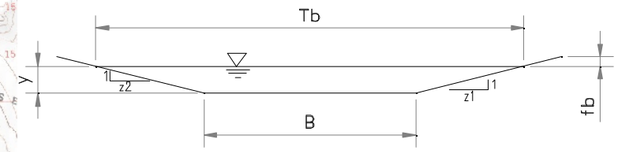
*USGS Open File Report 93-419 (1994)



APPENDIX I: PROPOSED HYDROLOGY MAP

Sub Basin	Area (mi^2)	10-yr			25-yr			100-yr		
		Peak Discharge (cfs)	Node Total		Peak Discharge (cfs)	Node Total		Peak Discharge (cfs)	Node Total	
			Node	Peak Discharge (cfs)		Node	Peak Discharge (cfs)		Node	Peak Discharge (cfs)
O1c	0.33	42.9	1B	42.9	75.8	1B	76	148.5	1B	148.5
O1	2.62	470.9	1C	512.2	787.1	1C	858	1,445.8	1C	1,592.1
O1b	1.35	223.1	1D	618.9	380.8	1D	1,086	708.7	1D	2,101.0
O2	20.73	2,598.4	2B	2,598.4	4648.5	2B	4,649	9,170.5	2B	9,170.5
O2b	1.35	168.5	2C	2,584.2	302.1	2C	4,619	594.0	2C	9,041.5
O2c	1.49	209.0	2D	2,655.6	377.6	2D	4,733	743.4	2D	9,293.0
O3	9.21	1,518.9	3A	1,518.9	2524.8	3A	2,525	4,611.1	3A	4,611.1
O3b	0.28	49.9	3B	1,527.8	88	3B	2,541	168.6	3B	4,650.7

TYPICAL CHANNEL CROSS SECTION



Channel Reach	Bed Slope	z1 = z2	Bottom Width (B) [ft]	Design Depth (y) [ft]	Flow Velocity [ft/s]	Top Width (Tb) [ft]	Freeboard (fb) [ft]	Design Radius of Curvature [ft]	Min ROW [ft]
1A - 1B	0.004	4.0	10.0	2.2	3.6	27.6	0.5	-	41.6
1C - 1D	0.009	4.0	35.0	3.9	8.1	66.2	3.0	198.6	100.2
1D - 1E	0.009	4.0	50.0	3.8	8.5	80.4	3.0	241.2	114.4
2A - 2B	0.015	4.0	10.0	3.2	8.0	35.6	0.8	-	52.3
2B - 2C	0.005	4.0	110.0	6.8	9.8	164.4	3.0	493.2	198.4
2C - 2D	0.012	4.0	100.0	6.1	12.2	148.8	3.0	-	182.8
3A - 3B	0.017	4.0	45.0	5.8	11.7	91.4	3.0	274.2	125.4

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

www.aecom.com

Designed:
Checked:
Drawn:
Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

- EA / 15.35 — DRAINAGE AREA NAME / AREA (SQ. MILES)
- NODE NUMBER 01
- FLOWLINE
- PROPOSED CHANNEL
- CATCHMENT
- DRAIANGE AREA BOUNDARY
- SOLAR BLOCK LOCATION

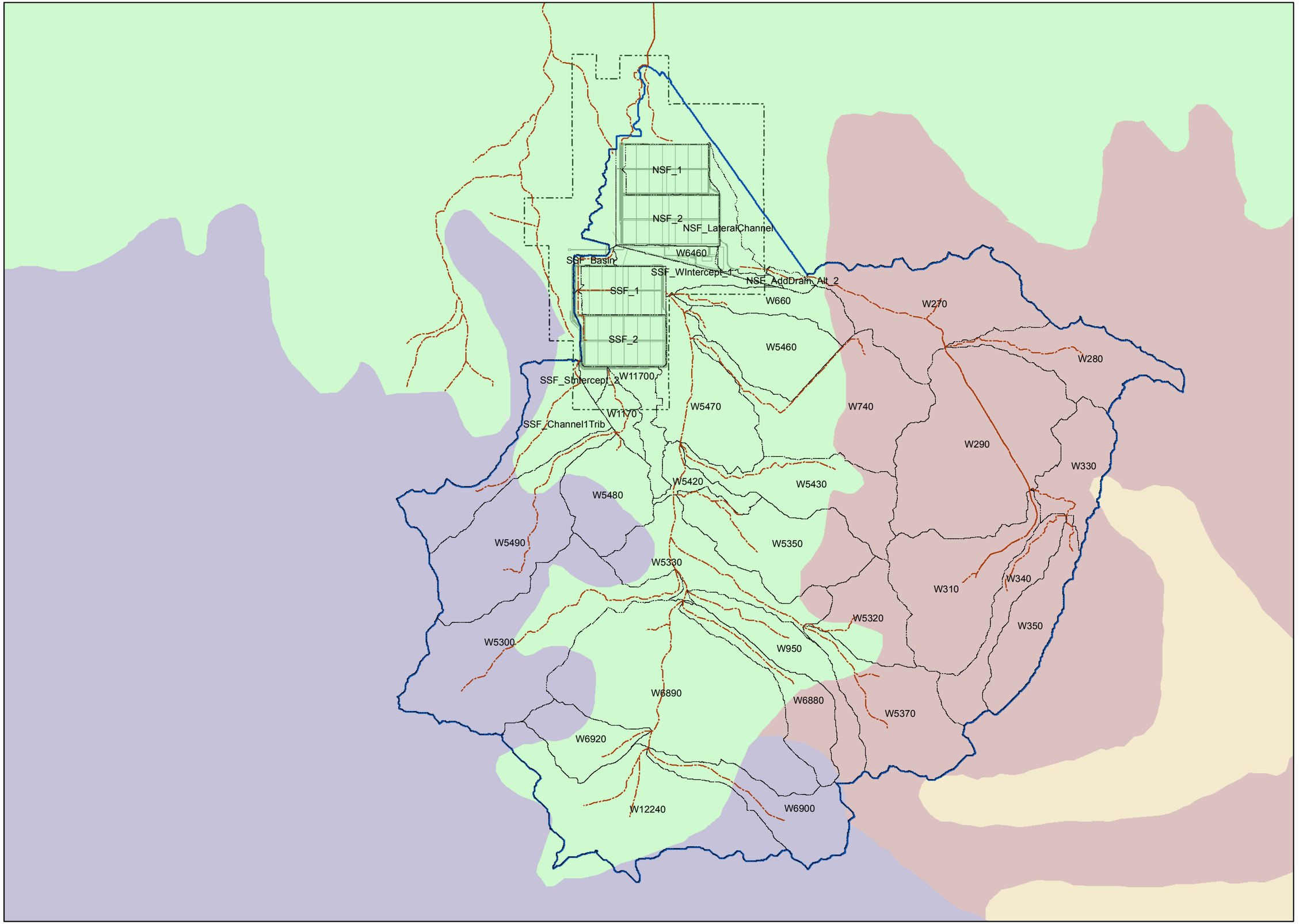
0 1,250 2,500 5,000 Feet

Ridgecrest Solar Energy Project

Kern County, California

Proposed Hydrology Map

Date: 5/10/09
Sheet: 1 of 2



AECOM

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

www.aecom.com

Designed:

Checked:

Drawn:

Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

- FLOWLINE
- SOLAR POWER BLOCK
- PROPERTY BOUNDARY
- DRAINAGE AREA BOUNDARY

SCS CN Values

- 62
- 75
- 76
- 77
- 79
- 81

0 1,700 3,400 6,800 Feet

Ridgecrest

Kern County, California

Proposed Hydrology Map

Date: 5/10/09

Sheet: 2 of 2

APPENDIX J: CHANNEL HYDRAULICS

Channel Reach	Bed Slope	Manning n	z1 = z2	Bottom Width (B) [ft]	Design Depth (y) [ft]	Flow Area [ft2]	Flow Velocity [ft/s]	Specific Energy [ft]	Normal Depth (ft)	Critical Depth (ft)	Critical Slope
1A - 1B	0.004	0.035	4.0	10.0	2.2	41.4	3.6	0.0	2.2	1.5	0.012
1C - 1D	0.009	0.035	4.0	35.0	3.9	197.3	8.1	4.9	3.9	3.5	0.012
1D - 1E	0.009	0.035	4.0	50.0	3.8	247.8	8.5	4.9	3.8	3.4	0.011
2A - 2B	0.015	0.035	4.0	10.0	3.2	73.0	8.0	4.2	3.2	3.2	0.015
2B - 2C	0.005	0.035	4.0	110.0	6.8	933.0	9.8	8.3	6.8	5.6	0.009
2C - 2D	0.012	0.035	4.0	100.0	6.1	758.8	12.2	8.4	5.9	6.1	0.010
3A - 3B	0.017	0.035	4.0	45.0	5.8	395.6	11.7	7.9	5.2	5.8	0.013

APPENDIX K: HYDROLOGY RESULTS

Ridgecrest Solar Plant

Exisiting Condition Hydrology Results

Sub Basin	Area (mi^2)	10-yr					25-yr					100-yr				
		Peak Discharge (cfs)	Sub Basin Volume (Ac-Ft)	Node Total			Peak Discharge (cfs)	Sub Basin Volume (Ac-Ft)	Node Total			Peak Discharge (cfs)	Sub Basin Volume (Ac-Ft)	Node Total		
				Node	Peak Discharge (cfs)	Volume (Ac-Ft)			Node	Peak Discharge (cfs)	Volume (Ac-Ft)			Node	Peak Discharge (cfs)	Volume (Ac-Ft)
E1	4.11	726.6	101.3	1	726.6	101.3	1220	158.1	1	1220	158.1	2269.6	275.8	1	2269.6	275.8
E1b	0.75	92.5	15.6	4	92.5	15.6	165.9	25.1	4	165.9	25.1	322.6	45.3	4	322.6	45.3
E2	22.01	2650.7	530	2	2650.7	530	4706.1	830.5	2	4706.1	830.5	9166.1	1455.2	2	9166.1	1455.2
E3	9.78	1552.7	310.5	3	1552.7	310.5	2582.4	463.6	3	2582.4	463.6	4735.8	771.3	3	4735.8	771.3
E3b	0.45	82.6	9.3	5	82.6	9.3	147.9	15	5	147.9	15	287.5	27.1	5	287.5	27.1

Proposed Condition Hydrology Results

Sub Basin	Area (mi^2)	10-yr					25-yr					100-yr				
		Peak Discharge (cfs)	Sub Basin Volume (Ac-Ft)	Node Total			Peak Discharge (cfs)	Sub Basin Volume (Ac-Ft)	Node Total			Peak Discharge (cfs)	Sub Basin Volume (Ac-Ft)	Node Total		
				Node	Peak Discharge (cfs)	Volume (Ac-Ft)			Node	Peak Discharge (cfs)	Volume (Ac-Ft)			Node	Peak Discharge (cfs)	Volume (Ac-Ft)
O1c	0.33	42.9	6.5	1B	42.9	6.5	75.8	10.5	1B	75.8	10.5	148.5	19	1B	148.5	19
O1	2.62	470.9	66.2	1C	512.2	72.8	787.1	102.9	1C	858.2	113.4	1445.8	178.7	1C	1592.1	197.7
O1b	1.35	223.1	30.3	1D	618.9	104.2	380.8	47.5	1D	1085.6	162.7	708.7	83.2	1D	2101	284.3
O2	20.73	2598.4	506.2	2B	2598.4	506.2	4648.5	791.4	2B	4648.5	791.4	9170.5	1383.2	2B	9170.5	1383.2
O2b	1.35	168.5	28.1	2C	2584.2	506.1	302.1	45.3	2C	4619	791.2	594	81.7	2C	9041.5	1382.8
O2c	1.49	209	30.3	2D	2655.6	536.5	377.6	48.9	2D	4733.3	840	743.4	88.1	2D	9293	1470.9
O3	9.21	1518.9	300	3A	1518.9	300	2524.8	446.7	3A	2524.8	446.7	4611.1	740.9	3A	4611.1	740.9
O3b	0.28	49.9	5.7	3B	1527.8	305.8	88	9.2	3B	2541.2	456	168.6	16.6	3B	4650.7	757.6

APPENDIX L.2

Drainage, Erosion and Sediment Control Plan

RIDGECREST SOLAR POWER PROJECT

Construction Drainage, Erosion and Sediment Control Plan / Stormwater Pollution Prevention Plan

Prepared for
Solar Millennium, LLC

July 2009

AECOM USA, Inc.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

FOR

Ridgecrest Solar Power Plant

Prepared for:

Solar Millennium
1625 Shattuck Ave., Suite 270
Berkeley, California 94709

Project Site Address:

Ridgecrest, CA

Prepared by:

AECOM USA
999 Town & Country Road
Orange, CA 92868

SWPPP Preparation Date:

5/18/09

Contents

SWPPP Attachments

SWPPP Certifications and Approval

100.1 Initial SWPPP Certification

Project Name: Ridgecrest

To be completed by SWPPP Preparer

"I certify that this document and all attachments thereto were prepared under my direction or supervision. I further certify that the information contained herein is true and accurate to the best of my knowledge."

Preparer's Signature	Date
Preparer's Name and Title	Telephone Number

To be completed by Contractor

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Contractor's Signature	Date
Contractor's Name and Title	Telephone Number

100.2 SWPPP Approval

For Solar Millennium LLC Use Only
Certification of the
Storm Water Pollution Prevention Plan (SWPPP)

Project Name: Ridgecrest

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Solar Millennium LLC Signature	Date
Solar Millennium LLC Name	Telephone Number

100.3 Annual Compliance Certification

By July 1 of each year, the Contractor shall submit an Annual Certification of Compliance to Caruso Affiliated Holdings stating compliance with the terms and conditions of the Permits and the SWPPP covering the preceding dates of July 1 to June 30. The annual certification of compliance form is included in Attachment M. Completed forms will be located in Attachment M.

Section 200
SWPPP Amendments

200.1 SWPPP Amendment Certification and Approval

This SWPPP shall be amended:

- Whenever there is a change in construction or operations which may affect the discharge of pollutants to surface waters, groundwaters, or a municipal separate storm sewer system (MS4); or
- If any condition of the Permit(s) is violated or the general objective of reducing or eliminating pollutants in storm water discharges has not been achieved. If the RWQCB determines that a Permit violation has occurred, the SWPPP shall be amended and implemented within 14-calendar days after notification by the RWQCB;
- When deemed necessary by the Engineer (Engineer) for Solar Millennium LLC or the Contractor.

The following items will be included in each amendment:

Who requested the amendment.

The location of proposed change.

The reason for change.

The original BMP proposed, if any.

The new BMP proposed.

The amendments for this SWPPP, along with the Contractor's Certification and Solar Millennium LLC Approval form are provided in the following pages. Amendments are listed in the Amendment Log in Section 200.2. All approved SWPPP Amendment Certifications and Amendments shall be kept in Attachment O.

SWPPP Amendment Certification
Amendment No. _____

Project Name: Ridgecrest

To be completed by Contractor

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Contractor's Signature | Date

Contractor's Name and Title | Telephone Number

For Solar Millennium LLC Use Only
Solar Millennium LLC Approval and
Certification of the
Storm Water Pollution Prevention Plan Amendment

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Solar Millennium LLC Signature | Date

Solar Millennium LLC Name | Telephone Number

200.2 Amendment Log

Project Name: Ridgecrest

Amendment No.	Date	Brief Description of Amendment	Prepared By

Section 300
Introduction and Project Description

300.1 Introduction and Project Description

Solar Millennium proposes to locate a solar power plant near Ridgecrest, in Kern County, California, on land administered by the Bureau of Land Management (BLM).The proposed power plant consists of one 250 MW parabolic trough solar thermal power plant which has a "solar field" comprised of rows of parabolic mirrors focusing solar energy on collector tubes. These collector tubes carry heated oil to a boiler which sends live steam to a Rankine – Cycle reheat steam turbine. The boiler turbine, and other associated equipment are located at the power block in the center of each solar field. The solar field and power generation equipment would be put into operation each morning after sunrise and insolation build-up, and shut down in the evening when insolation drops. Electricity would be produced by each plant's solar receiver boiler and the steam turbine generator.

300.2 Unique Site Considerations

The proposed project is located in the El Paso wash area. The site consist of approximately 3920 acres and is located 6 miles southwest of Ridgecrest, California and immediately west of U.S. Route 395. Access to the site is from the South Brown Road exit on U.S. Route 395. The 250 MW solar fields will occupy approximately 1,440 acres. Ancillary facilities consisting of an administration building, a parking area, a maintenance building, central switchyard, bioremediation areas, wastewater treatment facilities, onsite access and maintenance roadways, perimeter fencing, and utilities will occupy approximately 55 acres all of which would be located south of the Northern Solar Field. An additional 30 acres will be used for temporary laydown areas for construction staging activities. The total expected land currently proposed for development is approximately 1770 acres. The balance of land (2150 acres) will be kept in reserve for future expansion or for future uncertainties. Attachment A shows the site layout.

300.3 Construction Site Estimates

The following are estimates of the construction site:

Construction site area:	1770 Acres
Runoff coefficient before construction [(1)]:	0.850
Runoff coefficient after construction [(1)]:	0.851
Anticipated storm water flow onto the construction site [(2)]:	Storm water flow is contained within new channels and will not

flow across actual construction site.

(1) Calculations are shown in Attachment D
(2) Calculations are shown in Attachment E

300.4 Project Schedule/Water Pollution Control Schedule

The Contractor will mobilize and develop temporary construction facilities and lay down areas adjacent to the power block. Temporary facilities will include:

15-20 single-wide full length trailer offices or equivalent

Chemical toilets.

Parking for 800 vehicles

Approximately 30 tool sheds/containers

Equipment parking for 100 pieces of construction equipment

Construction material lay down area approximately 15 Acres in size

Batch plant adjacent to laydown area

The Contractor will perform clearing and grubbing of the construction areas via scrapers or equivalent. Clearing and grubbing at the site area will be performed in advance of grading, as the grading activities move across the site during a 27 month period of time.

300.4.1 Power Block, Administration Buildings, and Transmission Towers

Concrete, mechanical and electrical works will be performed over a period of 38 months, with the aid of graders, rollers, front loaders, dump trucks, trenching machines, concrete mixer and pump trucks, cranes, and pick-ups.

Some of the above areas may impinge on areas intended for the later stages of site erection. As site erection nears completion in the block area, temporary construction mobilization areas will be reduced as required. The primary site equipment and materials lay down area will be maintained in one location, but there will also be small localized areas within the power blocks that may be relocated from time to time.

Miscellaneous non-vehicle motorized equipment will also be used over the length of the job, such as vibrators, welding machines, etc.

Project Schedule/Water Pollution Control Schedule

[*Specific BMP implementation dates to be provided by the Contractor in an addendum*]

Date	Activity/Event
10/01/10	Notice to Proceed (NTP) is issued.
10/15/10	Mobilization of equipment and materials.
10/15/10	2005-06 Rainy season begins.
__/__/10	As construction progresses, implement applicable tracking control, wind erosion, non-storm water management, and waste management and materials pollution control BMPs.
__/__/10	As construction progresses, implement temporary soil stabilization and sediment control BMPs.
05/01/11	2010-2011 Rainy season ends. Continue implementing applicable tracking control, wind erosion, non-storm water management, and waste management and materials pollution control BMPs.
07/01/11	SWPPP Annual Certification due.
09/10/11	Start implementation of temporary soil stabilization and sediment control BMPs (before rainy season starts). Continue to implement and maintain temporary BMPs throughout rainy season.
10/15/11	2007-08 Rainy season begins.
10/15/12	2005-06 Rainy season begins.
__/__/12	As construction progresses, implement applicable tracking control, wind erosion, non-storm water management, and waste management and materials pollution control BMPs.
__/__/12	As construction progresses, implement temporary soil stabilization and sediment control BMPs.
05/01/12	2010-2011 Rainy season ends. Continue implementing applicable tracking control, wind erosion, non-storm water management, and waste management and materials pollution control BMPs.
07/01/12	SWPPP Annual Certification due.
09/10/12	Start implementation of temporary soil stabilization and sediment control BMPs (before rainy season starts). Continue to implement and maintain temporary BMPs throughout rainy season.
10/15/13	2005-06 Rainy season begins.
__/__/13	As construction progresses, implement applicable tracking control, wind erosion, non-storm water management, and waste management and materials pollution control BMPs.
__/__/13	As construction progresses, implement temporary soil stabilization and sediment control BMPs.
05/01/13	2010-2011 Rainy season ends. Continue implementing applicable tracking control, wind erosion, non-storm water management, and waste management and materials pollution control BMPs.
07/01/13	SWPPP Annual Certification due.

09/10/13	Start implementation of temporary soil stabilization and sediment control BMPs (before rainy season starts). Continue to implement and maintain temporary BMPs throughout rainy season.
12/31/13	Project complete.

300.5 Contact Information/List of Responsible Parties

The Storm Water Pollution Prevention Manager (SWPPM) assigned to this project is:

SWPPM's Name	
SWPPM's Telephone/Cell Number	
Company Name	Solar Millennium LLC
Address 1	1625 Shattuck Avenue
Address 2	Suite 270
City, State Zip	Berkeley, CA 94709
Telephone	

The SWPPM shall have primary responsibility and significant authority for the implementation, maintenance, inspection and amendments to the approved SWPPP. The SWPPM will be available at all times throughout the duration of the project. Duties of the SWPPM include but are not limited to:

- Ensuring full compliance with the SWPPP and the Permit
- Implementing all elements of the SWPPP, including but not limited to:
  - Implementation of prompt and effective erosion and sediment control measures
  - Implementing all non-storm water management, and materials and waste management activities such as: monitoring discharges (dewatering, diversion devices); general site clean-up; vehicle and equipment cleaning, fueling and maintenance; spill control; ensuring that no materials other than storm water are discharged in quantities which will have an adverse effect on receiving waters or storm drain systems; etc.
- Pre-storm inspections
- Post-storm inspections
- Storm event inspections
- Preparing annual compliance certification
- Ensuring elimination of all unauthorized discharges
- The SWPPM shall be assigned authority by the Contractor to mobilize crews in order to make immediate repairs to the control measures
- Coordinate with the Engineer to assure all of the necessary corrections/repairs are made immediately, and that the project complies with the SWPPP, the Permit and approved plans at all times

- Submitting Notices of Non-Compliance reports and reports of Illicit Connections or Illegal Discharges.

Section 400
References

The following documents are made a part of this SWPPP by reference:

- State Water Resources Control Board (SWRCB) Order No. 99-08-DWQ, National Pollutant Discharge Elimination System General Permit (NPDES) No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity, August 1999 (Statewide Construction Permit).
- State Water Resources Control Board (SWRCB) Resolution No. 2001-046, Modification of Water Quality Order 99-08-DWQ State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated With Construction Activity (General Permit), adopted by the SWRCB on April 26, 2001.
- Regional Water Quality Control Board, Riverside County. Order No. 01-182, National Pollutant Discharge Elimination System General Permit (NPDES) No. CAS004001.
- California Stormwater Quality Association Stormwater Best Management Practices Handbook, January, 2003 (CASQA BMPs Manual).
- Kleinfelder, Report of Geotechnical Investigation.

Section 500
Body of SWPPP

500.1 Objectives

This Storm Water Pollution Plan (SWPPP) has six main objectives:

- Identify all pollutant sources, including sources of sediment that may affect the quality of storm water discharges associated with the construction activity (storm water discharges) from the construction site, and
- Identify non-storm water discharges, and
- Identify, construct, implement in accordance with a time schedule, and maintain Best Management Practices (BMPs) to reduce or eliminate pollutants in storm water discharges and authorized non-storm water discharges from the construction site during construction, and
- Develop a maintenance schedule for BMPs installed during construction designed to reduce or eliminate pollutants after construction is completed (post-construction BMPs).
- Identify a sampling and analysis strategy and sampling schedule for discharges from construction activity which discharge directly into water bodies listed on Attachment 3 of the Permit (Clean Water Act Section 303(d) [303(d)] Water bodies listed for Sedimentation).
- For all construction activity, identifying a sampling and analysis strategy and sampling schedule for discharges that have been discovered through visual monitoring to be potentially contaminated by pollutants not visually detectable in runoff.

This SWPPP conforms to the required elements of the general Permit No. CAS 000002 issued by the State of California, State Water resources Control board (SWRCB). This SWPPP will be modified and amended to reflect any amendments to the Permit or any changes in construction or operations that may affect the discharge of pollutants from the construction site to surface waters or groundwater. The SWPPP will also be amended if it is in violation of any condition of the Permit or has not achieved the general objective of reducing pollutants in storm water discharges. The SWPPP shall be readily available on-site for the duration of the project.

This Storm Water Pollution Prevention Plan (SWPPP) was developed to address the new construction activity associated with the Ridgecrest Solar Power Project.

The construction activity does not discharge directly to a water body listed as impaired for sedimentation/siltation or turbidity under the Clean Water Act Section 303(d); therefore, a sampling and analysis strategy for turbidity or settable solids will not be established. Section 600 provides a sampling strategy for non-visible pollutants for background only, or as it becomes necessary.

Once a final design has been established, the selection Contractor will prepare site maps showing the construction project in detail. Site conditions, including paved areas, buildings, lots and roadways, general topography and drainage patterns for stormwater collection will be shown for the following phases of construction:

- **Existing Site Topography** - A plan showing existing site topography and drainage will be prepared.

- **Conceptual Rough Grading** - A plan with figures for interim grading and erosion control will be prepared. It will show the temporary onsite drainage patterns to be established by the grading of the project site, as well as any necessary erosion control features.

- **Finished Project** - A conceptual image of the completed Ridgecrest Solar Power Project.

500.2 Implementation Schedule

Construction will take place over approximately 28 months, from the fourth quarter of 2010 to the first quarter 2013. Commercial operations are expected to commence in 2013.

TABLE 500.3-1
Project Schedule Major Milestones

Activity	Date
Begin Construction	Fourth Quarter 2010
Commercial Operation	First Quarter 2013

Construction will generally be scheduled to occur between 5:00 a.m. and 7:00 p.m. on weekdays and Saturdays. Additional hours may be necessary to make up schedule deficiencies, or to complete critical construction activities (e.g., pouring concrete at night during hot weather, working around time-critical shutdowns and constraints). During some construction periods and during the startup phase of the project, some activities may continue 24 hours per day, 7 days per week.

500.3 Project Activities

The construction phases of the Ridgecrest Solar Power Project as they pertain to stormwater management are expected to be as follows:

- **Site Disturbance** - Within the power equipment areas, clearing and grubbing will be performed over the entire area. As much as possible, stripped topsoil will remain

onsite and wasted as necessary in site designated/specific areas. Native vegetation may be harvested for possible reuse to obtain long term soil stabilization.

- **Preparation** - Parking areas for construction workers and lay down areas for construction materials will be prepared per appropriate drawings. Detailed information regarding the location within the site of the lay down and parking areas will be developed after a Contractor is hired, and incorporated into the SWPPP as appropriate and/or by amendment.

- **Access Road** - Primary access to the site is via a new paved road from Browns Road. The access roads to the plant will be paved from their point of connection to the power block area. Access road beds will typically be 24 feet wide with 5-foot-wide crushed stone shoulders. A stabilized entrance/exit will be provided to clean vehicle wheels prior to exiting the construction area.

- **Site Grading** - The existing site has about a 0.5 percent relatively uniform natural slope down from southwest to northeast, located on a small alluvial runoff drainage basin. Disturbance activities will include clearing and grubbing, topsoil stripping and the development of compacted embankments. Extensive grading will be applied to the whole site including the power block areas, construction lay down areas, and the major access roads. Heavy equipment will be stored in designated areas to isolate drippage and for ease of clean-up of unwanted lubricating liquids.

- **Foundation** - All underground piping, conduits, and wiring will be installed, followed by installation of the foundations for the new power equipment, transmission pull-offs and tower to support, as necessary, overhead ground wire towers, and miscellaneous structures.

- **Station Construction** - Conceptual site design will be finalized and prior to any soil disturbance, the owner will be required to finalize the Drainage, Erosion and Sediment Control Plan/Construction SWPPP. During construction, the owner will be required to follow the Drainage, Erosion and Sediment Control Plan/Construction SWPPP to prevent the off-site migration of sediment and other pollutants and to reduce the effects of runoff from the construction site. BMPs to be used at the site will be fully addressed in the Drainage, Erosion and Sediment Control Plan/Construction SWPPP; this document will include the location of BMPs to be used, installation instructions, and maintenance schedules for each BMP.

- **Site Stabilization** - Finish subgrade areas in the power equipment areas will have temporary erosion protection in the form of well graded crushed stone spread in disturbed areas approximately 2 inches deep. During periods of heavy rain, collection basins may overflow into the respective armored ditches and catchments designed to return flow to sheet flow.

- **Demobilization** - All temporary construction facilities will be removed.

  Surface water impacts, if any, are anticipated to be a by product of short-term construction activity and consist of increased turbidity due to erosion of newly excavated or placed soils. Activities such as grading can potentially increase rates of erosion during construction. In addition, construction materials could contaminate

run-off or groundwater if not properly stored and used. Compliance with engineering and construction specifications, following approved grading and drainage plans, and adhering to proper material handling procedures will ensure effective mitigation of these short-term impacts. BMPs for erosion and sediment control, surface water pollution prevention measures, and other BMPs will be developed and implemented for both construction and operational phases. These plans will be prepared in accordance with the NPDES General Permit for Storm Water Discharges Associated with Construction Activity (General Permit) and local agency requirements.

A Notice of Intent to comply with the terms of the General Permit will be prepared and submitted to the SWRCB prior to commencement of construction. Once construction activities have been concluded and the site has been stabilized, a Notice of Termination will be submitted to the RWQCB.

Pipeline Construction:
The construction of the gas and/or water pipeline will consist of the following:

- **Trenching** - width depends on the type of soils encountered and requirements of the governing agencies. The optimal trench will be approximately 36 inches wide and 5 to 10 feet deep. With loose soil, a trench up to 8 feet wide at the top and 3 feet wide at the bottom may be required. The pipeline will be buried to provide a minimum cover of 36 inches. The excavated soil(s) will be piled on one side of the trench and used for backfilling after the pipe is installed.

- **Stringing** consist of trucking lengths of pipe and laying them on wooden skids beside the open trench.

- **Installation** for gas piping consists of bending, welding, and coating the weld-joint areas of the pipe after it has been strung, padding the ditch with sand or fine spoil, and lowering the pipe string into the trench. Installation for PVC water piping shall consist of cleaning of the bell and spigot ends of each section of pipe prior to lowering it into the trench and then firmly pushing the pipe sections together to achieve the required seal. Installation methods will vary and contractors are urged to use his acceptable method in combination with best management principles to accomplish installation.

- **Backfilling** consists of returning spoil back into the trench around and on top of the pipe, ensuring that the surface is returned to its original grade or level. The backfill will be compacted to protect the stability of the pipe and to minimize subsequent subsidence.

- **Plating** consists of covering any open trench in areas of foot or vehicle traffic at the end of a workday. Plywood plates will be used in areas of foot traffic and steel plates will be used in areas of vehicle traffic to ensure public safety. Plates will be removed at the start of each workday. Efforts will be made to minimize the length of trench open at any given time.

- **Hydrostatic testing** consists of filling the pipeline with fresh water, venting all air, increasing the pressure to the specified code requirements, and holding the pressure for a period of time. Stainless steel gas piping will be tested with demineralized

water, while carbon steel piping will be pressure tested using either demineralized water or potable water. Demineralized water would be trucked in if the on-site water treatment plant is not operational. After hydrostatic testing, the test water will be chemically analyzed for contaminants and discharged to the existing ground for percolation, unless the analysis shows that the water is contaminated. In which case, the water would be trucked to an appropriate disposal facility. Temporary approvals for test water use and permits for discharge will be obtained by the construction Contractor, as required.

- **Cleanup** consists of restoring the surface of the roadway by removing any construction debris, grading to the original grade and contour, and repairing where required.

- **Commissioning** consists of cleaning and drying the inside of the pipeline, purging air from the pipeline, and filling the pipeline with natural gas or water as appropriate.

500.4 Vicinity Map

The construction project vicinity map and site plan showing the project location, surface water features, geographic features, construction site perimeter, and general topography, is located in Attachment A.

500.5 Pollutant Source Identification and BMP Selection - Not used.

500.5.2 Related Construction Disturbance

The construction and operation of the Ridgecrest Solar Power Plant would not adversely affect the agricultural productivity of surrounding agricultural lands. BMPs will protect surrounding agricultural lands from flooding, erosion, sloughing, and sedimentation during both construction and operation. Because plant emissions during operation would not affect the re-vegetation potential of the soil, no effect on agricultural productivity would be expected from this source.

Temporary Erosion Control Measures
Temporary erosion control measures would be required during the construction period to help maintain water quality, protect property from erosion damage, and prevent accelerated soil erosion or dust generation. These measures will be installed before construction begins and will be removed after completion.

Typically, temporary erosion control measures include re-vegetation, slope stabilizers, dust suppression, construction of beams and ditches, and sediment barriers. Vegetation is the most efficient form of erosion control, because it stabilizes the soil and maintains the landscape. Vegetation reduces erosion by absorbing raindrop impact energy and

holding soil in place with fibrous roots; it reduces runoff volume by increasing infiltration into the soil. Disturbed areas will be re-vegetated with rapidly growing groundcover as soon as possible after construction, and vehicle traffic will be restricted from re-vegetated areas.

During construction of the proposed project, dust erosion control measures will be employed to minimize the wind-blown erosion of soil from the site. Clean water will be sprayed on the soil in construction areas to suppress dust and/or re-vegetation.

Sediment barriers, such as straw bales or silt fences, slow runoff and trap sediment. They are generally placed below disturbed areas, at the base of exposed slopes, below the disturbed area. Sediment barriers are often placed around sensitive areas, such as wetlands or creeks, to prevent contamination by sediment-laden water. Barriers will be placed around the proposed project and the active construction area of the RSPP to prevent sediment from leaving the site. Because the RSPP site is relatively level to gently sloping, standard surface erosion control techniques should be effective. Runoff detention/retention basins, drainage diversions, and other large-scale sediment traps are not expected to be needed because of the topography. Soil stockpiles generated during construction will be covered and protected from rainfall if left on site for long periods of time.

Permanent Erosion Control Measures
Permanent erosion control measures include drainage systems and/or, as required, re-vegetation. Re-vegetation will follow planting for short-term erosion control. Seed mixes will contain annuals that establish ground cover quickly, perennials and reseeding annuals for long-term vegetation, and legumes to provide a source of nitrogen to the plant community. Due to the site's gently sloping nature, additional long-term measures should not be required.

500.5.3 Inventory of Materials and Activities that May Pollute Stormwater

Construction materials and activities that have the potential to contribute pollutants, other than sediment, to stormwater runoff are listed below. Control practices for each activity are identified in the Water Pollution Control Drawings (Attachment B – final plans to be provided by Contractor) and Sections 500.5.4 through 500.2.10. Construction materials and activities include:

- Vehicle fluids, including oil, grease, petroleum, and coolants
- Asphaltic emulsions associated with asphalt-concrete paving operations
- Cement materials associated with Portland cement concrete (PCC)
- Base and subbase material
- Joint and curing compounds
- Concrete curing compounds
- Paints
- Solvents, thinners, acids
- BMP materials
- Treated lumber (materials and waste)

- PCC rubble
- General litter

Construction activities that have the potential to contribute sediment to stormwater discharges include:

- Clear and grub operations
- Grading operations
- Paving operations
- Boring operations
- Delivery/transportation operations
- Utility excavation operations
- Foundation/structure construction operations
- Vehicle and equipment cleaning, fueling, and maintenance
- Painting

500.5.3.1 Site Earthwork

Earthwork activities with heavy equipment will be required to grade a level area, cut new channels and to manage the no compressible soils for the power generation facility and switchyard. The volume of cut and fill is estimated to be approximately 6,300,000 cubic yards.

Earthwork on the power plant site will consist of removal of poor soils, topsoil, vegetation, and debris; excavation and compaction of earth to create the plant grade; and excavation for foundations and underground systems. Materials suitable for compaction will be stored in stockpiles within designated locations on the site using proper erosion prevention methods and then reused on site (e.g., plant power block). Materials unsuitable for compacted fills will be stored in separate stockpiles and reused on the site, where appropriate. Any contaminated materials encountered during excavation will be disposed in accordance with applicable laws, ordinances, regulations, and standards.

Maximum soil densities will be achieved by rolling or roller vibrating soils having the optimum conditions and uniform layers of specified thickness. Materials in each layer will be properly moistened to facilitate compaction to the specified density. To verify compaction, representative density and moisture content tests will be performed in the field during compaction. Structural fill material supporting foundations, roads, parking areas, etc., will be compacted. Prior to placing fill materials, sub grades will be examined for loose or soft areas and further excavated as necessary.

In an attempt to reduce erosion of alluvial soils, project construction will minimize land disturbance by limiting construction activities only to areas that are designated as being essential to the installation and operation of the project. In addition, disturbed soils will be compacted to reduce the rainfall absorptive capacity and vegetative productivity of the soils that are permanently covered by project facilities.

It will be necessary to segregate the stockpile surface soils and organic matter during construction and excavation. In areas of substantial grading, native vegetation may be harvested for possible reuse to obtain long term soil stabilization. All excavated soils are to be reused during construction at the site to prevent subsequent erosion and sedimentation issues. Materials suitable for backfill will be stored in stockpiles at designated locations using proper erosion and sediment control methods.

Utility lines (water, electric, gas and communication) will be placed underground by means of open cut trenches.

500.5.3.2 Linear Construction

Construction of the utility lines will be by open trench. Trench excavation will consist of making subgrade to the depth, width, and grade necessary for construction of the utilities. Excavated topsoil will be stockpiled separately from the underlying excavated soils using proper erosion and sediment control methods. The stockpiled topsoil would then be placed and compacted over the backfilled trench. Excess materials (i.e., sand, gravel, loose rock) will be incorporated into the unused portion of the site.

500.5.4 Existing (Pre-Construction) Control Measures

Initial BMPs possibly could include silt fence and/or check dams. (SE-1, SE-2)

In areas that have initial construction erosional action potential, a row of silt fence (SE-1) and rip rap check dams (SE-4) will be installed per BMP fact sheets and referenced BMPs as depicted in the attachment (later).

500.5.5 Nature of Fill Material and Existing Data Describing Soil

500.5.5.1 Soil Types

Soil types in the vicinity of the proposed Ridgecrest Solar Power Plant sit are noted in the Geotechnical Report. Soils are described and mapped at the level of “mapping unit” which are defined to the approximate level of detail appropriate for making decisions about soil management. The location and properties of the soil mapping units were identified from draft maps of the area using an aerial photograph base and from preliminary drafts of soil property descriptions, both prepared by the Natural Resources Conservation Service. The following paragraphs provide a brief description of the soil control measures to be utilized by Ridgecrest Solar Power Plant.

500.5.6 Erosion Control
Erosion Control

Erosion control, also referred to as soil stabilization, consists of source control measures designed to prevent soil particles from detaching and becoming transported in stormwater runoff. Erosion control BMPs protects the soil surface by covering or binding soil particles. The project will incorporate erosion control measures required by regulatory agency permits, contract documents, and other measures selected by the Contractor. Site-specific BMPs will be implemented by the construction contractor and associated figures are to be included in Attachment B. Attachment C is to be revised and will list the BMPs selected for this project. Appendix A will contain BMP fact-sheets once they are selected by the Contractor with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for temporary and final erosion control.

The erosion control measures are as follows:

Year-round:

- SWPPM to monitor the weather using National Weather Service reports to track conditions and alert crews to the onset of rainfall events.

- Preserve existing vegetation where required and when feasible. Conduct clearing and grading only in areas necessary for project activities and equipment traffic. Install temporary fencing prior to construction along the boundaries of the construction zone to clearly mark this zone, preventing vehicles or personnel from straying onto adjacent off-site habitat.

- Within designated site development areas, all vegetation will be removed. Areas to remain undisturbed shall be clearly marked and existing foliage will remain in place to anchor the soil reducing the potential for erosion. All cut vegetation is to mulched, buried or composted on-site to limit waste disposal. In areas of substantial grading, native vegetation may be harvested for possible reuse to obtain long-term soil stabilization.

- Sequence construction activities with the installation of both erosion control and sediment control measures. Arrange the construction schedule as much as practicable to leave existing vegetation undisturbed until immediately prior to grading.

- Protect slopes susceptible to erosion by installing controls.

- Stabilize non-active areas as soon as feasible after construction is complete and no later than 14 days after construction in that portion of the site has temporarily or permanently ceased. Reapply as necessary to maintain effectiveness.

- Place covers over stockpiles prior to forecasted storm events and during windy conditions. Place sediment controls (fiber rolls or gravel bags) around the perimeter of stockpiled materials year-round.

- Maintain sufficient erosion control materials on-site to allow implementation in conformance with General Permit requirements and as described in this SWPPP. This includes implementation requirements for active areas and non-active areas that require deployment before the onset of rain.

- Repair and reapply BMPs in areas where erosion is evident as soon as possible.

During the rainy season:

- Implement temporary erosion control measures at regular intervals throughout the defined rainy season and as needed determined by site conditions.

- Inspect and stabilize disturbed areas with temporary or permanent erosion control measures before rain events.

During the non-rainy season:

- Conduct construction activities that will have an impact on waters of the United States during the dry season to the extent feasible to minimize erosion.

Appendix A will be prepared by the Contractor which will provide fact-sheets on implementation of each BMP - these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. A combination of the following erosion controls may be used at the site:

- EC-1, Scheduling
- EC-2, Preservation of Existing Vegetation
- EC-3, Straw Mulch
- EC-4, Earth Dikes and Drainage Swales
- EC-5, Velocity Dissipation Devices

BMPs will be deployed in a sequence to follow the progress of grading the construction. As the locations of soil disturbance change, erosion controls will be adjusted accordingly to control stormwater runoff at the downgrade perimeter.

500.5.7 Sediment Control

Sediment controls are intended to complement and enhance the selection erosion control measures and reduce sediment discharges from active construction areas. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water. The project will incorporate sediment control measures required by regulatory agency permits, contract documents, and other measures selected by the Contractor. Site-specific BMPs will be designed and incorporated into the conceptual erosion control plan shown in Attachment B. Attachment C is to be updated by the Contractpr as required and will list the BMPs

selected for this project. Appendix A will contain BMP fact-sheets when provided by the Contractor with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for temporary sediment control:

Year-round:

- The power block area for each phase will be graded with moderate slopes to direct runoff and diverted stormwater to an infiltration/evaporation area before overflowing through native stone rip-rap to reinstate natural sheet flow conditions. Relatively small rock filters and local diversion berms through the sites will discourage water from concentrating to maintain sheet flow. The diversions ditches and infiltration/evaporation areas will be designed to pass flow from a 100 year storm event to prevent damage to the power block and tower areas; the design will also include in its calculations stormwater run-on to the site.

- Maintain the following temporary sediment control materials on-site: silt fence materials, gravel bags for linear barriers, and fiber rolls in sufficient quantities throughout the project to implement temporary sediment controls in the event of predicted rain and to respond to failures or emergencies, in conformance with General Permit requirements and as described in this SWPPP.

- Install gravel filter berms at the base of slopes adjacent to delineated sensitive areas (i.e., wetlands, dry washes) - if any.

- Native on-site stones/rocks will be used in construction of gravel filter berms or check dams.

- Install gravel filter berms along the boundaries of delineated sensitive areas - if any - within the boundaries of the project site or receiving runoff from the project site.

- Native on-site stones/rocks will be used in construction of gravel filter berms or check dams.

During the rainy season:

- During the rainy season, implement temporary sediment controls at the draining perimeter of disturbed soil areas, at the toe of slopes, and at outfall areas.

During the non-rainy season:

- During the non-rainy season, implement temporary sediment controls at the draining perimeter of disturbed soil areas.

Appendix A will provide fact-sheets selected by the Contractor for implementation of each BMP - these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. A combination of the following sediment controls may be used at the site:

- SE-1, Silt Fence
- SE-2, Check Dam
- SE-3, Fiber Rolls
- SE-4, Gravel Bag Berm
- SE-5, Street Sweeping and Vacuuming

BMPs will be deployed in a sequence to follow the progress of grading and construction. As the locations of soil disturbance change, sedimentation controls will be adjusted accordingly to control stormwater runoff at the downgrade perimeter.

500.5.8 Tracking Control

Site-specific BMPs will be selected by the Contractor and incorporated into the conceptual erosion control plans shown in Attachment B. Attachment C is to be updated by the Contractor as required and will list the BMPs selected for this project. Appendix A will contain BMP fact-sheets once they are selected by the Contractor with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for tracking control:

Year-round:

- The access roads to the plants will be paved from their point of connection to Interstate 10 Freeway. Maintain all public roadways free from dust, dirt and debris caused by construction activities. Sweep streets at the end of the day if visible soil materials re carried onto adjacent public paved roads.
- Clearly mark the driving areas within the site for limited speed to control dust.

Appendix A will provide fact-sheets selected by the Contractor for implementation of each BMP - these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. A combination of the following tracking controls may be used at the site:

- TC-1, Stabilized Construction Entrance/Exit
- TC-2, Stabilized Construction Roadway
- TC-3, Entrance/Outlet Tire Wash
- SE-5, Street Sweeping and Vacuuming

500.5.9 Wind Erosion Control

Site-specific BMPs will be selected by the Contractor and incorporated into the conceptual erosion control plans shown in Attachment B. Attachment C is to be updated by the Contractor as required and will list the BMPs selected for this project. Appendix A will contain BMP fact-sheets once they are selected by the Contractor with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for wind erosion control:

Year-round:

- Apply potable water (groundwater) to disturbed soil areas of the project site to control dust and maintain optimum moisture levels for compaction as needed. Apply the water using water trucks. NS-1 - Minimize water application rates as necessary to prevent runoff and ponding.

- During windy conditions 9forecast or actual wind conditions of approximately 25 mph or greater), apply dust control to disturbed areas, including haul roads, to adequately control wind erosion. Cover exposed stockpiled material areas.

- Suspend excavation and grading during periods of high winds.

- Cover all trucks hauling soil and other loose material or maintain at least 2 feet of freeboard.

Appendix A will provide fact-sheets selected by the Contractor for implementation of each BMP - these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. The following BMPs have been selected to control dust at the construction site:

- WE-1, Wind Erosion Control
- NS-1, Water Conservation Practices

500.5.10 Non-Stormwater Control

Site-specific BMPs will be selected by the Contractor and incorporated into the conceptual erosion control plans shown in Attachment B. Attachment C is to be updated by the Contractor as required and will list the BMPs selected for this project. Appendix A will contain BMP fact-sheets once they are selected by the Contractor with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for non-stormwater control:

- Dispose of Portland cement concrete and asphalt concrete waste in accordance with NS-3.

- Regularly inspect vehicles and equipment for signs of leaks. Have vehicles and equipment on a regular maintenance schedule.

- Place drip pans or absorbent materials under paving equipment when not in use. Park paving equipment over plastic to prevent soil contamination.

- Locate staging areas for construction equipment so that spills of oil grease or other petroleum by-products will not be discarded into watercourses or sensitive habitat. Protect the staging area with berms and/or dikes to prevent run-on, runoff, and to contain spills.

- Fuel, clean, and maintain vehicles and other equipment only within designated areas.

- A dedicated fueling area will be protected with berms and/or dikes to prevent run-on, runoff, and to contain spills. Self-propelled vehicles will be fueled off-site or at the temporary fueling area. Fuel trucks will be used for on-site fueling, whether at the temporary fueling area or for mobile fueling elsewhere on the site. Drip pans will be used for mobile fueling. Each fuel truck will be equipped with absorbent spill cleanup materials and a spill containment boom at all times.

- Drip pans or absorbent pads will be used for vehicle and equipment maintenance activities that involve grease, oil, solvents, or other vehicle fluids.

- Machinery will be properly maintained and cleaned to prevent spills and leaks.

- Inform workers of the importance of preventing spills and measures to take should a spill occur. Clean up spills immediately in accordance with applicable local, state, or federal regulations. Such spills will be reported in the post-construction compliance reports.

- Use proper storage and handing techniques for concrete curing compounds.

- Clean off-site vehicles that regularly enter and leave the site.

- Inspect all vehicles and equipment for leaks before coming on-site.

Appendix A will provide fact-sheets selected by the Contractor for implementation of each BMP - these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. An inventory of construction activities and potential non-stormwater discharges is provided in Section 500.5.10. The BMP consideration checklist in Attachment C and the following list indicates the BMPs that have been tentatively selected to control non-stormwater pollution on the construction site.

A combination of the following non-stormwater controls may be used at the site:

- NS-1, Water Conservation Practices
- NS-3, Paving and Grinding Operations
- NS-6, Illicit Connection/Illegal Discharge Detection and Reporting
- NS-7, Potable Water/Irrigation
- NS-8, Vehicle and Equipment Cleaning
- NS-9, Vehicle and Equipment Fueling
- NS-10, Vehicle and Equipment Maintenance
- NS-12, Concrete Curing
- NS-14, Concrete Finishing

500.5.11 Waste Management and Materials Pollution Control

The project will incorporate waste management and materials pollution control measures required by contract documents, supplemented with our measures selected by the

Contractor as needed to meet general Permit objectives. Site-specific BMPs will be selected by the Contractor and the conceptual erosion control plans shown in Attachment B will be updated. Attachment C is to be updated by the Contractor as required and will list the BMPs selected for this project. Appendix A will contain BMP fact-sheets when selected by the Contractor with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for waste management and materials pollution control:

Year-round:

In general, implement BMPs WM-1 and WM-2 to help prevent discharges of construction materials during delivery, storage, and use. Provide the following types of storage/containment facilities to minimize stormwater contact with construction materials:

1. Use a watertight container to store hand tools and other items such as small parts.
2. Provide cover and secondary containment for any stored hazardous materials. Store hazardous materials in appropriate containers.

    2.1 Temporary containment facilities for hazardous materials should provide for a spill containment volume able to contain precipitation from a 25-year storm event, plus 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater. It should be impervious to the materials stored therein for a minimum contact time of 72 hours.
3. Store large non-hazardous items, such as framing materials, in the general storage area. Elevate such materials with wood blocks to minimize contact with stormwater. Prevent run-on (i.e., with earthen dike, trench) into the general storage area.

Inspect storage areas for signs of spills and/or leakage.

Handle and dispose of hazardous wastes in accordance with applicable laws, ordinances, regulations, and standards, including licensing, personnel training, accumulation limits and times, and reporting and recordkeeping.

Collect hazardous wastes in satellite accumulation containers near the points of generation. Store hazardous wastes in appropriate and clearly marked containers and segregate from other non-waste materials. Move used waste containers daily to the Contractor's 90-day hazardous waste storage area, located at the site construction lay down area. Provide cover and secondary containment for the hazardous waste storage area. Remove the waste from the site by a certified hazardous waste collection company and deliver to an authorized hazardous waste management facility, prior to expiration of the 90-day storage limit.

In the unlikely event that even larger volumes of potentially hazardous material must be temporarily held awaiting disposition, a containment area will be constructed. Plastic sheeting will be laid on the ground prior to placement of the contaminated material and the material itself will be covered.

Store only enough products required to do the job.

Keep products in their original containers with the original manufacturer's label.

Follow manufacturers' recommendations for the storage, use and disposal of all materials.

At a minimum, follow the following practices for spill prevention and cleanup:

- Manufacturers' recommended methods for spill cleanup will be clearly posted and personnel will be made aware of the procedures and the location of the information and cleanup supplies.

- Maintain spill cleanup materials, material safety data sheets, a material inventory, and emergency contact numbers in all storage areas.

- Spill cleanup materials should include at a minimum: 1) absorbent materials (granular, socks, pillows), 2) tools to manage/contain smaller spills such as brooms/shovels/rakes/squeegees, 3) a spill-berm that would hold the amount of the largest container, 4) appropriate, water-tight disposal containers for used spill cleanup materials, and 5) personal protective gear.

- Clean up spills immediately after discovery.

- Keep spill area well ventilated.

- The Project Manager (or designee) will be the Spill Prevention and Cleanup Coordinator. The names of additional responsible spill personnel and authorized Contractors will be posted in various areas.

- Report spills of toxic or hazardous materials to the Project Manager (or designee), regardless of the size.

- Report spills of hazardous materials that exceed their reportable quantities to all appropriate local, state and federal government agencies. The Project Manager (or designee) will be responsible for investigating spills and determining whether the reportable quantity has been exceeded. Regulations defining the reportable quantity levels for oil and hazardous substances re found in 40 CFR Part 110, Part 117 or Part 302.

- Place covers over stockpiles prior to forecasted storm events and during windy conditions. Place sediment controls at the foot of stockpiled materials.

- Load solid wastes directly into trucks for off-site disposal. When on-site storage is necessary, store solid wastes in watertight covered dumpsters in the general storage area. Have licensed waste hauler move solid waste at least weekly and dispose of off-site.

- Provide weekly maintenance for portable toilets by a licensed sanitary service and dispose of wastes off-site.
- Locate portable toilets away from concentrated flow paths and traffic flow.
- Anchor portable toilets during periods of heavy winds.
- Establish concrete washout area in accordance with WM-8.

Appendix A will provide fact-sheets selected by the Contractor for implementation of each BMP - these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. A combination of the following waste management and materials pollution controls may be used at the site:

- WM-1, Material Delivery and Storage
- WM-2, Material Use
- WM-3, Stockpile Management
- WM-4, Spill Prevention and Control
- Wm-5, Solid Waste Management
- WM-6, Hazardous Waste Management
- WM-8, Concrete Waste Management
- WM-9, Sanitary/Septic Waste Management
- WM-10, Liquid Waste Management

500.5.12 Contaminated Soil

Although there is no known contaminated soil at the project site, it may be possible that contaminated soil is encountered during construction. Operators and construction personnel will be trained on the identification of contaminated soils and will be asked to report unusual conditions to an approved registered geologist. If soils require temporary stockpiling, piles will be placed on plastic sheeting, covered with plastic sheeting or tarp, secured safely with gravel bags and bermed with fiber rolls or silt fencing to prevent runoff from leaving the area. If required, samples will be collected and sent to a certified analytical laboratory for characterization. If contamination is detected, the waste will be handled accordingly and properly disposed of at an authorized waste management facility.

Section 600
Monitoring and Reporting Program

600.1 Site Inspections

The contractor will inspect the site as follows:

- Prior to a forecast storm
- Within 24 hours after every rainfall
- At 24-hour intervals during extended rain events
- Weekly during the rainy season
- Monthly during the non-rainy season.

and at any other intervals as specified in the contract documents. The results of all inspections and assessments will be documented, a copy shall be provided to the Engineer within 24 hours of the inspection, and copies of the completed inspection checklists will be maintained with the SWPPP. Site inspections conducted for monitoring purposes will be performed using the inspection checklist shown in Attachment H.

The name(s) and contact number(s) of the assigned inspection personnel are listed below:

[*Contractor to insert details in an amendment: Inspector name and contact number*]

Assigned inspector:_____
Contact phone number:_____

Assigned inspector:_____
Contact phone number:_____

600.2 Discharge Reporting

If a discharge occurs or if the project receives a written notice or order from any regulatory agency, the contractor will immediately notify Solar Millennium LLC, and will file a written report to the Solar Millennium LLC within 7 days of the discharge event, notice, or order. Corrective measures will be implemented immediately following the discharge, notice or order. A sample Notice of Non-Compliance form is provided in Attachment K. All discharges shall be documented on a Discharge Reporting Log using the form in Attachment T.

Discharges requiring reporting include:

- Storm water from a DSA discharged to a receiving water without treatment by a temporary construction BMP;

- Non-storm water, except conditionally exempted discharges, discharged to any surface water, or a storm drain system, without treatment by an approved control measure (BMP);
- Storm water discharged to a storm drain system where the control measures (BMPs) have been overwhelmed or not properly maintained or installed;
- Storm water runoff containing hazardous substances from spills discharged to the storm drain system;
- Other discharge reporting as directed by Solar Millennium LLC.

The report to Solar Millennium LLC will contain the following items:

- The date, time, location, nature of operation, and type of unauthorized discharge, including the cause or nature of the notice or order,
- The control measures (BMPs) deployed before the discharge event, or prior to receiving notice or order,
- The date of deployment and type of control measures (BMPs) deployed after the discharge event, or after receiving the notice or order, including additional measures installed or planned to reduce or prevent re-occurrence, and
- An implementation and maintenance schedule for any affected BMPs

600.3 Record Keeping and Reports

Records shall be retained for a minimum of three years for the following items:

- Site inspections
- Compliance certifications
- Discharge reports
- Approved SWPPP document and amendments

600.4 Sampling and Analysis Plan for Sediment

This project does not have the potential to discharge directly to a water body listed as impaired due to Sedimentation/Siltation and/or Turbidity pursuant to Clean Water Act, Section 303(d), therefore a sampling and Analysis Plan for Sedimentation is not required.

600.5 Sampling and Analysis Plan for Non-Visible Pollutants

This Sampling and Analysis Plan (SAP) for Non-Visible Pollutants describes the sampling and analysis strategy and schedule for monitoring non-visible pollutants in storm water discharges from the project site and offsite activities directly related to the project in accordance with the requirements of Section B of the General Permit, including SWRCB Resolution 2001-046.

600.5.1 Scope of Monitoring Activities

The following construction materials, wastes or activities, as identified in Section 500.3.1, are potential sources of non-visible pollutants to storm water discharges from the project. Storage, use, and operational locations will be shown on the final WPCDs prepared by the Contractor.

- Vehicle fluids, including oil, grease, petroleum, battery acid, and coolants
- Asphaltic emulsions associated with asphalt-concrete paving operations
- Cementitious materials associated with portland cement concrete (PCC) structures, and curb and gutters
- Base and subbase material
- Joint and curing compounds
- Concrete curing compounds
- Paints
- Solvents, thinners, acids, glue
- Mortar mix
- Metals and plated products
- Roofing material
- General litter

With the exception of possible undiscovered or buried wastes that may remain from previous operations, the project does not contain any other existing site features with the potential to contribute non-visible pollutants to storm water discharges from the project. Use of soil amendments/stabilizers that have the potential to alter pH or have unacceptable concentrations of non-visible pollutants will be minimized on the project. However, if such products must be used because no other soil amendments/stabilizers products are available, the Engineer will be notified as to the application locations and the product will be assessed as to the potential to contribute to non-visible pollutants to storm water discharges.

Sampling for non-visible pollutants will be conducted when (1) a breach, leakage, malfunction, or spill is observed; and (2) the leak or spill has not been cleaned up prior to the rain event; and (3) there is the potential for discharge of non-visible pollutants to surface waters or the drainage system.

600.5.2 Monitoring Strategy

Sampling Schedule

Samples for the applicable non-visible pollutant(s) and a sufficiently large uncontaminated background sample shall be collected during the first two hours of discharge from rain events resulting in a sufficient discharge for sample collection. Samples shall be collected during daylight hours (sunrise to sunset) and shall be collected regardless of the time of year, status of the construction site, or day of the week.

In conformance with the U.S. Environmental Protection Agency definition, a minimum of 72 hours of dry weather will be used to distinguish between separate rain events.

Collection of discharge samples for non-visible pollutant monitoring will be triggered when any of the following conditions are observed during the required inspections conducted before or during rain events:

- Materials or wastes containing potential non-visible pollutants are not stored under watertight conditions. Watertight conditions are defined as (1) storage in a watertight container, (2) storage under a watertight roof or within a building, or (3) protected by temporary cover and containment that prevents storm water contact and runoff from the storage area.

- Materials or wastes containing potential non-visible pollutants are stored under watertight conditions, but (1) a breach, malfunction, leakage, or spill is observed, (2) the leak or spill is not cleaned up prior to the rain event, and (3) there is the potential for discharge of non-visible pollutants to surface waters, or a storm sewer system.

- An operational activity, including but not limited to those in Section 600.5.1, with the potential to contribute non-visible pollutants (1) was occurring during or within 24 hours prior to the rain event, (2) applicable BMPs were observed to be breached, malfunctioning, or improperly implemented, and (3) there is the potential for discharge of non-visible pollutants to surface waters, or a storm sewer system.

- Soil amendments that have the potential to change the chemical properties, engineering properties, or erosion resistance of the soil have been applied, and there is the potential for discharge of non-visible pollutants to surface waters, or a storm sewer system.

- Storm water runoff from an area contaminated by historical usage of the site has been observed to combine with storm water runoff from the site, and there is the potential for discharge of non-visible pollutants to surface waters, or a storm sewer system.

Sampling Locations

Sampling locations are based on proximity to planned non-visible pollutant storage, occurrence or use; accessibility for sampling, personnel safety; and other factors. No known sampling locations have been determined. However, if a storm water inspection before or during a rain event identifies the presence of a material storage, waste storage, or operations area with spills or the potential for the discharge of non-visible pollutants to surface waters, or the drainage system that was an unplanned location, and has not been identified on the WPCDs, sampling locations will be selected at that time.

If an operational activity or storm water inspection conducted 24 hours prior to or during a rain event identifies the presence of a material storage, waste storage, or operations area with spills or the potential for the discharge of non-visible pollutants to surface waters or a storm sewer system that was an unplanned location and has not been identified on the WPCDs, sampling locations will be selected using the same rationale as that used to identify planned locations.

600.5.3 Monitoring Preparation

Samples on the project site will be collected by the contractor sampling personnel to be determined.

Prior to the rainy season, all sampling personnel and alternates will review the SAP. Qualifications of designated contractor personnel describing environmental sampling training and experience are provided in Attachment I.

An adequate stock of monitoring supplies and equipment for monitoring non-visible pollutants will be available on the project site prior to a sampling event. Monitoring supplies and equipment will be stored in a cool-temperature environment and will not come into contact with rain or direct sunlight. Sampling personnel with be available to collect samples in accordance with the sampling schedule. Supplies maintained at the project site will include, but are not limited to, surgical gloves, sample collection equipment, coolers, appropriate number and volume of sample bottles, identification labels, re-sealable plastic storage bags, paper towels, personal rain gear, Sharpies, ice. Sampling Activity Log forms, and Chain of Custody (COC) forms.

600.5.4 Analytical Constituents

Identification of Non-Visible Pollutants

The following table lists the specific sources and types of potential non-visible pollutants on the project site and the applicable water quality indicator constituent(s) for that pollutant.

Table 600-2
Potential Non-Visible Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent
Joint and Curing Compounds	Acidity, Alkalinity, pH, and Volatile Organic Compounds (VOCs)	pH
Solvents	Phenols, VOCs, and Semi-Volatile Organic Compounds (SVOCs)	Phenols
Thinners	Phenols, VOCs, and SVOCs	Phenols
Acids	Acidity, pH	pH
Lead/Acid Batteries	Sulfuric acid, lead, and pH	pH

Note: Vehicle fluids, oil, grease, coolant, asphaltic emulsions, paint, PCC, and plating products are considered visible pollutants and therefore are not monitored.

600.5.5 Sample Collection and Handling

Sample Collection Procedures

Samples of discharge will be collected at locations where observed breaches, malfunctions, leakages, spills, operational areas, soil amendment application areas, and historical site usage areas have that triggered the sampling event.

Grab samples will be collected and preserved in accordance with the methods identified in Table 600-3, "Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants" table provided in Section 600.5.6. Only personnel trained in proper water quality sampling will collect samples.

Samples will be collected by placing each lab-provided sample container directly into a stream of water downgradient and within close proximity to the potential non-visible pollutant discharge location. Each separate lab-provided sample container will be filled taking care not to spill preservatives. Bottles having a septum shall be filled using zero-headspace techniques. The upgradient and uncontaminated background samples shall be collected first prior to collecting the downgradient to minimize cross-contamination. The sampling personnel will collect the water upgradient of where they are standing.

To maintain sample integrity and prevent cross-contamination, sampling collection personnel will:

- Wear a new, clean pair of surgical gloves prior to the collection and handling of each sample at each location.
- Not contaminate the inside of the sample bottle by not allowing it to come into contact with any material other than the water sample.
- Discard sample bottles or sample lids that have been dropped onto the ground prior to sample collection.
- Not leave the cooler lid open for an extended period of time once samples are placed inside.
- Not sample near a running vehicle where exhaust fumes may impact the sample.
- Not touch the exposed end of a sampling tube, if applicable.
- Avoid allowing rainwater to drip from rain gear or other surfaces into sample bottles.
- Not eat, smoke, or drink during sample collection.
- Not sneeze or cough in the direction of an open sample bottle.
- Minimize the exposure of the samples to direct sunlight, as sunlight may cause chemical transformation of the sample to take place.
- Decontaminate sampling equipment prior to sample collection using a non-phosphate soap water wash (e.g., Alconox), distilled water rinse, and final rinse with distilled water.
- Dispose of decontamination water/soaps appropriately; i.e., not discharge to the storm drain system or receiving water.

Sample Handling Procedures

Immediately following collection, sample bottles for laboratory analytical testing will be capped, labeled, documented on a Chain of Custody form provided by the analytical laboratory, sealed in a re-sealable plastic storage bag, placed in an ice-chilled cooler that is maintained at 4 degrees Celsius +/-2, and delivered within 24 hours to a California state-certified laboratory.

Laboratory Name: **[*To be provided by the Contractor as an amendment*]**
Address:

Telephone Number:
Point of Contact:

Sample Documentation Procedures

All original data documented on sample bottle identification labels, Chain of Custody forms, Sampling Activity Logs, and Inspection Checklists will be recorded using waterproof ink. These will be considered accountable documents. If an error is made on an accountable document, the individual will make corrections by lining through the error and entering the correct information. The erroneous information will not be obliterated. All corrections will be initialed and dated. Copies of the Chain of Custody form and Sampling Activity Log are provided in Attachment R.

Sampling and field analysis activities will be documented using the following:

- Sample Bottle Identification Labels: Sampling personnel will attach an identification label to each sample bottle. At a minimum, the following information will be recorded on the label, as appropriate:

  - Project name
  - Project number
  - Unique sample identification number and location.
    [Project Number]-[Six digit sample collection date]-[Location]
    (*Example:* 07-0G5304-081803-Inlet472).
    Quality assurance/quality control (QA/QC) samples shall be identified similarly using a unique sample number or designation
    (*Example:* 07-0G5304-081803-DUP1).
    - Collection date/time (No time applied to QA/QC samples)
    - Analysis constituent

- Sampling Activity Logs: A log of sampling events will identify:

  - Sampling date
  - Separate times for collected samples and QA/QC samples recorded to the nearest minute
  - Unique sample identification number and location
  - Analysis constituent
  - Names of sampling personnel
  - Weather conditions (including precipitation amount)
  - Field analysis results
  - Other pertinent data

- Chain of Custody (COC) forms: All samples to be analyzed by a laboratory will be accompanied by a COC form provided by the laboratory. Only the sample collectors will sign the COC form over to the lab. COC procedures will be strictly adhered to for QA/QC purposes.

- Storm Water Quality Construction Inspection Checklists: When applicable, the contractor's storm water inspector will document on the checklist that samples for non-visible pollutants were taken during a rain event.

600.5.6 Sample Analysis

Samples will be analyzed for the applicable constituents using the analytical methods identified in Table 600-3, "Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants" table in this section.

600.5.7 Quality Assurance/Quality Control

For an initial verification of laboratory or field analysis, duplicate samples will be collected at a rate of 10 percent or 1 duplicate per sampling event. The duplicate sample will be collected, handled, and analyzed using the same protocols as primary samples. A duplicate sample will be collected at the selected location(s) immediately after the primary sample has been collected. Duplicates will be collected where contamination is likely, not on the background sample. Duplicate samples will not influence any evaluations or conclusions; however, they will be used as a check on laboratory quality assurance.

600.5.8 Data Management and Reporting

A copy of all water quality analytical results and QA/QC data will be submitted to Solar Millennium LLC within 5 days of sampling (for field analyses) and within 30 days (for laboratory analyses).

Lab reports and COCs will be reviewed for consistency between lab methods, sample identifications, dates, and times for both primary samples and QA/QC samples. All data, including COC forms, Sampling Activity Logs, and Sampling Data Reporting Forms shall be kept with the SWPPP.

600.5.9 Data Evaluation

An evaluation of the water quality sample analytical results, including figures with sample locations, will be submitted to the Resident Engineer with the water quality analytical results and the QA/QC data.

Should the runoff/downgradient sample show an increased level of the tested analyte relative to the background sample, the BMPs, site conditions, and surrounding influences will be assessed to determine the probable cause for the increase. As determined by the site and data evaluation, appropriate BMPs will be repaired or modified to mitigate discharges of non-visual pollutant concentrations. Any revisions to the BMPs will be recorded as an amendment to the SWPPP.

600.5.10 Change of Conditions

Whenever SWPPP monitoring, pursuant to Section B of the General Permit, indicates a change in site conditions that might affect the appropriateness of sampling locations or introduce additional non-visible pollutants of concern, testing protocols will be revised accordingly. All such revisions will be recorded as amendments to the SWPPP.

TABLE 600-3
Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants

Constituent	Analytical Method	Minimum Sample Volume	Sample Bottle	Sample Preservation	Reporting Limit	Maximum Holding Time
pH	EPA 150.1	1 x 100 mL	Polypropylene	Store at 4˚ C (record temperature at time of sampling)	unitless	Immediate (within 15 minutes of collection)
Phenol	EPA 420.1	1 x 1 L	Glass-amber	Store at 4˚ C, H_2SO_4 to pH<2	0.1 mg/L	28 days
Arsenic/ Potassium	EPA 200.8	1 x 250 mL	Polypropylene	Store at 4˚ C, Ultra HNO_3 to pH<2	0.2 µg/L/ 70 µg/L	180 days
TOC	EPA 415.1	1 x 250 mL	Glass	Store at 4˚ C, H_2SO_4 to pH<2	0.5 mg/L	28 days

Notes: [a] EPA 353.3, 354.1, and 365.3 are analyzed out of the same bottle

°C	–	Degrees Celsius	mg/L	–	Milligrams per Liter
EPA	–	U.S. Environmental Protection Agency	µg/L	–	Micrograms per Liter
H_2SO_4	–	Sulfuric Acid	mL	–	Milliliter
HNO_3	–	Nitric Acid	TOC	–	Total Organic Carbon
L	–	Liter			

Attachment A

Vicinity Map

Preliminary Civil Construction Plans

for

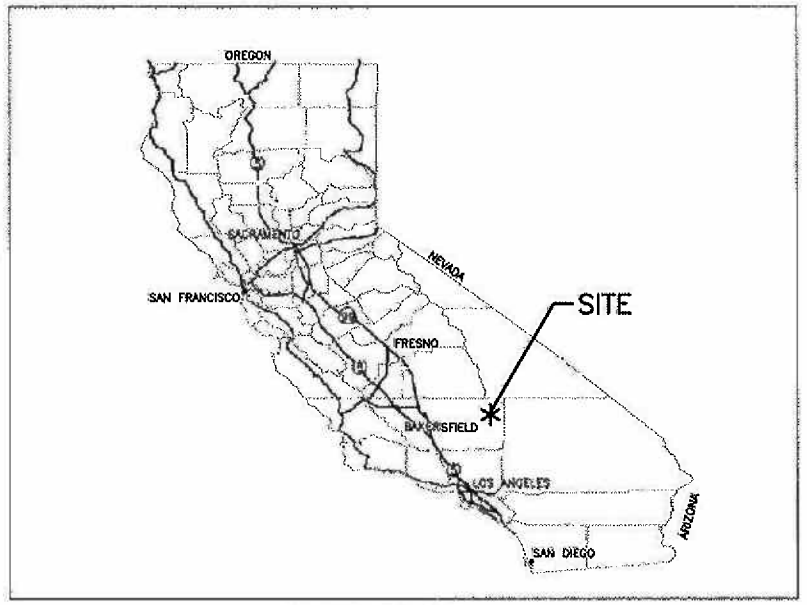
Bureau of Land Management Permitting Documents - Access Roads, Drainage and Erosion Control

for

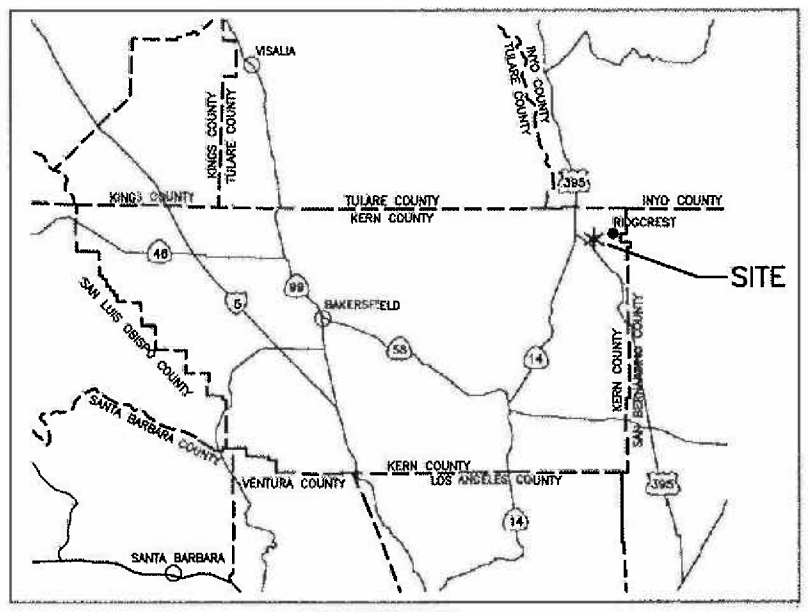
Ridgecrest Solar Power Project

Kern County California
A Development of Solar Millennium LLC

SHEET INDEX	
SHEET NUMBER	SHEET TITLE
1	COVER SHEET
2	SITE BOUNDARY AND LEGEND
3	SITE PLAN
4	SOLAR FIELD 1 GRADING PLAN
5	SOLAR FIELD 2 GRADING PLAN
6	CROSS SECTIONS, NORTH FIELD
7	CROSS SECTIONS, SOUTH FIELD
8	TYPICAL CROSS SECTIONS
9	ELECTRICAL POWER PLAN
10	GAS MAIN PLAN
11	WATER MAIN PLAN
12	EROSION CONTROL PLAN
13	EROSION CONTROL DETAILS



LOCATION MAP



VICINITY MAP

30% Conceptual Engineering Plans
NOT FOR CONSTRUCTION

AECOM
5001 E. Commercenter Dr.
Bakersfield, Ca 93309
Phone 661.325.7253
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Drawn:	K. S. BEDFORD
Record Drawing Info/ds:	

Revisions:		
#	DATE	DESCRIPTION

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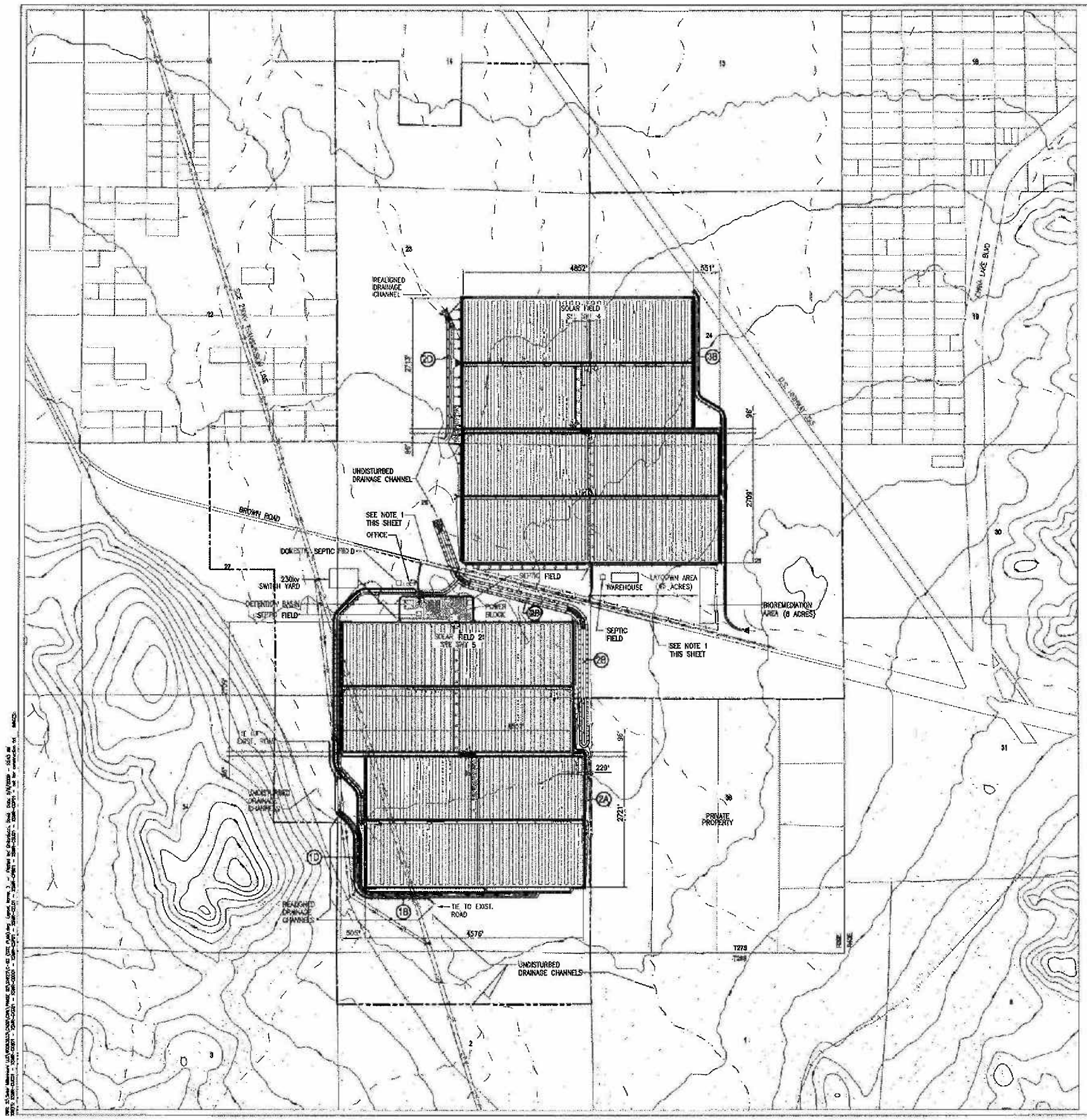
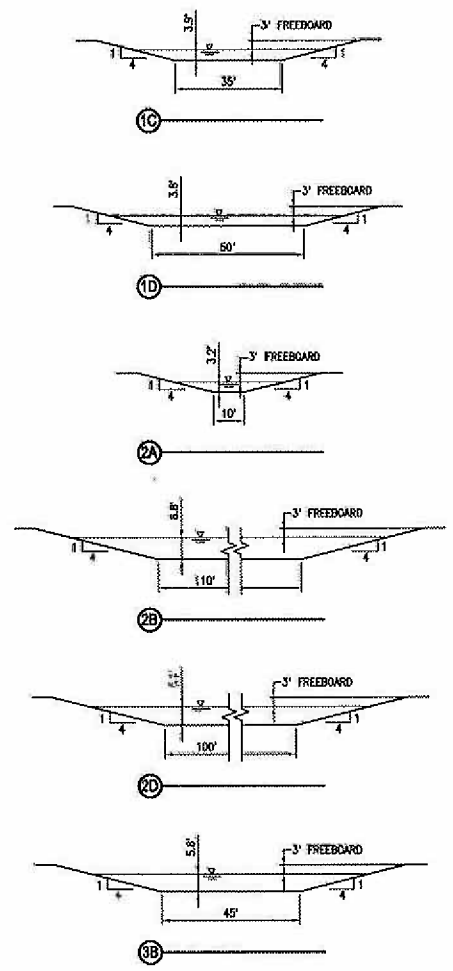
Solar Millennium LLC

Ridgecrest Solar Power Project
Kern County, California

Cover Sheet

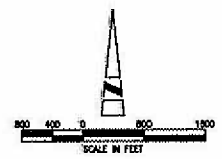
Date: 06/08/09
Sheet: 1 OF 13





CHANNEL SECTIONS
SCALE: 1" = 20'

NOTE:
1. PROVIDE ACCELERATION AND DECELERATION LANES AT EACH SITE ACCESS ENTRANCE. TWO 1,500' LONG ACCELERATION AND TWO 1,000' LONG DECELERATION LANES WILL BE REQUIRED TO ACCOMODATE EAST BOUND AND WEST BOUND INGRESS/EGRESS AT EACH LOCATION.



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LEGEND:

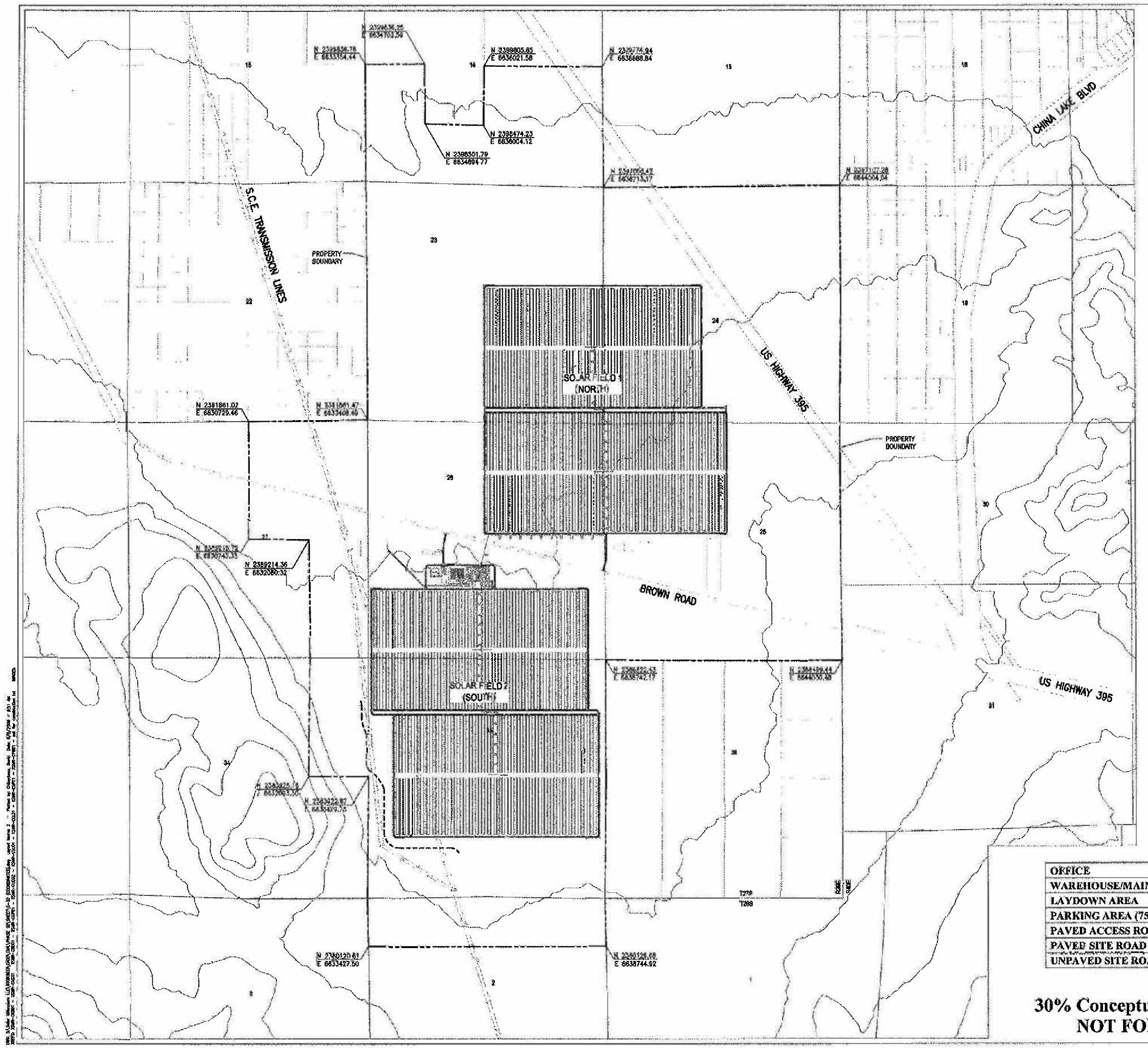
- SOLAR FIELD PARABOLIC TROUGH
- BALANCE OF PLANT FACILITIES
- PROPOSED ACCESS ROAD (PAVED)
- PROPOSED ACCESS ROAD (GRAVEL)
- RAILROAD
- PROPOSED GAS
- PROPOSED WATER
- PROPOSED TELEPHONE
- PROPOSED ELECTRIC
- EXISTING ELECTRIC
- PROPOSED SECURITY FENCE
- PROPOSED WIND FENCE
- EXISTING CONTOURS (10 FOOT INTERVALS)
- PROPOSED DRAINAGE CHANNEL/FLOW DIRECTION
- EXISTING INTERMITTENT DRAINAGE CHANNEL
- SITE BOUNDARY
- DISTURBANCE LIMITS
- HEADER PIPING
- ACCELERATION LANE
- DECELERATION LANE

Ridgecrest Solar Power Project

Kern County, California

SITE PLAN

Date: 06/08/09
Sheet: 3 OF 13



OFFICE	10,000 SF
WAREHOUSE/MAINTENANCE BLDG	112,200 SF
LAYDOWN AREA	45 AC
PARKING AREA (75 VEHICLES)	21,000 SF
PAVED ACCESS ROAD (24' WIDE)	700 LF
PAVED SITE ROAD (24' WIDE)	6,000 LF
UNPAVED SITE ROAD (24' WIDE)	61,300 LF

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Civil
STATE OF CALIFORNIA

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Project: K. S. BEDFORD
Record Drawing Initials:

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DATE DESCRIPTION

Prepared for:
Solar Millennium LLC

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- DISTURBANCE LIMITS
- HEADER PIPING

Ridgecrest Solar Power Project

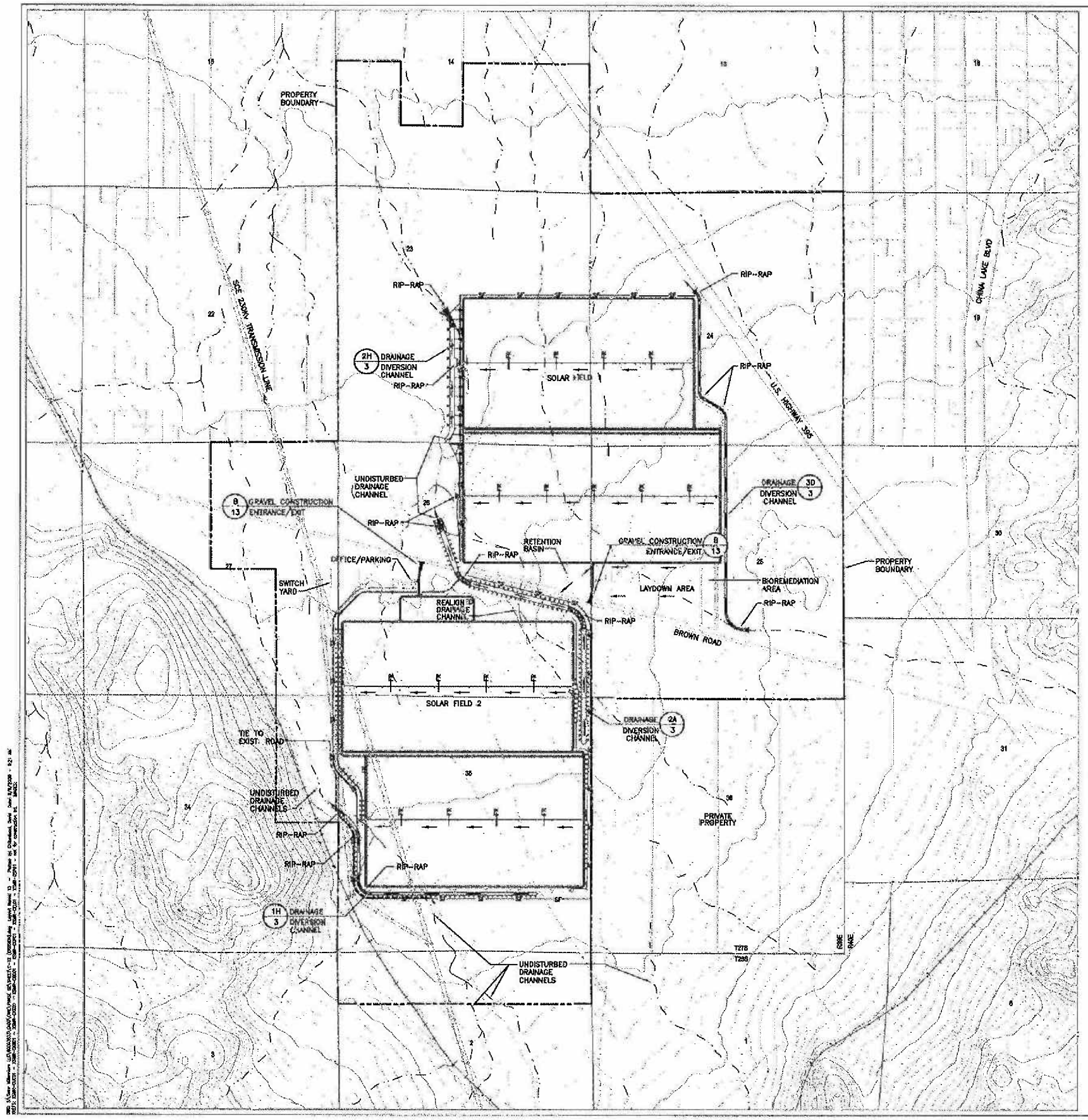
Kern County, California

Site Boundary and Legend

Date: 06/08/09
Sheet: 2 OF 13

Attachment B

Water Pollution Control Drawings



EROSION CONTROL NOTES:

1. CONTRACTOR SHALL BE CONTINUOUSLY RESPONSIBLE FOR ALL ASPECTS OF EROSION CONTROL AND STORMWATER POLLUTION PREVENTION INCLUDING CONFORMANCE WITH BEST MANAGEMENT PRACTICES (BMP'S) AND THE REQUIREMENTS OF THE STATE WATER RESOURCES CONTROL BOARD.

2. EROSION CONTROL PROVISIONS SHALL BE ESTABLISHED AND CONSTRUCTED PRIOR TO SITE GRADING OR CONSTRUCTION WORK.

3. PAVED AREAS SHALL BE KEPT CLEAN OF EARTH MATERIAL AND DEBRIS. THE SITE SHALL BE MAINTAINED SO THAT A MINIMUM OF SEDIMENT-LADEN RUNOFF ENTERS THE EXISTING DRYWASHES, CREEKS, OR ON-SITE STORM DRAINAGE SYSTEM.

4. FIBER ROLLS SHALL BE USED FOR CONCENTRATED DOWNSTREAM PERIMETER EROSION CONTROL.

5. EROSION CONTROL (RIP-RAP) SHALL BE PLACED DOWNSTREAM OF DETENTION BASIN OUTLETS TO DISSIPATE ENERGY AND SPREAD DRAINAGE WATER.

6. SILT FENCES SHALL BE PLACED AT PROJECT BOUNDARIES WHERE NON-CONCENTRATED (SHEET) FLOW IS ANTICIPATED TO FLOW OFF THE PROJECT SITE.

7. EROSION CONTROL BMP'S SHALL BE CONSTRUCTED WITHIN DITCHES TO CONTROL VELOCITY AND SCOUR.

8. ROCK CONSTRUCTION ENTRANCES SHALL BE LOCATED AT EACH POINT WHERE CONSTRUCTION TRAFFIC ENTERS OR EXITS THE SITE.

9. ADDITIONAL TEMPORARY EROSION CONTROL PROVISIONS WILL BE PROVIDED AS PART OF THE DEVELOPMENT PLANS.

DRAINAGE NOTES:

1. DRAINAGE DITCHES WILL BE SIZED BASED ON THE DESIGN LEVEL STORM EVENT REQUIRED BY THE COUNTY WITH PROVISIONS AND ANALYSIS OF FLOW VELOCITIES, SCOUR PROTECTION AND SEDIMENT CONTROL.

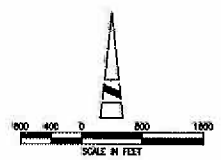
2. FLOW VELOCITIES IN THE CHANNEL AND AT THE CHANNEL EXITS WILL BE CONTROLLED WITH ADJUSTMENTS TO THE FLOW AREA, CHANNEL SLOPE WHERE APPROPRIATE AND USE OF APPROVED BMPS.

3. CHANNELS WILL BE DESIGNED TO WITHSTAND THE LOCALIZED FLOW VELOCITIES.

ON-SITE RETENSION BASINS ARE PROVIDED IN THE POWER BLOCK AREA TO CONTAIN RUNOFF FROM THE POWERBLOCK AREA.

5. DIVERTED DRAINAGE FLOWS CONCENTRATED TO THE SITE PERIMETER CHANNELS WILL BE DISCHARGED TO DEFINED DRAINAGE CHANNELS, WHERE AND WHEN AVAILABLE, WITH EROSION CONTROL PROVISIONS PROVIDED AT THE DISCHARGE POINT. FLOW VELOCITIES AT THE DISCHARGE POINTS WILL BE COORDINATED WITH THE JURISDICTIONAL AGENCIES.

6. DETENTION BASINS WILL BE SIZED SUCH THAT PROPOSED FLOWS IN EXCESS OF EXISTING FLOWS AT THE POINT OF DISCHARGE WILL BE DETAINED AND RELEASE FLOW VELOCITIES CONTROLLED TO MITIGATE EROSION.



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Revisions
DATE DESCRIPTION

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LEGEND:

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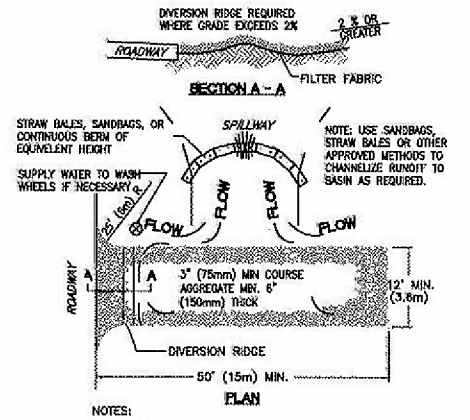
- EXISTING INTERMITTENT DRAINAGE CHANNEL
- SITE BOUNDARY
- DISTURBANCE LIMITS
- HEADER PIPING
- GRAVEL CONSTRUCTION ENTERANCE
- CONCRETE WASHOUT
- PROPOSED FIBER ROLLS
- PROPOSED SILT FENCE

Ridgecrest Solar Power Project

Kern County, California

Erosion Control Plan

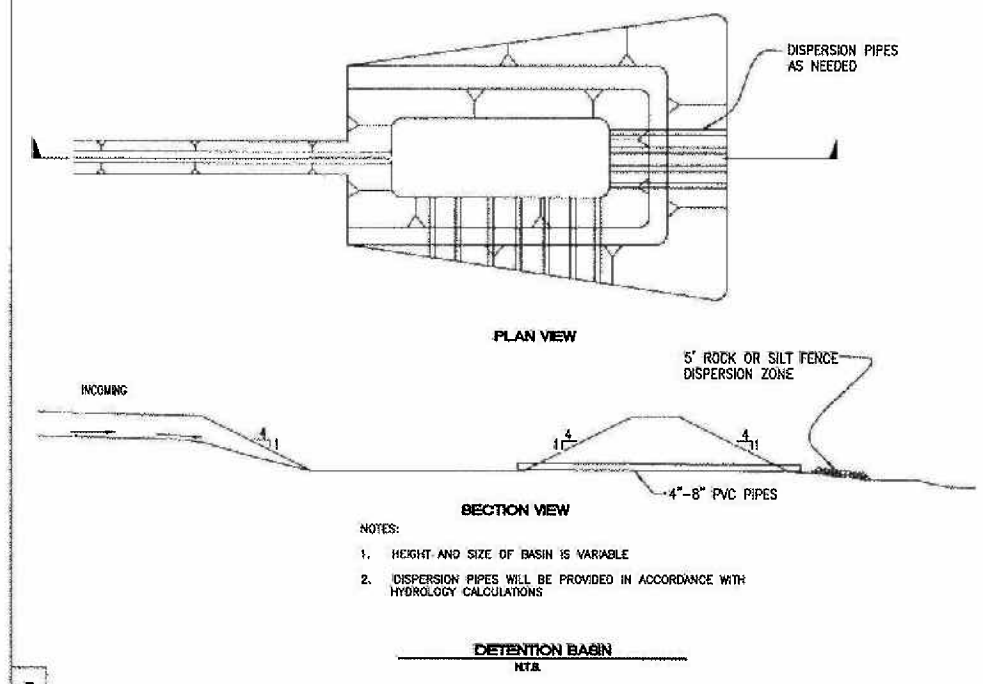
Date: 06/08/09
Sheet: 12 OF 13



NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

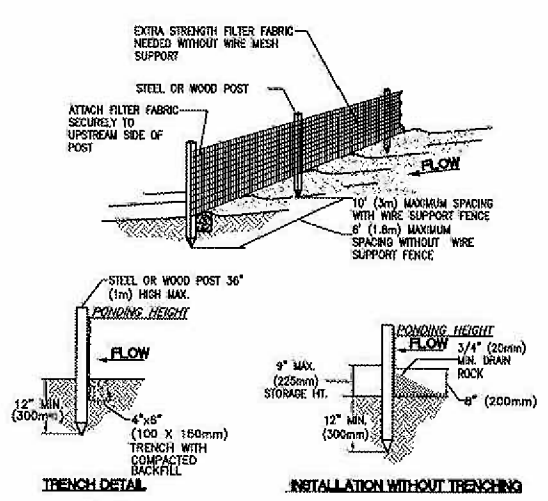
GRAVEL CONSTRUCTION ENTRANCE/EXIT
N.T.S.



NOTES:

1. HEIGHT AND SIZE OF BASIN IS VARIABLE
2. DISPERSION PIPES WILL BE PROVIDED IN ACCORDANCE WITH HYDROLOGY CALCULATIONS

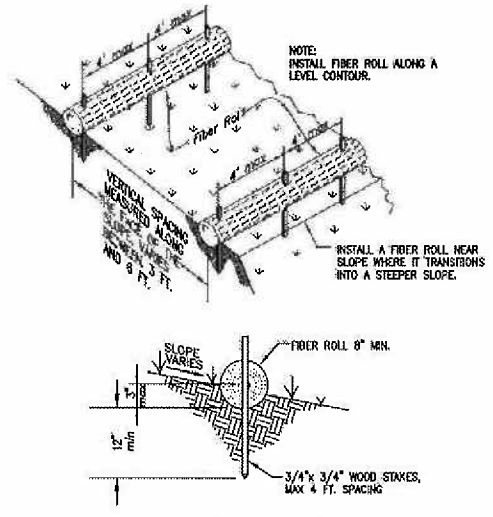
DETENTION BASIN
N.T.S.



NOTES:

1. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
2. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY. 6" (225mm) MAXIMUM RECOMMENDED STORAGE HEIGHT.
3. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE STABILIZED.

SILT FENCE
N.T.S.



TYPICAL FIBER ROLL INSTALLATION
N.T.S.

GENERAL NOTES

1. THIS PLAN MAY BE MODIFIED AND ALTERNATE MEASURES MAY BE USED TO INSURE BETTER EROSION AND SEDIMENT CONTROL RESULTS
2. CONTRACTOR SHALL USE THE APPROPRIATE EROSION CONTROL AND SEDIMENT MEASURES AS SHOWN AND DESCRIBED IN THE SWPPP APPENDICES.
3. CONTRACTOR SHALL PROTECT AND STABILIZED SLOPES PER DETAIL AS SHOWN IN THE SWPPP APPENDICES.

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Solar Millennium LLC

Ridgecrest Solar Power Project

Kern County, California

Erosion Control Details

Date: 06/08/09
Sheet: 13 OF 33

Attachment C

BMP Consideration Checklist

ATTACHMENT C
BMP Consideration Checklist

The BMPs listed here should be considered for every project. Those BMPs that are not included in the SWPPP must be checked as "Not Used" with a brief statement describing why it is not being used.

EROSION CONTROL BMPs

BMP No.	BMP	Considered For Project	Check If Used	Check If Not Used	If Not Used, State Reason
EC-1	Scheduling	✓	✓		
EC-2	Preservation of Existing Vegetation	✓			Grubbing and clearing includes grading of entire site.
EC-3	Hydraulic Mulch	✓		✓	Using Other Measures as primary means of Erosion Control.
EC-4	Hydroseeding	✓		✓	Using Other Measures as Primary means of Erosion Control
EC-5	Soil Binders	✓		✓	Using Other Measures as Primary means of Erosion Control
EC-6	Straw Mulch	✓		✓	Using Other Measures as Primary means of Erosion Control
EC-7	Geotextiles & Mats	✓	✓		As Option
EC-8	Wood Mulching	✓		✓	Using Other Measures as Primary means of Erosion Control
EC-9	Earth Dikes & Drainage Swales	✓	✓		
EC-10	Velocity Dissipation Devices	✓		✓	
EC-11	Slope Drains	✓	✓		Not Applicable
EC12	Streambank Stabilization	✓		✓	Not Applicable

ATTACHMENT C
BMP Consideration Checklist

The BMPs listed here should be considered for every project. Those BMPs that are not included in the SWPPP must be checked as "Not Used" with a brief statement describing why it is not being used.

SEDIMENT CONTROL BMPs

BMP No.	BMP	Considered For Project	Check If Used	Check If Not Used	If Not Used, State Reason
SE-1	Silt Fence	✓			
SE-2	Sediment Basin	✓		✓	Not Applicable.
SE-3	Sediment Trap	✓	✓		May be used.
SE-4	Check Dam	✓	✓		
SE-5	Fiber Rolls	✓			
SE-6	Gravel Bag Berm	✓		✓	Using Other Measures as Primary means of Sediment Control
SE-7	Street Sweeping and Vacuuming	✓	✓		
SE-8	Sandbag Barrier	✓	✓		.
SE-9	Straw Bale Barrier	✓		✓	Using Other Measures as Primary means of Sediment Control
SE-10	Storm Drain Inlet Protection	✓	✓		
SE-11	Chemical Treatment	✓		✓	Not Applicable

WIND EROSION CONTROL BMPs

WE-1	Wind Erosion Control	✓	✓		

TRACKING CONTROL BMPs

TC-1	Stabilized Construction Entrance/Exit	✓	✓		
TC-2	Stabilized Construction Roadway	✓	✓		
TC-3	Entrance/Outlet Tire Wash	✓			

ATTACHMENT C
BMP Consideration Checklist

The BMPs listed here should be considered for every project. Those BMPs that are not included in the SWPPP must be checked as "Not Used" with a brief statement describing why it is not being used.

NON-STORM WATER MANAGEMENT BMPS

BMP No.	BMP	Considered For Project	Check If Used	Check If Not Used	If Not Used, State Reason
NS-1	Water Conservation Practices	✓	✓		
NS-2	Dewatering Operations	✓	✓		
NS-3	Paving and Grinding Operations	✓	✓		
NS-4	Temporary Stream Crossing	✓			
NS-5	Clear Water Diversion	✓			
NS-6	Illicit Connection/ Discharge	✓	✓		
NS-7	Potable Water/Irrigation	✓	✓		
NS-8	Vehicle and Equipment Cleaning	✓	✓		
NS-9	Vehicle and Equipment Fueling	✓	✓		
NS-10	Vehicle and Equipment Maintenance	✓	✓		
NS-11	Pile Driving Operations	✓		✓	Not Applicable
NS-12	Concrete Curing	✓	✓		
NS-13	Concrete Finishing	✓	✓		
NS-14	Material and Equipment Use Over Water	✓		✓	Not Applicable
NS-15	Demolition Adjacent to Water	✓		✓	Not Applicable
NS-16	Temporary Batch Plants	✓		✓	Not Applicable

ATTACHMENT C
BMP Consideration Checklist

The BMPs listed here should be considered for every project. Those BMPs that are not included in the SWPPP must be checked as "Not Used" with a brief statement describing why it is not being used.

WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BMPS

BMP No.	BMP	Considered For Project	Check If Used	Check If Not Used	If Not Used, State Reason
WM-1	Material Delivery and Storage	✓	✓		
WM -2	Material Use	✓	✓		
WM -3	Stockpile Management	✓	✓		
WM -4	Spill Prevention and Control	✓	✓		
WM -5	Solid Waste Management	✓	✓		
WM -6	Hazardous Waste Management	✓			
WM -7	Contaminated Soil Management	✓		✓	Contaminated soil issues were addressed during the Geotechnical Investigation
WM -8	Concrete Waste Management	✓	✓		
WM -9	Sanitary/Septic Waste Management	✓	✓		
WM -10	Liquid Waste Management	✓	✓		

Attachment D

Computation Sheet for Determining Runoff Coefficients

Computation Sheet for Determining Runoff Coefficients

Total Site Area [1]	=	1770 AC	(A)

Existing Site Conditions

Impervious Site Area	=	0	(B)
Impervious Site Area Runoff Coefficient	=	0	(C)
Pervious Site Area	=	1770 AC	(D)
Pervious Site Area Runoff Coefficient	=	.85	(E)
Existing Site Area Runoff Coefficient $\frac{(B \times C) + (D \times E)}{(A)}$	=	0.850	(F)

Proposed Site Conditions (after construction)

Impervious Site Area	=	21.90	(G)
Impervious Site Area Runoff Coefficient	=	1.0	(H)
Pervious Site Area	=	1770	(I)
Pervious Site Area Runoff Coefficient	=	0.85	(J)
Proposed Site Area Runoff Coefficient $\frac{(G \times H) + (I \times J)}{(A)}$	=	0.862	(K)

1. The pervious area for the project impacts 1.2% of the surface area and thus the existing condition and the proposed condition are approximately the same.

Attachment E

Computation Sheet for Determining Run-on Discharges

Existing Site Conditions

Area Runon Coefficient[1]		=	NA	(A)
Area Rainfall Intensity[2]		=	NA in/hr	(B)
Drainage Area[3]		=	0.0 acres	(C)
Site Area Run-on Discharge	(A)x(B)x (C)	=	0.0 cfs	(D)

Attachment F

Notice of Intent (NOI)

Attachment G

Program for Maintenance, Inspection, and Repair of Construction Site BMPs

The Contractor shall use the following guidelines for maintenance, inspection, and repair of BMPs identified in the SWPPP:		
BEST MANAGEMENT PRACTICES (BMPs)	**INSPECTION FREQUENCY (all controls)**	**MAINTENANCE/REPAIR PROGRAM**
TEMPORARY EROSION CONTROL BMPs		
EC-1 Scheduling	Prior to the start of rainy season	■ Review the Project Schedule. Revise construction activities, if possible, and implement appropriate construction site BMPs.
EC-2 Preservation Of Existing Vegetation		■ Ensure vegetation outside of the clearing limits remain undisturbed. Revive vegetation as necessary.
EC-4 Hydroseeding		■ Reapply the selected hydroseeding product as needed for proper effectiveness.
EC-4 Hydroseeding EC-7 Geotextiles and Mats EC-8 Wood Mulching		■ If washout or breakage occurs, or if material has been blown off the area requiring protection, re-install the material after repairing any damage to the protected area.
EC-9 Earth Dikes/Drainage Swales and Lined Ditches EC-10 Velocity Dissipation Devices EC-11 Slope Drains		■ Inspect ditches and berms for erosion and the accumulation of debris and sediment. Remove debris and sediment, and repair damaged linings or soil stabilizers as needed. ■ Temporary conveyances shall be completely removed as soon as the surrounding drainage area has been adequately stabilized or at the completion of construction.
TEMPORARY SEDIMENT CONTROL BMPs		
SE-5 Fiber Rolls SE-9 Straw Bale Barrier SE-6 Gravel Bag Berms	Every other week during the rainy season Prior to forecast storm After a rain event that causes runoff from the construction site At 24-hour intervals during extended rain events	■ Repair or replace split, torn, unraveling, or slumping fiber rolls. ■ Inspect fiber rolls for sediment holding capacity. Remove retained sediments before they reach 1/3 of the barrier height. Removed sediments shall be incorporated in the project at locations acceptable to the Engineer or disposed of outside the highway right-of-way in conformance with the plans and specifications of the contract. ■ Remove fiber rolls when no longer needed.
SE-7 Street Sweeping and Vacuuming		■ Sweep tracked sediment as needed or as required by the Public Works Representative. ■ Properly dispose of sweeper wastes in conformance with the plans and specifications of the contract.

The Contractor shall use the following guidelines for maintenance, inspection, and repair of BMPs identified in the SWPPP:		
BEST MANAGEMENT PRACTICES (BMPs)	**INSPECTION FREQUENCY (all controls)**	**MAINTENANCE/REPAIR PROGRAM**
SE-4 Check Dams SE-10 Storm Drain Inlet Protection		■ Repair or replace split, torn, unraveling, or slumping sandbags. ■ Inspect sandbags for sediment holding capacity. Remove retained sediments before they reach 1/3 of the barrier height. Properly dispose of accumulated sediments. ■ Remove the sandbags and accumulated sediment when sandbags are no longer needed.
WIND EROSION CONTROL BMPs		
WE-1 Wind Erosion Control	Daily during working days	■ Check applicable areas to ensure proper coverage.
TRACKING CONTROL BMPs		
TC-1 Stabilized Construction entrance/Exit	Daily during working days Prior to forecast storm	■ Remove excessive soil accumulation.
SE-7 Street Sweeping and Vacuuming	After a rain event that causes runoff from the construction site At 24-hour intervals during extended rain events	■ Sweep tracked sediment as needed. ■ Properly dispose of sweeper wastes in conformance with the plans and specifications of the contract.

The Contractor shall use the following guidelines for maintenance, inspection, and repair of BMPs identified in the SWPPP:		
BEST MANAGEMENT PRACTICES (BMPs)	**INSPECTION FREQUENCY (all controls)**	**MAINTENANCE/REPAIR PROGRAM**
NON-STORM WATER MANAGEMENT BMPs		
NS-1 Water Conservation Practices	Monthly	■ Keep watering equipment in good working condition.
NS-2 Dewatering Operations	Daily during operations	■ Inspect filtering or settling devices and repair or remove accumulated sediment once the sediment build-up prevents the structure from functioning as designed.
NS-3 Pavement and Grinding Operations	Daily during operations	■ SWPPM shall monitor concrete working tasks such as saw cutting, coring, and grinding to ensure proper pollution control practices are implemented.
NS-7 Potable Water/Irrigation	Weekly during rainy season and at two-week intervals during non-rainy season	■ Inspect irrigated areas regularly. ■ Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
NS-6 Illicit Connection/Discharge	Daily	■ Report any discharges or illicit connections.
NS-8 Vehicle and Equipment Cleaning	Regularly	■ Monitor employees and subcontractors to ensure that vehicle washing does not occur on site.
NS-9 Vehicle and Equipment Fueling NS-10 Vehicle and Equipment Maintenance	Monthly Prior to forecast storm After a rain event that causes runoff from the construction site At 24-hour intervals during extended rain events	■ Keep an ample supply of spill cleanup materials near designated areas. Personnel in charge of mobile fueling and maintenance shall have ample spill cleanup materials at all times during operations. ■ Inspect and repair damaged hoses and leaky gaskets.
NS-12 Concrete Curing	Daily during operations	■ Inspect cure containers and spraying equipment for leaks. ■ SWPPM shall monitor concrete curing operations to ensure proper pollution control practices are employed.
NS-13 Concrete Finishing	Daily during operations	■ Sweep or vacuum up debris from sandblasting at the end of each shift.

The Contractor shall use the following guidelines for maintenance, inspection, and repair of BMPs identified in the SWPPP:		
BEST MANAGEMENT PRACTICES (BMPs)	**INSPECTION FREQUENCY (all controls)**	**MAINTENANCE/REPAIR PROGRAM**
WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BMPs		
WM-1 Material Delivery and Storage	Monthly Prior to forecast storm After a rain event that causes runoff from the construction site At 24-hour intervals during extended rain events	■ Keep material storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. ■ Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function and protection. ■ Temporary containment facilities shall be maintained free of accumulated rainwater and spills.
WM-2 Material Use	Monthly	■ Spot check employees and subcontractors to ensure appropriate practices are being employed.
WM-3 Stockpile Management	Monthly Prior to forecast storm After a rain event that causes runoff from the construction site At 24-hour intervals during extended rain events	■ Review site to ensure that stockpiles are properly protected. ■ Repair or replace plastic sheeting or sediment barrier as needed.
WM-4 Spill Prevention and Control	Monthly	■ Review spill prevention and control plans and ensure appropriate clean-up materials are on site.
WM-5 Solid Waste Management	Monthly Prior to forecast storm After a rain event that causes runoff from the construction site At 24-hour intervals during extended rain events	■ Police the construction site for litter and debris. ■ Remove solid waste when containment structures are adequately filled.
WM-6 Hazardous Waste Management		■ Review hazardous waste handling and disposal procedures.
WM-8 Concrete Waste Management		■ The SWPPM shall inspect temporary washout facilities before a concrete pour to ensure that an adequate holding capacity is provided. The holding capacity shall maintain a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilities. Remove hardened concrete and dispose of in conformance with the plans and specifications of the contract.
WM-9 Sanitary/Septic Waste Management		■ SWPPM to ensure proper sanitary/septic procedures are being implemented. ■ Pick up and properly dispose of spills of sanitary wastes.

The Contractor shall use the following guidelines for maintenance, inspection, and repair of BMPs identified in the SWPPP:		
BEST MANAGEMENT PRACTICES (BMPs)	**INSPECTION FREQUENCY (all controls)**	**MAINTENANCE/REPAIR PROGRAM**
WM-10 Liquid Waste Management	Weekly during rainy season and at two-week intervals during non-rainy season	■ Inspect containment areas and repair or clean as necessary.

Attachment H

Storm Water Quality Construction Site Inspection Checklist

Contractor to use this form for inspecting BMPs as described in SWPPP Section 600.1.

Instructions to Contractor:

This inspection form shall be completed and signed by the Contractor's Storm Water Pollution Prevention Manager (SWPPM).

The weather information shall be the best estimate of beginning of the storm event, duration of the event, time elapsed since the last storm, and approximate amount of rainfall.

List observations of all BMPs: temporary soil stabilization (erosion control), temporary sediment controls, wind erosion controls, tracking controls, non-storm water controls and waste management and materials pollution controls.

Evaluate BMPs for adequacy and proper implementation and whether additional BMPs are required in accordance with the terms of the Permits.

Verify implementation of non-storm water discharge BMPs and evaluate their effectiveness.

One-time discharges of non-storm water shall be inspected when such discharges occur.

Describe any inadequate BMPs.

Note the corrective actions required, including any changes to the SWPPP, and implementation dates.

If you answer "No" to any of the questions, describe the corrective action(s) to be taken and when the corrective action(s) are to be completed. Should you need more space to describe corrective actions, identify your response numerically and use additional sheets as necessary.

INSPECTION LOG

Date	Inspection Frequency			Inspector Signature
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
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	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
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	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	
	Pre-Storm ❑	Post-Storm ❑	Monthly ❑	

GENERAL INFORMATION				
Project Name				
Date of Inspection				
Contractor				
Inspector's Name				
Inspector's Title				
Signature				
Current Weather Conditions				
Inspection Type (Check Applicable)	❒ Prior to forecast rain		❒ After a rain event	
	❒ 24-hr intervals during extended rain		❒ Other _____	
Season (Check Applicable)	❒ Rainy		❒ Non-Rainy	
Storm Data	Storm Start Date & Time:		Storm Duration (hrs):	
	Time elapsed since last storm (Circle Applicable Units)	Min. Hr. Days	Approximate Rainfall Amount (mm)	

PROJECT AREA SUMMARY AND DISTURBED SOIL AREA (DSA) SIZE LIMITS FROM SPECIAL PROVISIONS		
Total Project Area	_____	Acres
Rainy Season DSA Limit	_____	Acres
Field Estimate of Active DSAs	_____	Acres

INSPECTION OF BMPs				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Preservation of Existing Vegetation				
Is temporary fencing provided to preserve vegetation in areas where no construction activity is planned?				
Location:				
Location:				
Location:				
Location:				

INSPECTION OF BMPs				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Erosion Control				
Does the applied temporary erosion control provide 100% coverage for the required areas?				
Are there any non-vegetated areas that may require temporary erosion control?				
Is the area where erosion controls are required free from visible erosion?				
Location:				
Location:				
Location:				
Location:				
Temporary Linear Sediment Barriers (silt fence, fiber rolls, sandbag barrier, etc.)				
Are temporary linear sediment barriers properly installed, functional and maintained?				
Are temporary linear sediment barriers free of accumulated litter?				
Is the built-up sediment less than 1/3 the height of the barrier?				
Are cross barriers installed where necessary and properly spaced?				
Location:				
Location:				
Location:				
Location:				
Location:				
Storm Drain Inlet Protection				
Are storm drain inlets internal to the project properly protected?				
Are storm drain inlet protection devices in working order and being properly maintained?				
Location:				
Location:				
Location:				
Location:				
Location:				
Sediment Basins				
Are basins designed in accordance with the requirements of the Genera Permit?				
Are basins maintained to provide the required retention/detention?				
Are basin controls (inlets, outlets, diversions, weirs, spillways, and racks) in working order?				
Location:				
Location:				
Location:				

INSPECTION OF BMPs				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Stockpiles				
Are all locations of temporary stockpiles, including soil, hazardous waste, and construction materials in approved areas?				
Are stockpiles protected from run-on, runoff from adjacent areas, and from winds?				
Are stockpiles located at least 15 m from concentrated flows, downstream drainage courses and storm drain inlets?				
Are required covers and/or perimeter controls in place?				
Location:				
Location:				
Location:				
Location:				
Concentrated Flows				
Are concentrated flow paths free of visible erosion?				
Location:				
Location:				
Location:				
Location:				
Tracking Control				
Is the entrance stabilized to prevent tracking?				
Are points of ingress/egress to public/private roads inspected and swept and vacuumed as needed?				
Are all paved areas free of visible sediment tracking or other particulate matter?				
Location:				
Location:				
Location:				
Location:				
Wind Erosion Control				
Is dust control implemented?				
Location:				
Location:				
Location:				
Location:				

INSPECTION OF BMPs				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Dewatering Operations				
Are all one-time dewatering operations covered by the General Permit inspected before and as they occur and BMPs implemented as necessary during discharge?				
Is groundwater dewatering handled in conformance with the dewatering permit issued by the RWQCB?				
Is required treatment provided for dewatering effluent?				
Location:				
Location:				
Location:				
Location:				
Vehicle & Equipment Fueling, Cleaning, and Maintenance				
Are vehicle and equipment fueling, cleaning and maintenance areas reasonably clean and free of spills, leaks, or any other deleterious material?				
Are vehicle and equipment fueling, cleaning and maintenance activities performed on an impermeable surface in dedicated areas?				
If no, are drip pans used?				
Are dedicated fueling, cleaning, and maintenance areas located at least 15 m away from downstream drainage facilities and water courses and protected from run-on and runoff?				
Is wash water contained for infiltration/ evaporation and disposed of outside the highway right of way?				
Is on-site cleaning limited to washing with water (no soap, soap substitutes, solvents, or steam)?				
On each day of use, are vehicles and equipment inspected for leaks, and if necessary, repaired?				
Location:				
Location:				
Location:				
Location:				
Waste Management & Materials Pollution Control				
Are material storage areas and washout areas protected from run-on and runoff, and located at least 15 m from concentrated flows and downstream drainage facilities?				
Are all material handling and storage areas clean; organized; free of spills, leaks, or any other deleterious material; and stocked with appropriate cleanup supplies?				
Are liquid materials, hazardous materials, and hazardous wastes stored in temporary containment facilities?				
Are bagged and boxed materials stored on pallets?				
Are hazardous materials and wastes stored in appropriate, labeled containers?				
Are proper storage, cleanup, and spill-reporting procedures for hazardous materials and wastes posted in open, conspicuous and accessible locations adjacent to storage areas?				

Are temporary containment facilities free of spills and rainwater?				
INSPECTION OF BMPs				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Are temporary containment facilities and bagged/boxed materials covered?				
Are temporary concrete washout facilities designated and being used?				
Are temporary concrete washout facilities functional for receiving and containing concrete waste? Are concrete residues prevented from entering the drainage system?				
Do temporary concrete washout facilities provide sufficient volume and freeboard for planned concrete operations?				
Are concrete wastes, including residues from cutting and grinding, contained and disposed of off-site or in concrete washout facilities?				
Are spills from mobile equipment fueling and maintenance properly contained and cleaned up?				
Is the site free of litter?				
Are trash receptacles provided in the Contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods?				
Is litter from work areas collected and placed in watertight dumpsters?				
Are the contents of waste management receptacles properly protected from contact with storm water or from being dislodged by winds?				
Are waste management receptacles filled at or beyond capacity?				
Location:				
Location:				
Location:				
Location:				
Temporary Water Body Crossing or Encroachment				
Are temporary water body crossings and encroachments constructed properly?				
Does the project conform to the requirements of the 404 permit and/or 1601 agreement?				
Location:				
Location:				
Location:				
Location:				
Illicit Connection/Illegal Discharge Detection and Reporting				
Is there any evidence of illicit discharges or illegal dumping on the project site?				
If yes, has the Owner been notified?				
Location:				
Location:				
Location:				
Location:				

INSPECTION OF BMPs				
BMP	**Yes**	**No**	**N/A**	**Corrective Action**
Discharge Points				
Are discharge points and discharge flows free from visible pollutants?				
Are discharge points free of any significant sediment transport?				
Location:				
Location:				
Location:				
Location:				
SWPPP Update				
Does the Project Schedule/Water Pollution Control Schedule of the SWPPP adequately reflect the current site conditions and Contractor operations?				
Are all BMPs shown on the WPCDs installed in the proper location(s) and according to the details in the SWPPP?				
Location:				
Location:				
Location:				
Location:				
General				
Are there any other potential water pollution control concerns at the site?				
Location:				
Location:				
Location:				
Storm Water Monitoring				
Does storm water discharge directly to an impaired water body for Sedimentation/Siltation or Turbidity as listed in the Statewide Construction Permit?				
If yes, were samples for sedimentation/siltation or turbidity collected pursuant to the sampling and analysis plan in the SWPPP?				
Were there any BMPs not properly implemented or breaches, malfunctions, leakages or spills observed which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water?				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan during the rain event?				
Were soil amendments (e.g. gypsum) used on the project?				
If yes, were samples for non-visually detectable pollutants taken pursuant to the sampling and analysis plan during the rain event?				
Did storm water contact stored materials or wastes and run off of the construction site? (Materials not in watertight containers, etc.)				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan in the SWPPP?				

Attachment I

Trained Contractor Personnel Log

Storm Water Management Training Log

Project Name: _____

Contract Number: _____

Storm Water Management Topic: (check as appropriate)

- ❑ Temporary Soil Stabilization
- ❑ Temporary Sediment Control
- ❑ Wind Erosion Control
- ❑ Tracking Control
- ❑ Non-storm water management
- ❑ Waste Management and Materials Pollution Control
- ❑ Storm Water Sampling

Specific Training Objective: _____

Location: _____ Date: _____

Instructor: _____ Telephone: _____

Course Length (hours) _____

Attendee Roster (attach additional forms if necessary)

Name	Company	Phone

COMMENTS:

_____

_____

_____

Attachment J

Subcontractor Notification Letter
Subcontractor Notification Log

[*To be completed and inserted by the Contractor as an amendment*]

SWPPP Notification

ABC Construction Inc,
123 Sunset Blvd., Suite 456
Hollywood, CA 90000

Dear Sir/Madam,

Please be advised that the following permits have been adopted to prevent the discharge of pollutants associated with construction activity from entering the storm drain system, ground and surface waters.

- Current version of the State Water Resources Control Board (SWRCB) Order No. 99-08-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity, August 1999 (available online at http://www.swrcb.ca.gov/stormwtr/docs/finalconstpermit.pdf), including Resolution No. 2001-046, "Modification of Water Quality Order 99-08-DWQ State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity (General Permit)", adopted by the SWRCB on April 26, 2001. (available online at http://www.swrcb.ca.gov/stormwtr/docs/approvmodification_wqo9908dwq.pdf)

[Contractor] has developed a Storm Water Pollution Prevention Plan (SWPPP) in order to implement the requirements of the Permits.

As a subcontractor, you are required to comply with the SWPPP and the Permits for any work that you perform on site. Any person or group who violates any condition of the Permits may be subject to substantial penalties in accordance with state and federal law. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP and the Permits. A copy of the Permits and the SWPPP are available for your review at the construction office. Please contact me if you have further questions.

Sincerely,

John Doe
Project Superintendent
[Contractor's Company Name]

SUBCONTRACTOR NOTIFICATION LOG

Project Name: _____

Contract Number: _____

SUBCONTRACTOR COMPANY NAME	CONTACT NAME	ADDRESS	PHONE NUMBER	PAGER/ FIELD PHONE	DATE NOTIFICATION LETTER SENT	TYPE OF WORK

Attachment K

Notice of Non-Compliance

Instructions to Contractor: This attachment contains a form indicating the required information upon a Notice of Discharge, Written Notice, or Order. The Contractor is to complete when applicable and submit to the Public Works Representative.

To: Date:

Subject: Notice of Non-Compliance

Project Name: _____

Contract No.: _____

The following instance of discharge is noted:

[Describe date, time, and location of discharge]

[Describe nature of the operation that caused the discharge]

[Describe existing BMP(s) in place prior to discharge event]

[Describe date of deployment and type of BMPs deployed after the discharge]

[Describe implementation and maintenance schedule for any affected BMPs]

If further information or a modification to the above schedule is required, notify the contact person below.

Name of Contact Person	Title
Company	Telephone Number
Signature	Date

Attachment L

Storm Water Pollution Prevention Plan (SWPPP)
And Monitoring Program Checklist

CONSTRUCTION PROJECT: _____

CONTRACTOR: _____

CONTRACT NO.: _____

SECTION A: STORM WATER POLLUTION PREVENTION PLAN (SWPPP)				
CHECK IF ADDRESSED N/A IF NOT APPLICABLE	**SWPPP Section**	**ITEM**	**GENERAL PERMIT REF.**	**COMMENTS**
✓	100	***SWPPP Certifications and Approval***	C.10	
✓	100.1	SWPPP Certification	C.10	
✓	100.2	SWPPP Approval	C.10	
✓	200	***SWPPP Amendments***	A.4.a, A.16	
✓	200.1	Amendment number and date entered into SWPPP – Amendment Log	A.4.a, A.16	
✓	200.2	Amendment Certification and Approval	A.4.a, A.16	
✓	300	***Introduction/Project Description***	A.5	
✓	300.1	Project Description and Location (narrative)	A.5.a.1	
✓	300.2	Unique Site Features (narrative)	A.5.a.1	
✓	300.4	***Project Schedule/Water Pollution Control Schedule (narrative or graphical)***	A.5.c.5	
✓	400	***References***	A.14	
✓	500.2	***Vicinity Map (narrative or graphic)***	A.5.a.1	
✓	500.2	Site perimeter	A.5.a.1	
✓	500.2	Geographic features	A.5.a.1	
✓	500.2	General topography	A.5.a.1	
✓	500.4	***Water Pollution Control Drawings (WPCDs) (graphic or narrative)***	A.5.a.2	
✓	500.4	Site perimeter	A.5.a.2	
✓	500.4	Existing and proposed buildings, lots, and roadways	A.5.a.2	
✓	500.4	Storm water collection and discharge points	A.5.a.2	
✓	500.4	General topography before and after construction	A.5.a.2	
✓	500.4	Anticipated discharge location(s)	A.5.a.2	
✓	500.4	Drainage patterns including the entire relevant drainage areas	A.5.a.2	
✓	500.4	Temporary on-site drainage(s)	A.5.a.2	

SECTION A: STORM WATER POLLUTION PREVENTION PLAN (SWPPP)				
CHECK IF ADDRESSED N/A IF NOT APPLICABLE	**SWPPP Section**	**ITEM**	**GENERAL PERMIT REF.**	**COMMENTS**
✓	500.3	***Pollutant Source and BMP Identification (narrate or indicate on site map)***	A.5.b	
✓		***Drainage***	A.5.b.1	
✓	500.4	Drainage patterns after major grading	A.5.b.1	
✓	500.4	Slopes after major grading	A.5.b.1	
✓	Attach. E	Calculations for storm water run-on	A.5.b.1	
✓	500.4	BMPs that divert off-site drainage from passing through site	A.5.b.1	
✓	500.4	***Storm Water Inlets***	A.5.b.2	
✓	500.4	Drainage patterns to storm water inlets or receiving water	A.5.b.2	
✓	500.4	BMPs that protect storm water inlets or receiving water	A.5.b.2	
✓		***Site History (narrative; if possible, indicate location(s) on the Water Pollution Control Drawings)***	A.5.b	
✓	500.3.3	Nature of fill material and data describing the soil. Description of toxic materials treated, stored, disposed, spilled or leaked on site	A.5.b.3	
✓	500.3.8 & 500.3.9	BMPs that minimize contact of contaminants with storm water	A.5.b.3	
✓		***Location of Areas Designated for:***	A.5.b.4	
✓	500.3.8 & 500.4	Vehicle storage & service	A.5.b.4	
✓	500.3.8 & 500.4	Equipment storage, cleaning, maintenance	A.5.b.4	
✓	500.3.9 & 500.4	Soil or waste storage	A.5.b.4	
✓	500.3.9 & 500.4	Construction material loading, unloading, storage and access	A.5.b.4	
✓	500.3.8 & 500.3.9	Areas outside of owners right-of-way (yards, borrow areas, etc.)	A.5.b.5	
✓		***BMP Locations or Descriptions for:***	A.5.b.5	
✓	500.3.9 & 500.4	Waste handling and disposal areas	A.5.b.5	
✓	500.3.9 & 500.4	On-site storage and disposal of construction materials and waste	A.5.b.5	
✓	500.3.8, 500.3.9 & 500.4	Minimum exposure of storm water to construction materials, equipment, vehicles, waste	A.5.b.5	
✓	500.6	***Post-Construction BMPs***	A.5.b.6	
✓	500.6.1	Listing or description of post-construction BMPs	A.5.b.6	
✓	500.4	Locations of post-construction BMPs	A.5.b.6	
✓	500.6.2	Parties responsible for long-term maintenance	A.5.b.6	

SECTION A: STORM WATER POLLUTION PREVENTION PLAN (SWPPP)				
CHECK IF ADDRESSED N/A IF NOT APPLICABLE	**SWPPP Section**	**ITEM**	**GENERAL PERMIT REF.**	**COMMENTS**
✓		***Additional Information***	A.5.c	
✓	500.3.1	Description of other pollutant sources and BMPs	A.5.c.1	
✓	500.3.2	Pre-construction control practices	A.5.c.1	
✓	500.3.1	Inventory of materials and activities that may pollute storm water	A.5.c.2	
✓	500.3.8 & 500.3.9	BMPs to reduce/eliminate potential pollutants listed in the inventory	A.5.c.2	
✓	300.4	Runoff coefficient (before & after)	A.5.c.3	
✓	300.4	Percent impervious (before & after)	A.5.c.3	
✓	Attach. F	Copy of the NOI	A.5.c.4	
✓	300.3	Construction activity schedule	A.5.c.4	
✓	300.5	Contact information	A.5.c.5	
✓	500.4.1	**SOIL STABILIZATION (EROSION CONTROL)**	A.6	
✓		***The SWPPP shall include:***	A.6.a-c	
✓	500.4	Areas of vegetation on site	A.6.a.1	
✓	500.4	Areas of soil disturbance that will be stabilized during rainy season	A.6.a.2	
✓	500.4	Areas of soil disturbance which will be exposed during any part of the rainy season	A.6.a.3	
✓	300.4	Implementation schedule for erosion control measures	A.6.a.4	
✓	500.3.4	BMPs for erosion control	A.6.b	
✓	500.3.7	BMPs to control wind erosion	A.6.c	
✓	500.3.5	**SEDIMENT CONTROL**	A.8	
✓	500.3.5 & 500.4	Description/Illustration of BMPs to prevent increase of sediment load in discharge	A.8	
✓	300.4, 500.3.5	Implementation schedule for sediment control measures	A.8	
✓	500.3.6	BMPs to control sediment tracking	A.8	
✓	500.3.8 & 500.3.9	**NON-STORM WATER MANAGEMENT**	A.9	
✓	500.3.8 & 500.3.9	Description of non-storm water discharges to receiving waters	A.9	
✓	500.3.8 & 500.3.9	Locations of discharges	A.9	
✓	500.3.8 & 500.3.9	Description of BMPs	A.9	
✓	300.5	Name and phone number of person responsible for non-storm water management	A.9	

SECTION A: STORM WATER POLLUTION PREVENTION PLAN (SWPPP)				
CHECK IF ADDRESSED N/A IF NOT APPLICABLE	**SWPPP Section**	**ITEM**	**GENERAL PERMIT REF.**	**COMMENTS**
✓	500.6	**POST-CONSTRUCTION**	A.10	
✓	500.6.1	Description of post-construction BMPs	A.10	
✓	500.6.2	Operation/Maintenance of BMPs after project completion (including short-term funding, long-term funding and responsible party)	A.10	
✓	500.5	**MAINTENANCE, INSPECTIONS, AND REPAIR**	A.11	
✓	300.5, 600.1	Name and phone number of person(s) responsible for inspections	A.11	
✓	600.1, Attach. H	Complete inspection checklist: date, weather, inadequate BMPs, visual observations of BMPs, corrective action, inspector's name, title, signature	A.11.a-f	
✓		**OTHER REQUIREMENTS**	A.12-16	
✓	500.7	Documentation of all training	A.12	
✓	500.8	List of Contractors/Subcontractors	A.13	

SECTION B: STANDARD PROVISIONS FOR CONSTRUCTION ACTIVITIES				
CHECK IF ADDRESSED N/A IF NOT APPLICABLE	**SWPPP Section**	**ITEM**	**GENERAL PERMIT REF.**	**COMMENTS**
✓	600.1	Description of Site Inspection Plans	B.3	
✓	100.3	Annual Compliance Certification (July 1)	B.4	
✓	600.2	Discharge Reporting	B.5	
✓	600.3	Keep records of all inspections, compliance certifications, and discharge reporting for a period of three years	B.6	
N/A	600.4	Sampling and Analysis Plan for Sediment	B.7	
✓	600.5	Sampling and Analysis Plan for Non-Visible Pollutants	B.8	

SECTION C: STANDARD PROVISIONS FOR CONSTRUCTION ACTIVITIES				
CHECK IF ADDRESSED N/A IF NOT APPLICABLE	**SWPPP Section**	**ITEM**	**GENERAL PERMIT REF.**	**COMMENTS**
✓	100.1	Signed SWPPP Certification	C.9, 10	

Attachment M

Annual Certification of Compliance Form

Annual Certification of Compliance

Project Name: _____

Contract No.: _____

Contractor Company Name: _____

Contractor Address: _____

Construction Start Date: _____ **Completion Date:** _____

Description of Work:

Work Now in Progress:

Work Planned for Next 12 Months:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

_____ _____

Contractor's Signature Date

Attachment N – Permit

Attachment O

SWPPP Amendments

Attachment P

Notice of Termination

Attachment Q

BMPs Selected for the Project

The California Stormwater Quality Association (CASQA) Best Management Practices (BMP) Handbook was used to develop this SWPPP. This document may be accessed electronically at http://www.cabmphandbooks.net/Construction.asp. Tear sheets for the BMPs are listed at this website address.

BMPs that were selected for the project include:

EC-1	Scheduling
EC-9	Earth Dikes and Drainage Swales
SE-3	Sediment Trap
SE-4	Check Dams
SE-7	Street Sweeping and Vacuuming
SE-8	Sandbag Barrier
SE-10	Storm Drain Inlet Protection
TC-1	Stabilized Construction Entrance/Exit
TC-2	Stabilized Construction Roadway
WE-1	Dust Control
NS-1	Water Conservation Practices
NS-2	Dewatering Operations
NS-3	Paving and Grinding Operations
NS-6	Illicit Connection/Discharge
NS-7	Potable Water/Irrigation
NS-8	Vehicle and Equipment Cleaning
NS-9	Vehicle and Equipment Fueling
NS-10	Vehicle and Equipment Maintenance
NS-12	Concrete Curing
NS-13	Concrete Finishing
WM-1	Material Delivery and Storage

WM-2	Material Use
WM-3	Stockpile Management
WM-4	Spill Prevention and Control
WM-5	Solid Waste Management
WM-8	Concrete Waste Management
WM-9	Sanitary / Septic Waste Management
WM-10	Liquid Waste Management

Attachment R

Sample Activity Log

Sample Activity Log

GENERAL INFORMATION				
Project Name				
Contract No:				
Contractor				
Sampler's Name				
Sampler's Title				
Signature				
Date of Sampling				
Storm Data	Storm Start Date & Time:		Storm Duration (hrs):	
	Time elapsed since last storm (Circle Applicable Units)	Min. Hr. Days	Approximate Rainfall Amount (mm)	

Sample Log		
Sample Identification	**Sample Location**	**Collection Date and Time**

Field Analysis		
Yes		No
Sample Identification	**Test**	**Result**

Attachment S

Pollutant Testing Guidance Table – Non-Visible Pollutants

Attachment S
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	Visually Observable?	Pollutant Indicators [2]	Suggested Analyses Field [3]	Laboratory
Asphalt Products (Sections 37, 39, 92, 93, 94, and Special Provisions)	Hot Asphalt	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		
	Asphalt Emulsion				
	Liquid Asphalt (tack coat)				
	Cold Mix				
	Crumb Rubber	Yes – Black, solid material	Visually Observable - No Testing Required		
	Asphalt Concrete (Any Type)	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		
Cleaning Products	Acids	No	pH Acidity Anions (acetic acid, phosphoric acid, sulfuric acid, nitric acid, hydrogen chloride)	pH Meter Acidity Test Kit	EPA 150.1 (pH) SM 2310B (Acidity) EPA 300.0 (Anion)
	Bleaches	No	Residual Chlorine	Chlorine	SM 4500-CL G (Res. Chlorine)
	Detergents	Yes - Foam	Visually Observable - No Testing Required		
	TSP	No	Phosphate	Phosphate	EPA 365.3 (Phosphate)
	Solvents	No	VOC	None	EPA 601/602 or EPA 624 (VOC)
			SVOC	None	EPA 625 (SVOC)

Attachment S
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	Visually Observable?	Pollutant Indicators [2]	Suggested Analyses Field [3]	Laboratory
Portland Concrete Cement & Masonry Products (Section 27, 28, 29, 40, 41, 42, 49, 50, 51, 53, 63, 65, 72, 73, 80, 81, 83, 90, and Special Provisions)	Portland Cement (PCC)	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Masonry products	No	pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
			Alkalinity		SM 2320 (Alkalinity)
	Sealant (Methyl Methacrylate - MMA)	No	Methyl Methacrylate	None	EPA 625 (SVOC)
			Cobalt		EPA 200.8 (Metal)
			Zinc		
	Incinerator Bottom Ash Bottom Ash Steel Slag Foundry Sand Fly Ash Municipal Solid Waste	No	Aluminum Calcium Vanadium Zinc	Calcium Test	EPA 200.8 (Metal) EPA 200.7 (Calcium)
	Mortar	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Concrete Rinse Water	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Non-Pigmented Curing Compounds	No	Acidity	pH Meter Alkalinity or Acidity Test Kit	SM 2310B (Acidity)
			Alkalinity		SM 2320 (Alkalinity)
			pH		EPA 150.1 (pH)
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)

Attachment S
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	Visually Observable?	Pollutant Indicators [2]	Suggested Analyses Field [3]	Laboratory
Landscaping and Other Products (Section 20, 24, and Special Provisions)	Aluminum Sulfate	No	Aluminum	TDS Meter Sulfate	EPA 200.8 (Metal)
			TDS		EPA 160.1 (TDS)
			Sulfate		EPA 300.0 (Sulfate)
	Sulfur-Elemental	No	Sulfate	Sulfate	EPA 300.0 (Sulfate)
	Fertilizers-Inorganic [4]	No	Nitrate	Nitrate	EPA 300.0 (Nitrate)
			Phosphate	Phosphate	EPA 365.3 (Phosphate)
			Organic Nitrogen	None	EPA 351.3 (TKN)
			Potassium	None	EPA 200.8 (Metal)
	Fertilizers-Organic	No	TOC	Nitrate	EPA 415.1 (TOC)
			Nitrate		EPA 300.0 (Nitrate)
			Organic Nitrogen		EPA 351.3 (TKN)
			COD		EPA 410.4 (COD)
	Natural Earth (Sand, Gravel, and Topsoil)	Yes - Cloudiness and turbidity	Visually Observable - No Testing Required		
	Herbicide	No	Herbicide	None	Check lab for specific herbicide or pesticide
	Pesticide		Pesticide		
	Lime		Alkalinity	pH Meter Alkalinity or Acidity Test Kit	SM 2320 (Alkalinity)
			pH		EPA 150.1 (pH)

Attachment S
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	Visually Observable?	Pollutant Indicators [2]	Suggested Analyses Field [3]	Laboratory
Painting Products (Section 12-3.08, 20-2.32, 50-1.05, 59, 91, and Special Provisions)	Paint	Yes	Visually Observable - No Testing Required		
	Paint Strippers	No	VOC	None	EPA 601/602 or EPA 624 (VOC)
			SVOC	None	EPA 625 (SVOC)
	Resins	No	COD	None	EPA 410.4 (COD)
			SVOC		EPA 625 (SVOC)
	Sealants	No	COD	None	EPA 410.4 (COD)
	Solvents	No	COD	None	EPA 410.4 (COD)
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
	Lacquers, Varnish, Enamels, and Turpentine	No	COD	None	EPA 410.4 (COD)
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
	Thinners	No	VOC	None	EPA 601/602 or EPA 624 (VOC)
			COD		EPA 410.4 (COD)
Portable Toilet Waste Products	Portable Toilet Waste	Yes	Visually Observable - No Testing Required		

Attachment S
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	Visually Observable?	Pollutant Indicators [2]	Suggested Analyses Field [3]	Laboratory
Contaminated Soil [5]	Aerially Deposited Lead[3]	No	Lead	None	EPA 200.8 (Metal)
	Petroleum	Yes – Rainbow Surface Sheen and Odor	Visually Observable - No Testing Required		
	Mining or Industrial Waste, etc.	No	Contaminant Specific	Contaminant Specific – Check with laboratory	Contaminant Specific – Check with laboratory
Line Flushing Products	Chlorinated Water	No	Total chlorine	Chlorine	SM 4500-CL G (Res. Chlorine)
Adhesives	Adhesives	No	COD	None	EPA 410.4 (COD)
			Phenols	Phenol	EPA 420.1 (Phenol)
			SVOC	None	EPA 625 (SVOC)
Dust Palliative Products (Section 18)	Salts (Magnesium Chloride, Calcium Chloride, and Natural Brines)	No	Chloride	Chloride	EPA 300.0 (Chloride)
			TDS	TDS Meter	EPA 160.1 (TDS)
			Cations (Sodium, Magnesium, Calcium)	None	EPA 200.7 (Cations)
Vehicle	Antifreeze and Other Vehicle Fluids	Yes - Colored Liquid	Visually Observable - No Testing Required		
	Batteries	No	Sulfuric Acid	None	EPA 300.0 (Sulfate)
			Lead	None	EPA 200.8 (Metal)
			pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
	Fuels, Oils, Lubricants	Yes - Rainbow Surface Sheen and Odor	Visually Observable - No Testing Required		

Attachment S
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	Visually Observable?	Pollutant Indicators [2]	Suggested Analyses Field [3]	Laboratory
Soil Amendment/Stabilization Products	Polymer/Copolymer [6, 7]	No	Organic Nitrogen	None	EPA 351.3 (TKN)
			BOD	None	EPA 405.1 (BOD)
			COD	None	EPA 410.4 (COD)
			DOC	None	EPA 415.1 (DOC)
			Nitrate	Nitrate	EPA 300.0 (Nitrate)
			Sulfate	Sulfate	EPA 300.0 (Sulfate)
			Nickel	None	EPA 200.8 (Metal)
	Straw/Mulch	Yes - Solids	Visually Observable - No Testing Required		
	Lignin Sulfonate	No	Alkalinity	Alkalinity	SM 2320 (Alkalinity)
			TDS	TDS Meter	EPA 160.1 (TDS)
	Psyllium	No	COD	None	EPA 410.4 (COD)
			TOC		EPA 415.1 (TOC)
	Guar/Plant Gums	No	COD	None	EPA 410.4 (COD)
			TOC		EPA 415.1 (TOC)
			Nickel		EPA 200.8 (Metal)
	Gypsum	No	pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
			Calcium	Calcium	EPA 200.7 (Calcium)
			Sulfate	Sulfate	EPA 300.0 (Sulfate)
			Aluminum	None	EPA 200.8 (Metal)
			Barium		
			Manganese		
			Vanadium		

Attachment S
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	Visually Observable?	Pollutant Indicators [2]	Suggested Analyses Field [3]	Laboratory
Treated Wood Products (Section 58, 80-3.01B(2), and Special Provisions)	Ammoniacal-Copper-Zinc-Arsenate (ACZA) Copper-Chromium-Arsenic (CCA) Ammoniacal-Copper-Arsenate (ACA) Copper Naphthenate	No	Arsenic Total Chromium Copper Zinc	Total Chromium	EPA 200.8 (Metal)
	Creosote	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		

Notes:

1. 1 If specific pollutant is known, analyze only for that specific pollutant. See MSDS to verify.
2. For each construction material, test for one of the pollutant indicators. Bolded pollutant indicates lowest analysis cost or best indicator. However, the composition of the specific construction material, if known, is the first criterion for selecting which analysis to use.
3. See www.hach.com, www.lamotte.com, www.ysi.com and www.chemetrics.com for some of the test kits
4. If the type of inorganic fertilizer is unknown, analyze for all pollutant indicators listed.
5. Only if special handling requirements are required in the Standard Special Provisions for aerially deposited lead (ADL)
6. If used with a dye or fiber matrix, it is considered visually observable and no testing is required.
7. Based upon research conducted by Caltrans, the following copolymers/polymers do not discharge pollutants and water quality sampling and analysis is **not** required: Super Tak™, M-Binder™, Fish Stik™, Pro40dc™, Fisch-Bond™, and Soil Master WR™.

Acronyms:

BOD – Biochemical Oxygen Demand
COD – Chemical Oxygen Demand
DOC – Dissolved Organic Carbon

EPA – Environmental Protection Agency
HACH – Worldwide company that provides advanced analytical systems and technical support for water quality testing.
SM – Standard Method
SVOC – Semi-Volatile Organic Compounds
TDS – Total Dissolved Solids
TKN – Total Kjeldahl Nitrogen
TOC – Total Organic Carbon
TSP – Tri-Sodium Phosphate
VOC - Volatile Organic Compounds

References:

Construction Storm Water Sampling and Analysis Guidance Document, California Stormwater Quality Task Force, October 2001.
Environmental Impact of Construction and Repair Materials on Surface and Ground Waters, Report 448, National Cooperative Highway Research Program, 2001
Soil Stabilization for Temporary Slopes, Environmental Programs, California Department of Transportation, October 1, 1999.
Statewide Storm Water Management Plan, Division of Environmental Analysis, California Department of Transportation, April 2002.
Statewide Storm Water Quality Practice Guidelines, Environmental Program, California Department of Transportation, August 2000.
Soil Stabilization for Temporary Slopes and District 7 Erosion Control Pilot Study, June 2000.
Stormwater Monitoring Protocols, Guidance Manual, California Department of Transportation, May 2000.

Attachment T

Discharge Reporting Log

Discharge Reporting Log

Project Name: _____

Contract No: _____

Date	Material(s) Discharged	Estimated Quantity	Observed By

Attachment U

Analytical Results

Appendix A

BMP Fact Sheets

(to be selected and provided by the Contractor)