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November 30, 2009

California Energy Commission
Docket Unit
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: **PALEN SOLAR POWER PLANT PRE-DEVELOPMENT DRAINAGE CONDITIONS REPORT DOCKET NO. (09-AFC-7)**

Enclosed for filing with the California Energy Commission is the original copy of the **PALEN SOLAR POWER PLANT PRE-DEVELOPMENT DRAINAGE CONDITIONS REPORT**, for the Palen Solar Power Project (09-AFC-7).

Sincerely,

Marie Mills

AECOM

Palen Solar Power Plant

Pre-Development Drainage Conditions

November 25, 2009

This report has been prepared for:

Solar Millennium
1625 Shattuck Ave., Suite 270
Berkeley, CA 94709-1611

This report was prepared by:

AECOM Inc.
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EXECUTIVE SUMMARY

This report provides results of analysis of on-site, pre-development drainage conditions at the Palen Solar Power Plant site. This report is a supplement to the *Palen Solar Power Plant, Drainage Report: July 29, 2009* (July 2009 report) . This report utilizes refined topographic site data (LIDAR) and a detailed two-dimensional, unconfined flow modeling approach (FLO-2D) to document the pre-development flows.

Appendices A, B, and C include site maps of the Palen site (associated with the 100-year, 25-year and 10-year storm events, respectively) of FLO-2D simulated maximum flow depth (Sheet 1 of 3), maximum velocity (Sheet 2 of 3), and maximum water surface elevation (Sheet 3 of 3).

Tables 1, 2, and 3 below provide a summary of peak flow rate (cfs), total flow volume (acre-feet), and maximum flow width (feet) at the three "Flow Analysis Cross Sections" defined in the FLO-2D model and shown on Appendix maps (for the 10-, 25-, and 100-year storm events, respectively). The three "Flow Analysis Cross Sections" represent the location at the downstream side of the project boundary where water exits the site. The three Flow Analysis Cross Section locations associated with existing flows are utilized in the proposed design to align the post-development drainage discharges closely with the existing condition.

TABLE 2
PRE-DEVELOPMENT FLO2D RESULTS
10-Year Storm Event

Flow Analysis Cross Section	Peak Flow Rate (cfs)	Total Flow Volume (ac-ft)	Max. Flow Width (ft)
West (1)	2000*	766*	3120*
Center (2)	160	80	2080
East (3)	207	61	1690

TABLE 3
PRE-DEVELOPMENT FLO2D RESULTS
25-Year Storm Event

Flow Analysis Cross Section	Peak Flow Rate (cfs)	Total Flow Volume (ac-ft)	Max. Flow Width (ft)
West (1)	2730*	1083*	3250*
Center (2)	515	207	4420
East (3)	441	129	1820

TABLE 4
PRE-DEVELOPMENT FLO2D RESULTS
100-Year Storm Event

Flow Analysis Cross Section	Peak Flow Rate (cfs)	Total Flow Volume (ac-ft)	Max. Flow Width (ft)
West (1)	4254*	1642*	3380*
Center (2)	1417	517	4420
East (3)	959	270	2340

** Flows shown in this table represent only flows crossing the site boundary, other flows will bypass the site.*

The FLO-2D model simulates volumetric mass balance of water inflows, losses, and outflows consisting of five primary components listed below and tabulated in Table 4 by column:

A. Off-Site Surface Water Inflow (estimated with HEC-HMS model from July 2009 report).
B. On-Site Precipitation Inflow (estimated with FLO-2D model).
C. On-Site Initial Abstraction and Infiltration Losses (estimated with FLO-2D model).
D. On-Site Watershed Storage (estimated with FLO-2D model).
E. Surface Water Outflow (calculated with FLO-2D model as item A plus B minus C minus D).

TABLE 4
FLO-2D MODEL RESULTS (MASS BALANCE)

Storm Event	A Off-Site SW Inflow (ac-ft) (ac-ft)	B On-Site Precip. Inflow (ac-ft) (ac-ft)	C On-Site Initial Ab. and Infil. Loss (ac-ft) (ac-ft)	D On-Site Watershed Storage (ac-ft) (ac-ft)	E Surface Water Outflow (ac-ft) (ac-ft)
10-Yr	2302	2953	2205	2587	463
25-Yr	3254	3736	2514	3682	794
100-Yr	4919	5036	2905	5576	1474

GLOSSARY OF TERMS

The following glossary provides brief definitions of technical terms used throughout this report.

Drainage Basin: Extent of land where water from rain or snow-melt drains by gravity into a body of water (e.g., river, lake, reservoir, estuary, wetland, sea, or ocean).

Dynamic Wave: One solution method used (in FLO-2D) to solve the *momentum equation*.

FLO-2D Model: An integrated river/floodplain and flood routing hydrologic/hydraulic model.

Grid Element (also Grid Cell): Geographic space, as an array, of equally sized square grid points arranged in rows and columns. Each grid point stores a numeric value that represents a geographic attribute (such as elevation or surface slope) for that unit of space. Each grid cell is referenced by its X and Y coordinate location.

Hydrograph: Graph showing changes in flow rate over time.

Hydrologic Model: Simplified, conceptual representation of portions of the hydrologic cycle.

Hydrology: Study of movement, distribution, and quality of water through a system.

Initial Abstraction (also Interception): The portion of rainfall that does not reach the ground (initially) due to vegetated cover or other man-made obstructions.

Model Domain: Geographic area represented by the FLO-2D model.

Momentum Equation: Equation to represent open channel flow and flow over floodplains.

Model Stability: The ability of the model to solve governing equations given computational time and error considerations.

Non-Uniform Flow: Flow characterized by varying velocity with respect to distance at a given time.

Spatial/Model Domain: Geographic area represented by the FLO-2D model.

Spatial Resolution: The level of detail that can be included in the geographic representation of the model. The smaller the model grid cell size, the higher the model resolution.

Time Step: A discrete length of time used in the model calculations.

Unsteady Flow: Flow characterized by varying velocity with respect to time at a given location.

1. PROJECT DESCRIPTION

1.1 Introduction

Solar Millennium and Chevron Energy Solutions (Chevron) propose to locate a solar power plant near Desert Center, in Riverside County, California, on land administered by the Bureau of Land Management (BLM).

A hydrologic study (*Palen Solar Power Plant, Drainage Report: July 29, 2009*) was completed to analyze surface water drainage characteristics at the proposed Palen site. The July 2009 study included pre- and post-development hydrologic modeling (HEC-HMS) of drainage areas off-site (upslope) and through the proposed site and post-development, one-dimensional hydraulic modeling (HEC-RAS) of proposed drainage channel improvements adjacent to and through the site to downstream discharge points. The July 2009 study utilized USGS 20-foot contour-interval topography as a portion of the model input parameters.

Subsequent to completion of the July 2009 report, LIDAR one-foot contour-interval topography over the site was collected to refine on-site, pre-development hydrology and hydraulic analysis. For the purposes of the current report, a detailed, two-dimensional, physical modeling approach (FLO-2D) was implemented, using the LIDAR topography data, to refine results of the original hydrologic model (HEC-HMS).

The two-dimensional FLO-2D approach summarized herein allows a more detailed characterization of unconventional, unconfined surface water flow over topography consisting of “alluvial fans”, as identified on the Palen site. Off-site (up-slope) HEC-HMS hydrology data (taken from the July 2009 report) was used, in combination with the LIDAR topography and on-site rainfall and physical land attributes, as input parameters for the FLO-2D model, to analyze pre-development flow characteristics (flow rate, velocity, volume, depth, and width) across the project site.

1.2 Site Description

The general area surrounding the proposed project site consists of approximately 5,160 acres located 10 miles east of Desert Center, California and 0.5 miles north of Interstate I-10. The total area of land currently proposed for development is approximately 3,200 acres.

1.3 Existing Condition Flow Patterns

1.3.1 Off-Site Flow Patterns

The major watercourse in the project area is Corn Springs Wash which drains 31 square miles of the Chuckwalla Mountains and exits the mountains to the southwest of the site. Flows from Corn Springs Wash and adjacent unnamed watersheds are intercepted by dikes south of the along I-10 freeway and conveyed to three box culverts (south) upstream of the site. Flows exit these culverts and cross the site flowing north east.

The project site lies in the Chuckwalla Valley northeast of the Chuckwalla Mountains. The general stormwater flow pattern is from the higher elevations in the mountains located approximately 6 miles south west of the project site to the lower elevations in Chuckwalla Valley to the northeast. The stormwater from the project site flows northeast to Palen Dry Lake which is a depression in the Chuckwalla Valley with no identifiable outlet.

1.3.2 On-Site Flow Patterns

Although the bridges concentrate the flood flows, the flat topography of the area causes the flow to spread back out north of the bridges. Immediately downstream of each bridge there is an incised water course but the bank heights rapidly diminish to 12 to 18 inches and the water spreads into numerous erosion rills. Aerial photography, vegetation patterns and the existing erosion rills indicate that the flows maintain a fairly straight path across the site towards Ford Dry Lake.

2. METHODOLOGY

Pre-development drainage over the Palen site was analyzed using FLO-2D Version 2007.06, a physical process model that routes rainfall-runoff and flood hydrographs over unconfined flow surfaces or in channels. FLO-2D, owned by FLO-2D Software, Inc., is on FEMA's list of approved hydraulic models for riverine and unconfined alluvial fan flood studies, and has been extensively used by the US Army Corps of Engineers.

The FLO-2D model's spatial domain is represented as a system of square grid elements (tiles), called cells, each with an elevation derived from a digital terrain model of the LIDAR topography and hydraulic characteristics. The model provides results of water surface elevation, flow rate and velocity, and other hydraulic parameters for all grid elements in discrete time steps, using a dynamic wave approximation to the momentum equation[1]. FLO-2D simulates infiltration and runoff after rainfall initial abstraction[2], using the Soil Conservation Service (SCS) Curve Number method.

Drainage conditions were simulated for a 48-hour period for the 10-, 25-, and 100-year hydrologic events using the same base model configuration and parameters for all three hydrologic events. The remainder of this section describes key user-selected model parameters used for this study.

2.1 Spatial Configuration

A modeled area is defined by the model computational boundary (the model boundary), a line that encloses the terrain to be modeled. The model boundary was placed around the project site to accurately define flood distribution along the upstream and downstream project site boundaries. The model boundary for this study is a closed polygon between a line along Interstate 10 on the southwest, and a line on the northeast, more or less the far side of Ford Dry Lake. Rising topography on the northerly side of the dry lake provides a hydraulic boundary. Figure 1 shows the model boundary superimposed on an area map showing project site boundaries as well as the location of the culverts that convey upstream contributions to the project site.

The grid element size was selected to coincide with FLO-2D efficiency (stability / computation) guidelines, resulting in grid squares measuring 130 feet square. This cell size provides good spatial resolution of the floodplain, without compromising model run time and stability.

[1] The dynamic wave approximation represents the change of momentum in a body of water as a function of the change in local and convective accelerations, the pressure force, and the gravity force and friction losses.
[2] Portion of rainfall that does not reach the ground (initially) due to vegetated cover or other man-made obstructions.

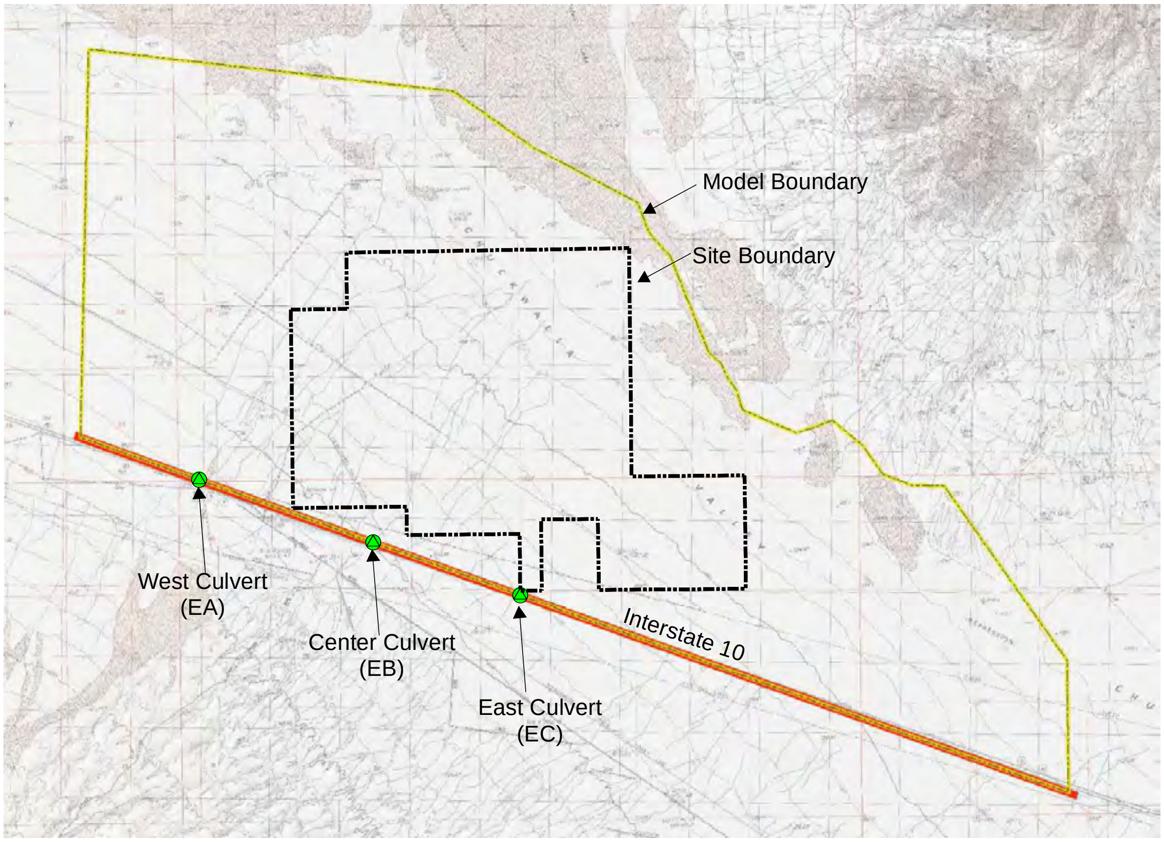


Figure 1. Model Boundary and inflow locations

2.2 Elevation

Grid elevations were interpolated from a contour map generated by merging high-resolution (1.0-foot contour) LIDAR data inside the site with lower-resolution (20-foot contour) USGS topography outside the site. The FLO-2D model package tools were utilized to perform the interpolation, assigning representative elevation to each grid element.

2.3 Manning's N

Overland flow velocities and depths vary with topography and the surface roughness. A composite overland flow roughness value was assigned to each grid cell to account for vegetation, surface irregularity, and non-uniform[3] and unsteady flow[4]. Sparse vegetation and sandy soils are predominant across the site. Areas of slightly denser/sparser vegetation and farm lands were also identified in the modeled area, based on field observations and aerial imagery. Figure 2 shows areas of similar surface roughness characteristics (by color) and their assigned values. These values were chosen based from documented FLO-2D tabular values, attributed to the US Army Corps of Engineers' HEC-1 Manual and Technical Engineering and Design Guide.

[3] Flow characterized by a varying velocity with respect to distance at a given time.
[4] Flow characterized by a varying velocity with respect to time at a given location.

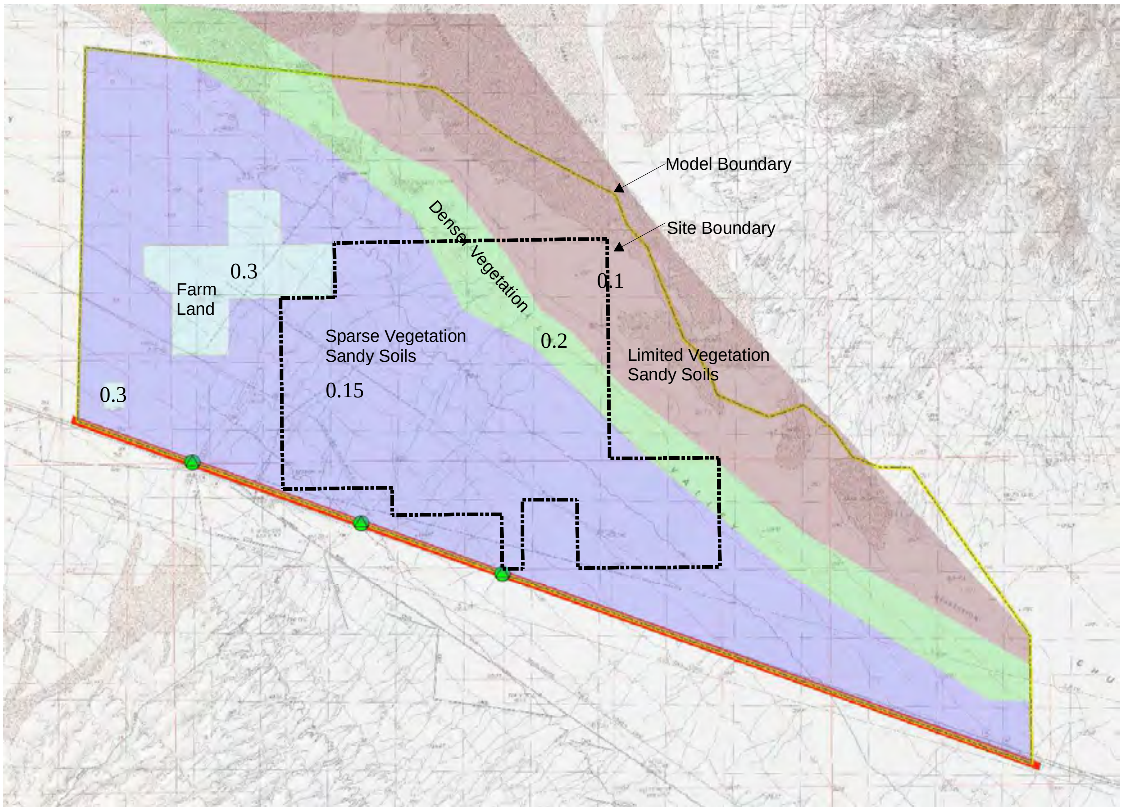


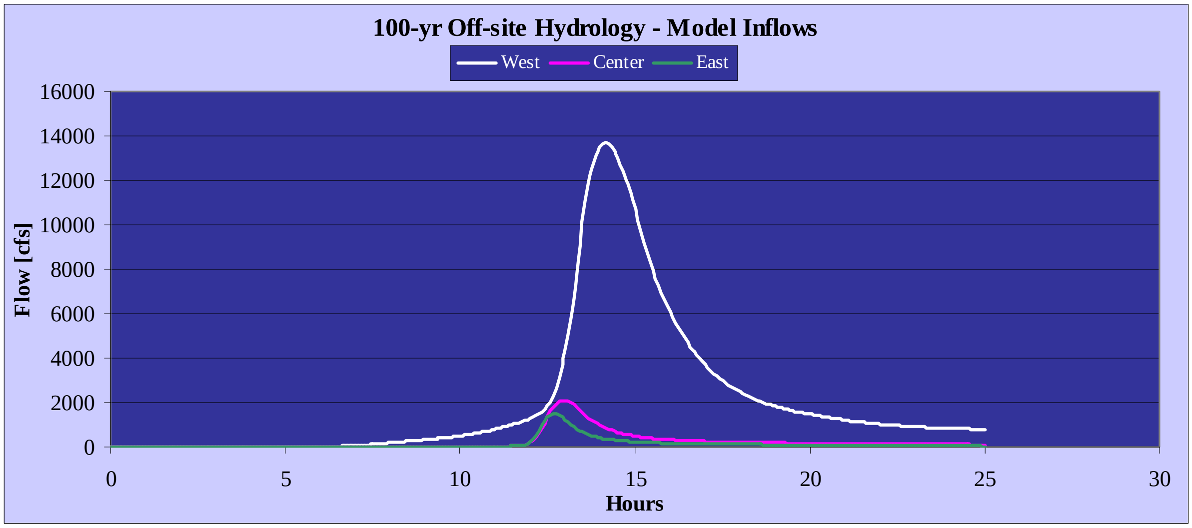
Figure 2. Spatial distribution of overland flow roughness coefficients

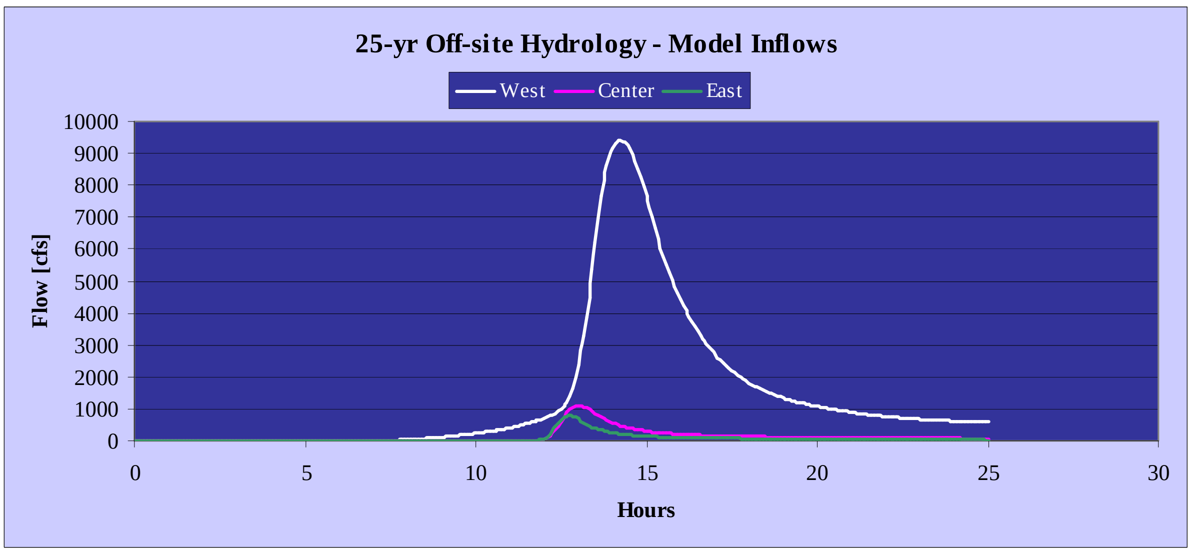
2.4 Rainfall-Runoff Modeling

The SCS Curve Number approach, including water loss through infiltration, was used to account for rainfall-runoff processes inside the modeled area. Soil types and cover conditions of the modeled area (from the July 2009 report) were used to assign a general curve number (77) and an initial abstraction (0.59 inches) for this study, providing consistency with the July 2009 report / hydrologic analysis.

2.5 Inflow to the FLO-2D Model

The Palen project site receives surface water flow from higher elevations in the Chuckwalla Mountains located southwest of the site. Flow contributions from drainage basins outside the model boundary (defined in section 2.1 above) were input to the FLO-2D model from results of the July 2009 report. Natural flow paths are interrupted by Interstate 10, which bounds the FLO-2D model on the southwest. The highway is protected by a series of wing dikes which direct flows to three box culverts (Figure 1). Hydrographs (flow rate over time) from these “exterior” drainage basins are implemented at the model boundary, providing inflows to the FLO-2D model. Figure 3 shows the off-site 24-hour storm hydrographs through each of the “exterior” drainage basins, corresponding to 10-year, 25-year, and 100-year precipitation events. The inflow locations are identified in Figure 1 with the original HEC-HMS name used in the July 2009 report.





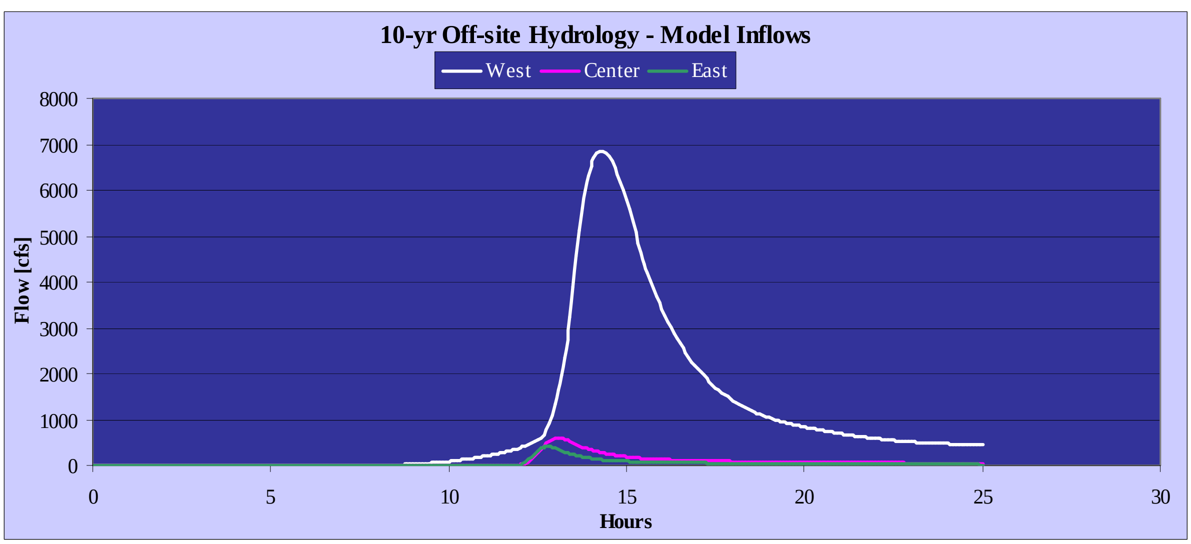


Figure 3. Inflow hydrographs for 100, 25 and 10 year hydrologic events

2.6 Outflow from the FLO-2D Model

Movement of water inside the FLO-2D modeled area is based on topography, roughness characteristics and conservation of mass; therefore, outflow locations were designated at model boundaries were water will move through the model boundary. Northwest model boundaries were designated as potential model outflow locations; while the northeast boundary remained close to simulate water accumulation at Ford Dry Lake. Simulation of drainage outflow through the model boundary was achieved by designating cells along this boundary as "floodplain outflow cells". The two-dimensional modeling process across and through the site simulates exact outflow locations along the model boundary based on the topographic direction of the overland flow at each model boundary cell.

Within the FLO-2D model boundary, "Flow Analysis Cross Sections" were established at the downstream site boundary locations where existing drainage water exits the site. The drainage outflow through these cross sections at the north and east project site boundaries, provides the basis of surface water discharge over time for each of the 10, 25 and 100 year events. Flow Analysis Cross Sections are defined by a set of cells aligned at a right angle with the main direction of flow exiting the model boundary. Figure 4 shows the location of the implemented Flow Analysis Cross Sections. The three Flow Analysis Cross Section locations associated with existing flows are utilized in the proposed design to align the post-development drainage discharges closely with the existing condition.

2.7 Precipitation

The 24-hour precipitation event that generates the modeled inflow from upstream drainage basins is assumed to occur contemporaneously over the model domain[5]. The 24-hour precipitation depth was obtained from NOAA's Precipitation Frequency Data Server (PFDS). Rainfall depths used for 10-year, 25-year, and 100-year return periods were, respectively, 2.0 inches, 2.53 inches, and 3.41 inches.

Comparable with the July 2009 report, precipitation was distributed temporally as a Type II storm, in accordance with the U.S. Soil Conservation Service (now NRCS) Technical Release 55 recommendation for extreme eastern California.

[5] Geographic area represented by the FLO-2D model.

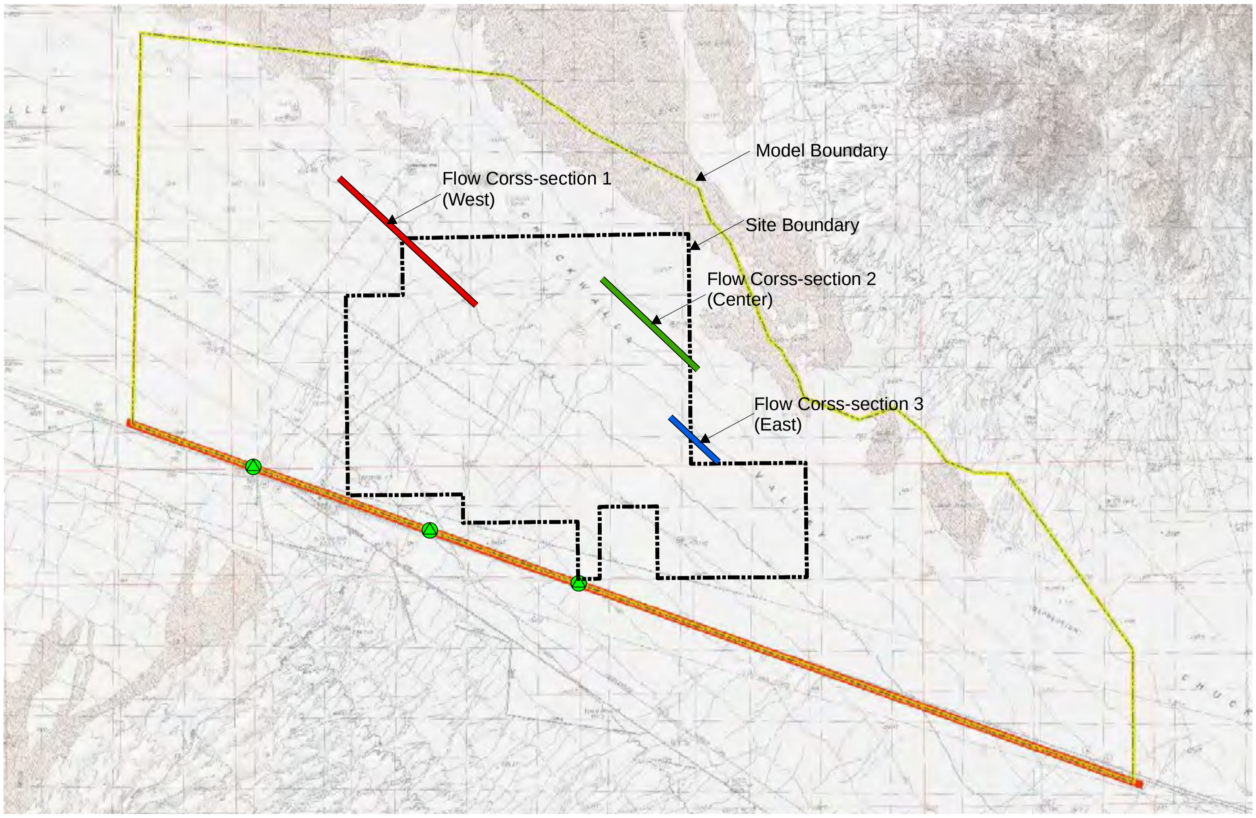


Figure 4. Flow Cross Section Locations

3. RESULTS AND CONCLUSIONS

- This report provides results of analysis of on-site, pre-development drainage conditions at the Palen site, which are supplement to the July 2009 report through utilization of refined topographic site data (LIDAR) and a detailed two-dimensional, unconfined flow modeling approach (FLO-2D) described in more detail in the report introduction. This refined model approach was utilized to generate a more detailed representation of water movement across the Palen site, including routing flow from mountainous terrain through shallow moderately-defined channels at the base of the mountains that radiate outward in a complex alluvial fan onto a broad, flat expanse of desert terrain.

- Appendices A, B, and C include site maps of the Palen site (associated with the 100-year, 25-year and 10-year storm events, respectively) of FLO-2D simulated maximum flow depth (Sheet 1 of 3), maximum velocity (Sheet 2 of 3), and maximum water surface elevation (Sheet 3 of 3, which also provides an inset chart summarizing flow hydrographs at three "Flow Analysis Cross Sections" identified on the maps).

  Review of the maps described above provides several general flow characteristics. The "Flow Areas" are noted on the respective Appendix maps:

  - <u>Flow Area 1</u> –This area includes northeasterly flow from Corn Springs Wash through the northwest corner of the site boundary. Off-site surface water flow is intercepted by dikes located south of the I-10 freeway and conveyed to a box culvert (referred to as "west"). Immediately down-slope of the culvert surface water flows spread northeasterly within a large number of relatively parallel channels that convey flows to a topographic depression (Ford Dry Lake). The footprint of the area of flow concentration (as defined above) diverges and widens in the direction of the flow (northeasterly) to nearly 10,000 feet wide near Dry Lake. The largest concentration of water (deeper water) occurs near the western-most portion of the area of concentration, immediately west (outside) of the northwest corner of the site boundary. Table 1 show the volumes and peak flows estimated to be intercepted by the project site as a portion of the flow analysis section "West" located inside the site boundary. Table 1A shows the volumes and peak flows estimated to be intercepted by the project site as a portion of the flow analysis section "West" located inside the site boundary. FLO-2D model also provides peak flows and volumes for the entire Flow Area 1 (Table 1B). Substantial portion of the volume in Flow Area 1 bypasses the site, so this information is provided for information only.

TABLE 1A
PROJECT SITE INTERCEPTED FLOWS - FLOW AREA 1

100-year		25-year		10-year	
Peak Flow Rate (cfs)	Total Volume (Ac-Ft)	Peak Flow Rate (cfs)	Total Volume (Ac-Ft)	Peak Flow Rate (cfs)	Total Volume (Ac-Ft)
4254	1642	2730	1083	2000	766

TABLE 1B
TOTAL FLOWS - FLOW AREA 1

100-year		25-year		10-year	
Peak Flow Rate (cfs)	Total Volume (Ac-Ft)	Peak Flow Rate (cfs)	Total Volume (Ac-Ft)	Peak Flow Rate (cfs)	Total Volume (Ac-Ft)
11718	4461	7804	2953	5445	2089

- Flow Area 2 – Similar to Flow Area 1, this area includes northeasterly originating from discharge of an off-site box culvert beneath I-10, but with lower flow rates, than Flow Area 1, entering the site along the southern site boundary. The flow widens with flow direction (northeasterly) reaching its widest point (approx 4,600 ft) near the middle of the project site. The largest concentration of water (deeper water) occurs near the center of the flow area.

- Flow Area 3 – This flow area conveys smaller flows that, similar to flow areas 1 and 2, spread out downstream of an I-10 box culvert. This area is characterized by having an approximate constant width (1,500 ft) through the site, with the largest concentrations towards the center of the flow area.

➢ Tables 2, 3, and 4 below provide a summary of peak flow rate (cfs), total flow volume (acre-feet), and maximum flow width (feet) at the three "Flow Analysis Cross Sections" defined in the FLO-2D model and shown on Appendix maps (for the 10-, 25-, and 100-year storm events, respectively). The three "Flow Analysis Cross Sections" represent the locations at the downstream side of the project boundary where existing drainage water exits the site.

TABLE 2
PRE-DEVELOPMENT FLO2D RESULTS
10-Year Storm Event

Flow Analysis Cross Section	Peak Flow Rate (cfs)	Total Flow Volume (ac-ft)	Max. Flow Width (ft)
West (1)	2000*	766*	3120*
Center (2)	160	80	2080
East (3)	207	61	1690

TABLE 3
PRE-DEVELOPMENT FLO2D RESULTS
25-Year Storm Event

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TABLE 4
PRE-DEVELOPMENT FLO2D RESULTS
100-Year Storm Event

Flow Analysis Cross Section	Peak Flow Rate (cfs)	Total Flow Volume (ac-ft)	Max. Flow Width (ft)
West (1)	4254*	1642*	3380*
Center (2)	1417	517	4420
East (3)	959	270	2340

* *Flows shown in this table represent only flows crossing the site boundary, other flows will bypass the site.*

- The FLO-2D model simulates volumetric mass balance of water inflows, losses, and outflows consisting of five primary components listed below and tabulated in Table 5 by column:

  A. Off-Site Surface Water Inflow (estimated with HEC-HMS model from July 2009 report).
  B. On-Site Precipitation Inflow (estimated with FLO-2D model).
  C. On-Site Initial Abstraction and Infiltration Losses (estimated with FLO-2D model).
  D. On-Site Watershed Storage (estimated with FLO-2D model).
  E. Surface Water Outflow (calculated with FLO-2D model as item A plus B minus C minus D).

TABLE 5
FLO-2D MODEL RESULTS (MASS BALANCE)

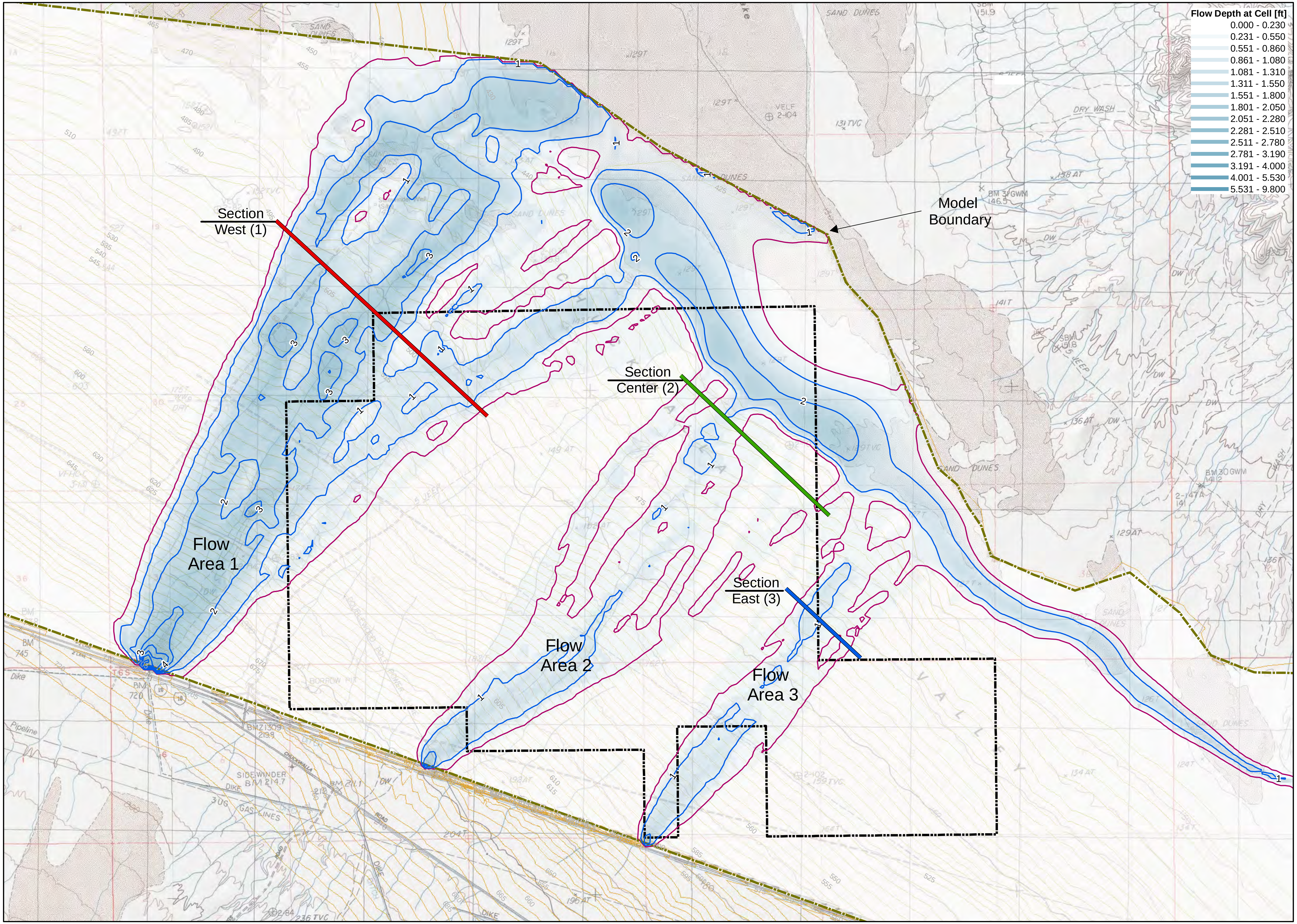
Storm Event	A Off-Site SW Inflow (ac-ft) (ac-ft)	B On-Site Precip. Inflow (ac-ft) (ac-ft)	C On-Site Initial Ab. and Infil. Loss (ac-ft) (ac-ft)	D On-Site Watershed Storage (ac-ft) (ac-ft)	E Surface Water Outflow (ac-ft) (ac-ft)
10-Yr	2302	2953	2205	2587	463
25-Yr	3254	3736	2514	3682	794
100-Yr	4919	5036	2905	5576	1474

- In general, the results presented above portray peak flow rates and total flow volumes that are less than those results presented in the July 2009 Drainage Report. Comparison of results between this report and the July 2009 report must include qualification of model assumptions utilized for each report, as summarized below.

1. The July 2009 Drainage Report was prepared to analyze the post-development drainage flows on a full graded site with no localized depressions, no detention, and to size drainage channels to convey the storm events around and through the site to avoid damage to the project infrastructure. The HEC-RAS model is the appropriate tool for this type of flow modeling. This predevelopment report was prepared to analyze existing flows on a site that contains depressions, braided washes, and alluvial fan flows. FLO-2D is the appropriate model for this type of flow. The comparison of channelized flow to overland flow will naturally create differences.

2. The July 2009 analysis included HEC-HMS modeling based on 20-foot contour-interval topography; the current report analysis includes FLO-2D modeling based on 1-foot contour-interval topography. Contour interval resolution affects watershed slope and boundary delineation, flow routing dynamics, flow concentration and flow diffusion.
3. The July 2009 analysis included HEC-HMS modeling based on Muskingum routing; the current report analysis includes FLO-2D modeling based on dynamic wave approximation. Each of these methods is appropriate for their respective modeling (channel flow versus overland flow) but they are difficult to compare because they analyze different types of flow.
4. The July 2009 Drainage Report utilized HEC-HMS modeling, a software package for sizing the post development drainage channels. It does not have the modeling capability for predicting watershed storage. The current report analysis utilizes FLO-2D modeling, a software package that includes an on-site "Watershed Storage" factor that will hold water in on-site storage when simulated hydraulic head is beneath a specific threshold. This "storage factor" results in different flow rates at the site boundary.

APPENDIX A:
100-year Existing Hydrology Flow Depth, Velocity, and Water Surface Maps



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

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

Flow Analysis Section
Center (2)
East (3)
West (1)
Flow Depth at Cell (Contour)
Model Boundary
Site Boundary
Area of Concentrated Flow*

* Area of maximum concentrated flow with water depth exceeding 0.3 feet

N

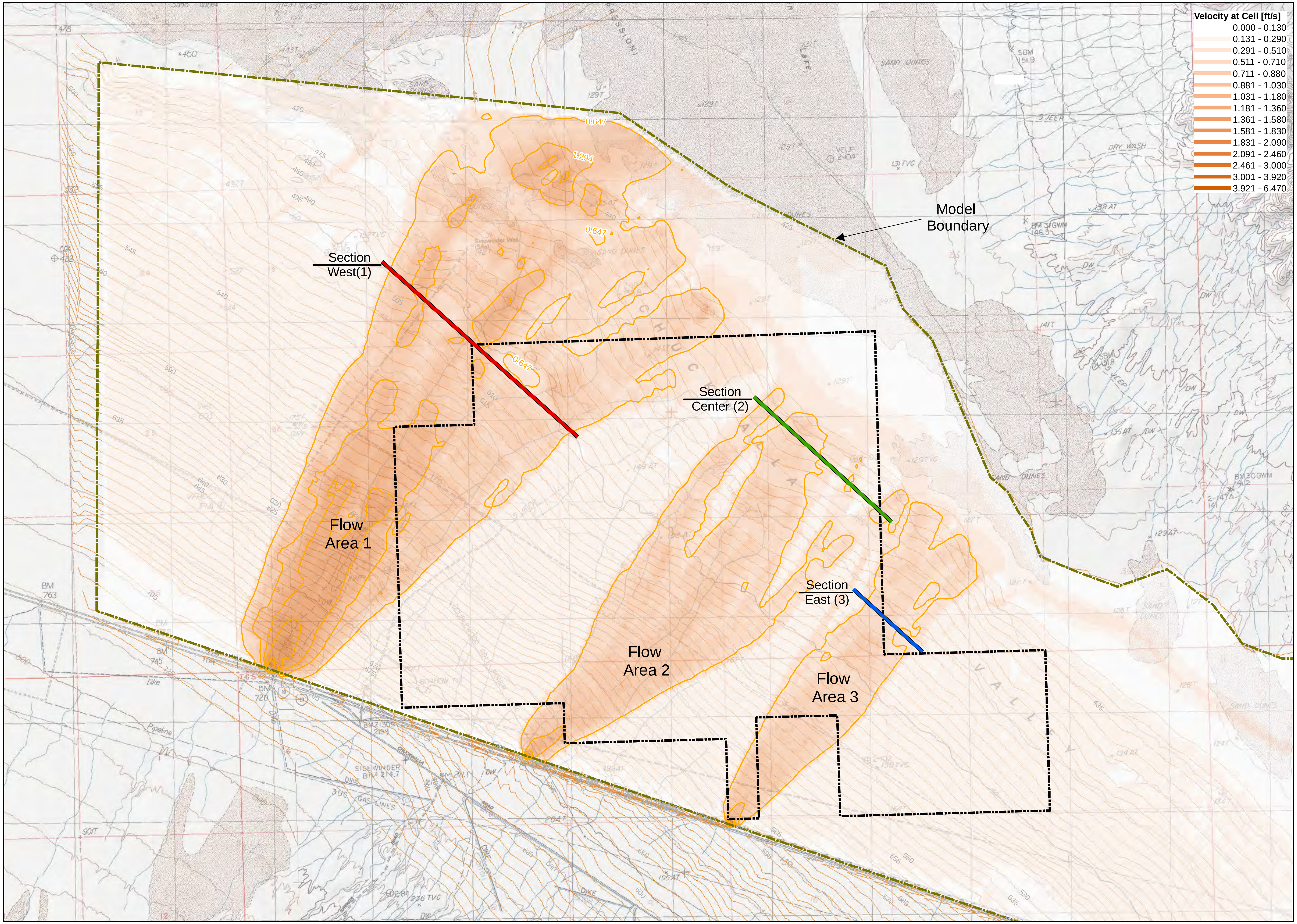
0 875 1,750 3,500 Feet

Palen Solar Power Plant

Riverside County, California

Exisiting Conditoins
100-Yr Storm
Max. Flow Depth

Date: 11/25/09
Sheet: 1 of 3



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Designed:
Checked:
Drawn:
Record Drawing by/date:
Revisions:
#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

Flow Analysis Section
- Center (2)
- East (3)
- West (1)
- Model Boundary
- Site Boundary
- Contours 5ft
- Velocity at Cell (Contour)

N

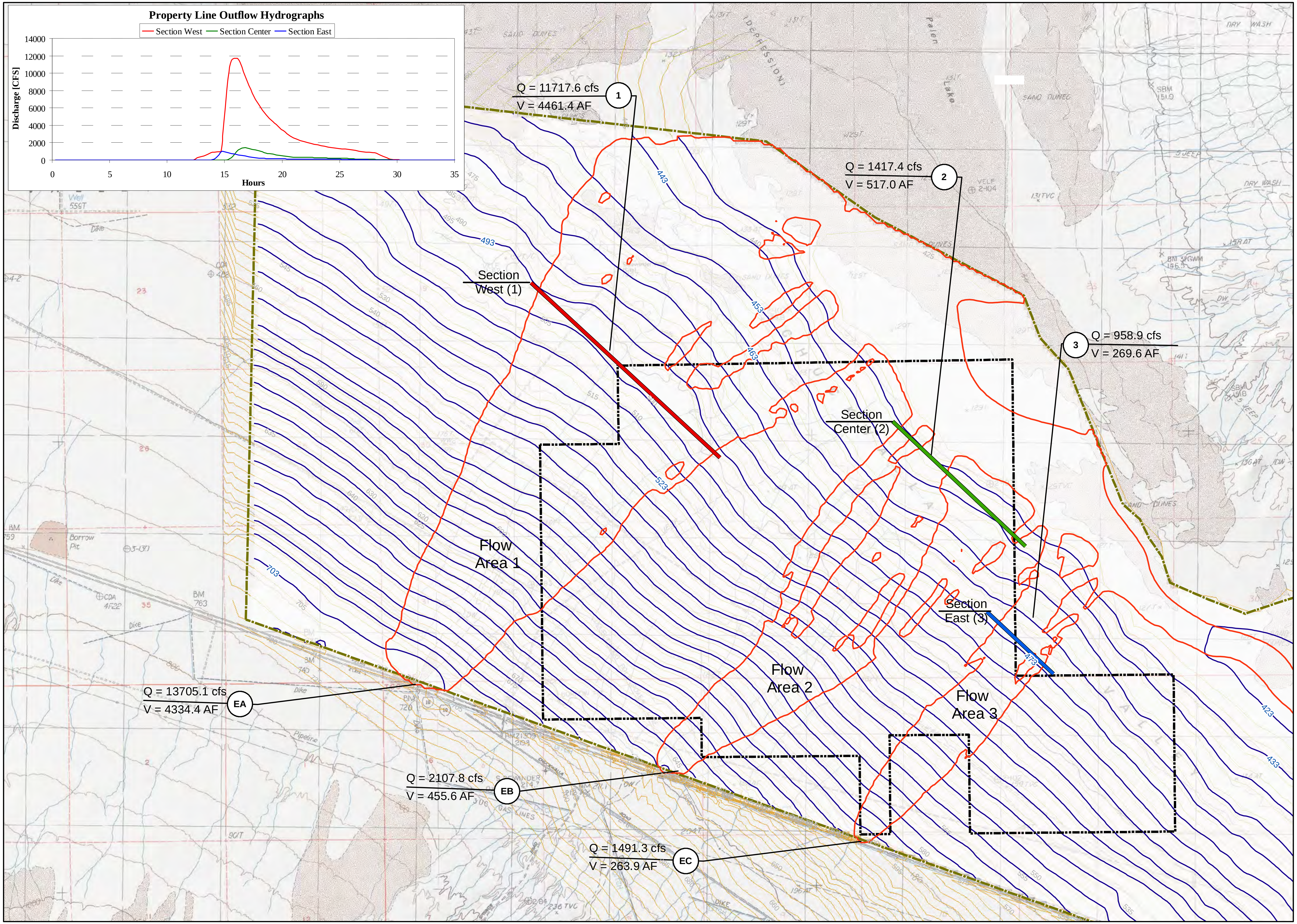
0 850 1,700 3,400 Feet

Palen Solar Power Plant

Riverside County, California

Exisiting Conditions
100-Yr Storm
Maximum Velocity

Date: 11/25/09
Sheet: 2 of 3



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Revisions:
DATE DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

Q = Peak Flow
V = Total 24-hour Volume
Flow Analysis Section
Center (2)
East (3)
West (1)
Model Boundary
Site Boundary
Max Water Elevation
Surface Contours
Area of Concentrated Flow*

* Area of maximum concentrated flow with water depth exceeding 0.3 feet

N

0 900 1,800 3,600 Feet

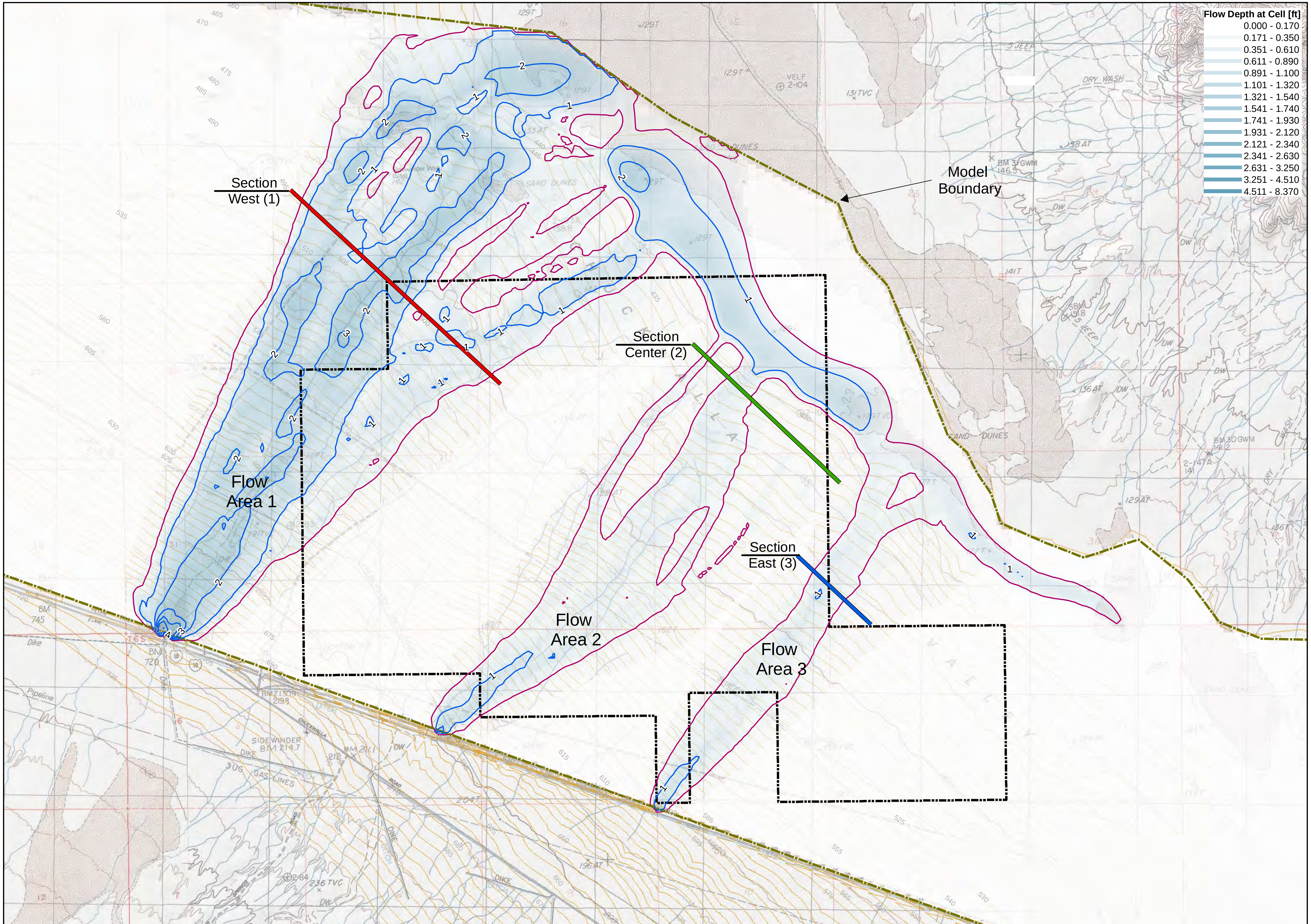
Palen Solar Power Plant

Riverside County, California

Exisiting Conditions 100-Yr Storm Max. Water Surface

Date: 11/25/09
Sheet: 3 of 3

APPENDIX B
25-year Existing Hydrology Flow Depth, Velocity, and Water Surface Maps



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999 Town & Country Road
Orange, CA 92686

www.aecom.com

Designed:

Checked:

Drawn:

Record Drawing by/date:

Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

Flow Analysis Section

Center (2)

East (3)

West (1)

Flow Depth at Cell (Contour)

Model Boundary

Site Boundary

Area of Concentrated Flow*

*** Area of maximum concentrated flow with water depth exceeding 0.3 feet**

N

0 900 1,800 3,600 Feet

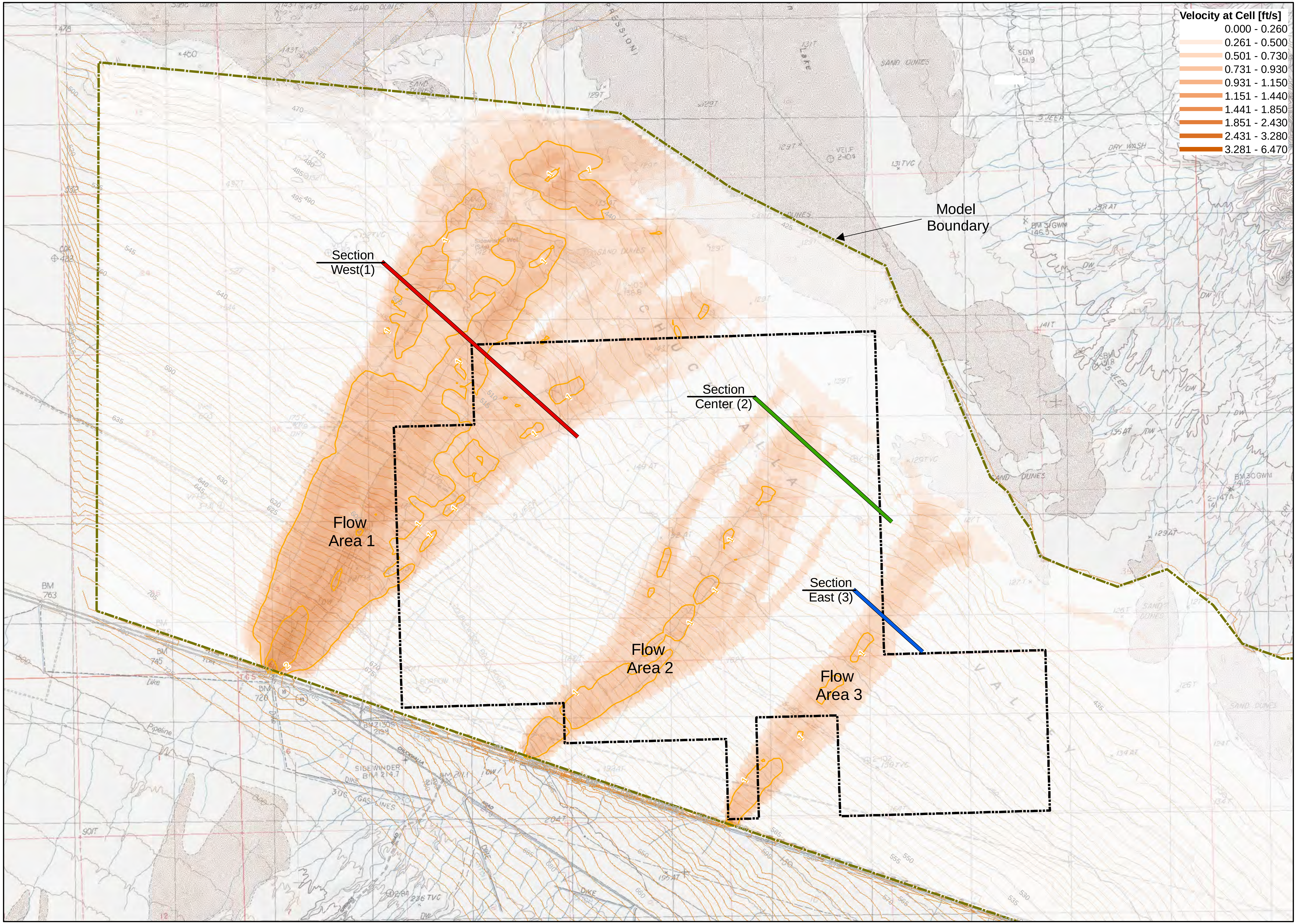
Palen Solar Power Plant

Riverside County, California

Exisiting Conditoins 25-Yr Storm Max. Flow Depth

Date: 11/25/09

Sheet: 1 of 3



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Revisions:

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Prepared for:

Solar Millennium LLC

LEGEND:

Flow Analysis Section
Center (2)
East (3)
West (1)
Model Boundary
Site Boundary
Velocity at Cell (Contour)
Contours 5ft

N

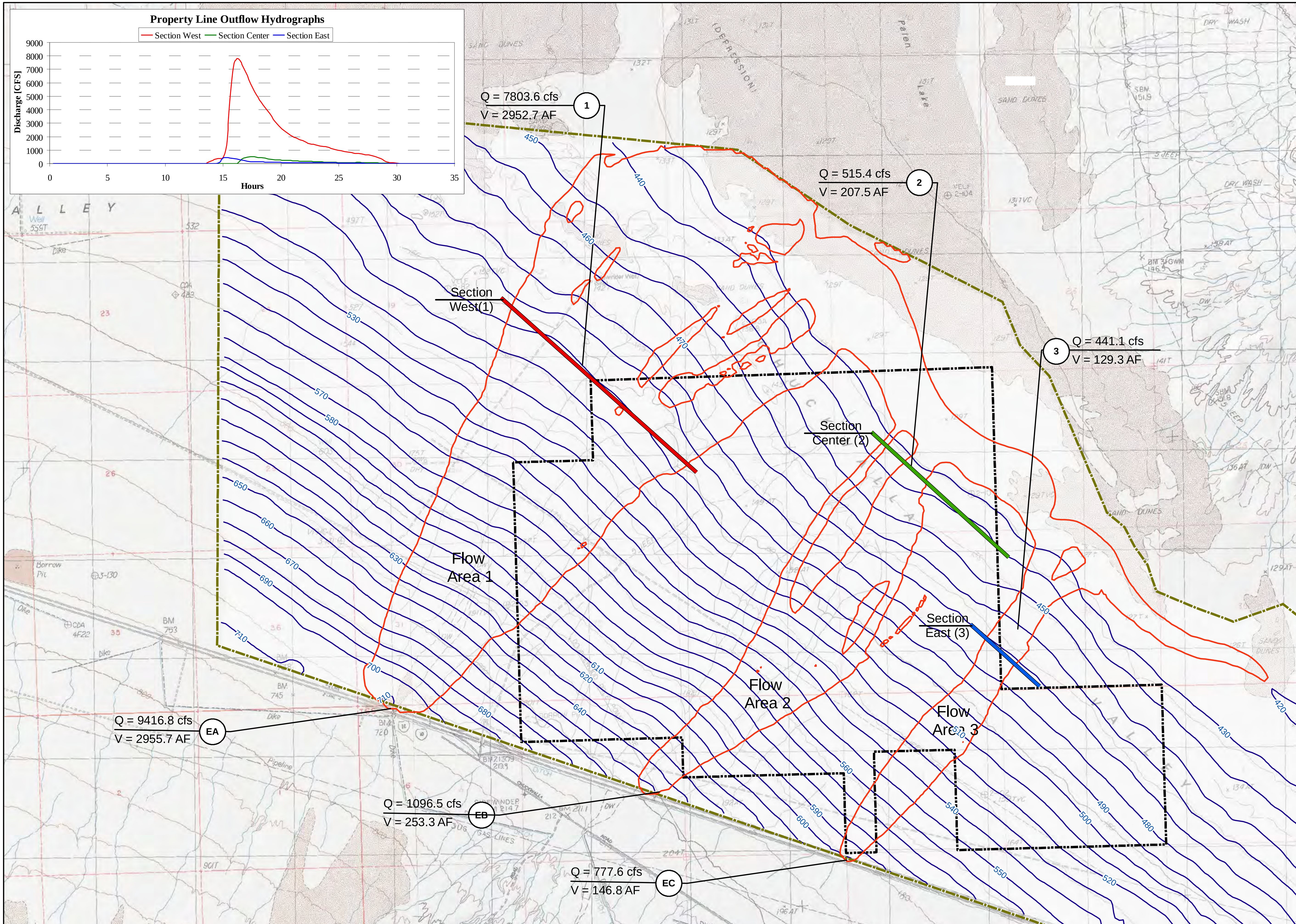
0 850 1,700 3,400 Feet

Palen Solar Power Plant

Riverside County, California

Exisiting Conditions
25-Yr Storm
Maximum Velocity

Date: 11/25/09
Sheet: 2 of 3



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Prepared for:

Solar Millennium LLC

LEGEND:

Q = Peak Flow
V = Total 24-hour Volume

Flow Analysis Section
Center (2)
East (3)
West (1)
Model Boundary
Site Boundary
Max Water Elevation
Area of Concentrated Flow*

* Area of maximum concentrated flow with water depth exceeding 0.3 feet

N

0 1,000 2,000 4,000 Feet

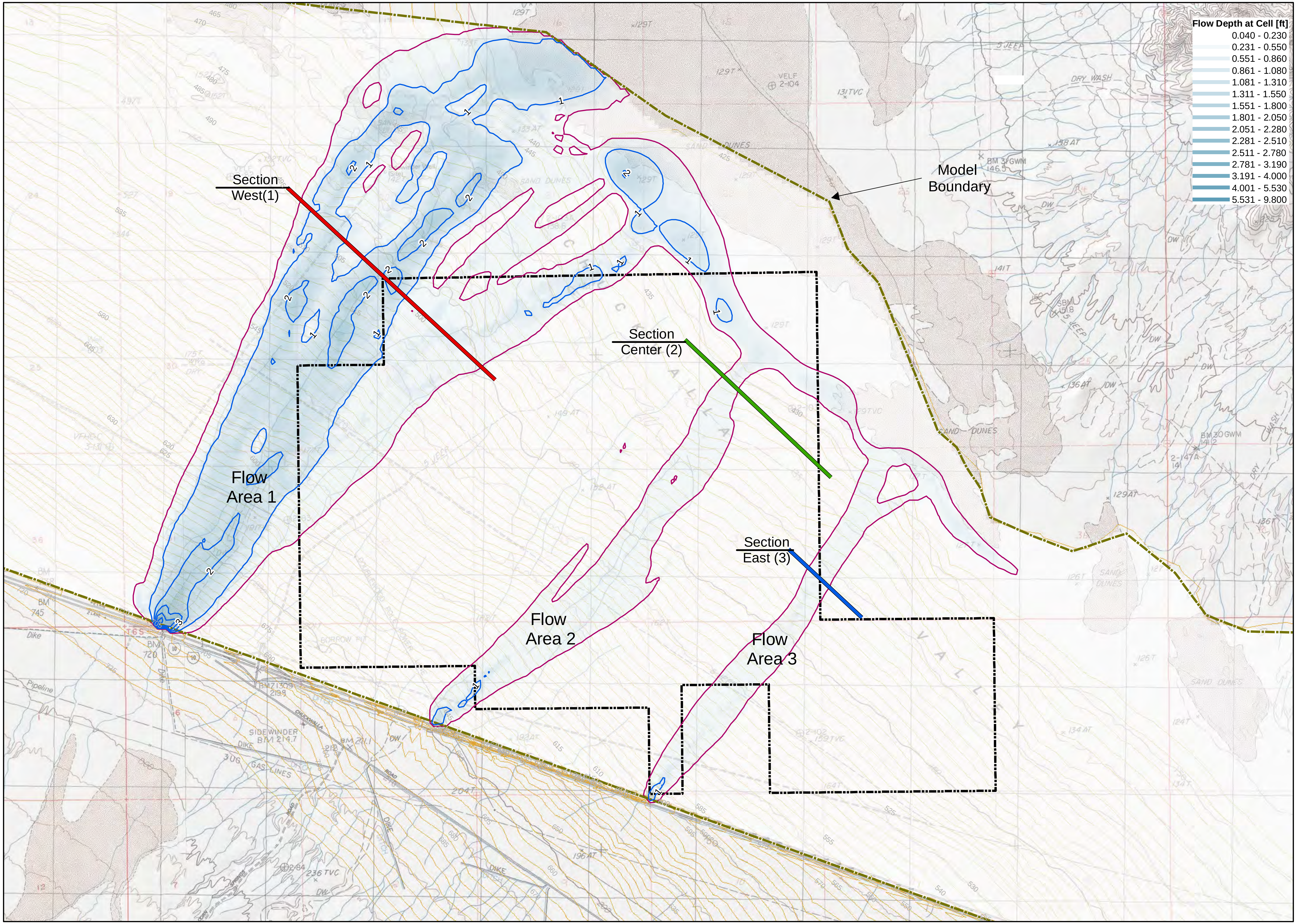
Palen Solar Power Plant

Riverside County, California

Exisiting Conditions
25-Yr Storm
Max. Water Surface

Date: 11/25/09
Sheet: 3 of 3

APPENDIX C
10-year Existing Hydrology Flow Depth, Velocity, and Water Surface Maps



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Revisions:

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Prepared for:

Solar Millennium LLC

LEGEND:

Flow Analysis Section
Center (2)
East (3)
West (1)
Flow Depth at Cell (Contour)
Model Boundary
Site Boundary
Area of Concentrated Flow*

* Area of maximum concentrated flow with water depth exceeding 0.3 feet

N

0 875 1,750 3,500 Feet

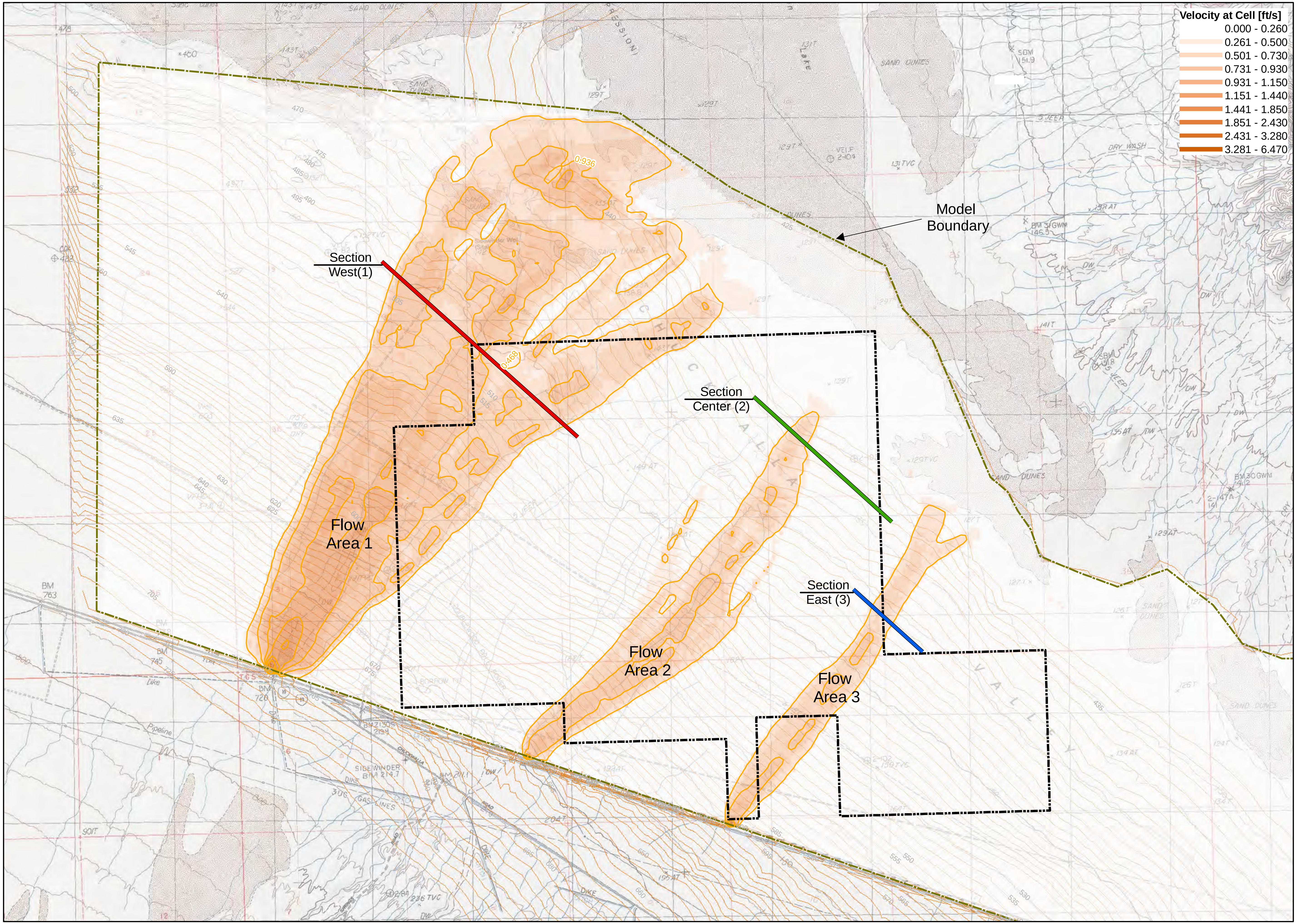
Palen Solar Power Plant

Riverside County, California

Exisiting Conditoins
10-Yr Storm
Max. Flow Depth

Date: 11/25/09

Sheet: 1 of 3



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Prepared for:

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LEGEND:

Flow Analysis Section
- Center (2)
- East (3)
- West (1)
- Model Boundary
- Site Boundary
- Contours 5ft
- Velocity at Cell (Contour)

N

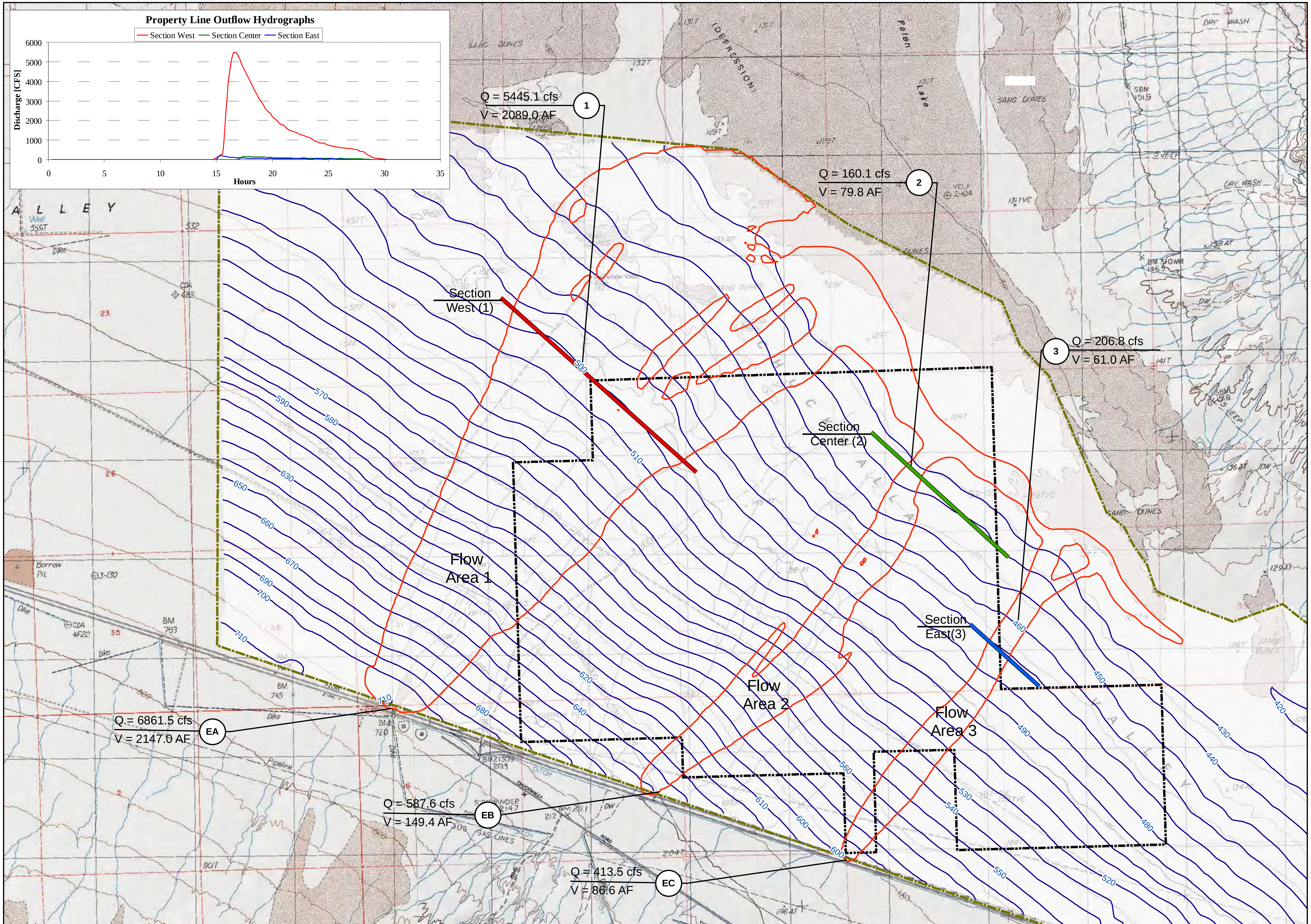
0 875 1,750 3,500 Feet

Palen Solar Power Plant

Riverside County, California

Exisiting Conditions 10-Yr Storm Maximum Velocity

Date: 11/25/09
Sheet: 2 of 3



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Revisions:

#	DATE	DESCRIPTION

Prepared for:

Solar Millennium LLC

LEGEND:

Q = Peak Flow
V = Total 24-hour Volume

Flow Analysis Section
Center (2)
East (3)
West (1)
Model Boundary
Site Boundary
Max Water Elevation
Area of Concentrated Flow*

* Area of maximum concentrated flow with water depth exceeding 0.3 feet

N

0 950 1,900 3,800 Feet

Palen Solar Power Plant

Riverside County, California

Exisiting Conditions 10-Yr Storm Max. Water Surface

Date: 11/25/09

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – [WWW.ENERGY.CA.GOV]

APPLICATION FOR CERTIFICATION FOR THE *PALEN SOLAR POWER PLANT PROJECT*

Docket No. 09-AFC-7

PROOF OF SERVICE
(Established 11/18/09)

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*indicates change

DECLARATION OF SERVICE

I, Ashley Y. Garner declare that on November 30, 2009, I served and filed copies of the attached PALEN SOLAR POWER PLANT PRE-DEVELOPMENT DRAINAGE CONDITIONS REPORT dated November 25, 2009. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: [http://www.energy.ca.gov/sitingcases/solar_millennium_palen]

The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

FOR SERVICE TO ALL OTHER PARTIES:

__X__ sent electronically to all email addresses on the Proof of Service list;

__X__ by personal delivery or by depositing in the United States mail at with first-class postage thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses NOT marked "email preferred."

AND

FOR FILING WITH THE ENERGY COMMISSION:

__X__ sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (***preferred method***);

OR

____ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-7
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct.

// Original Signed //
Ashley Y. Garner