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July 2, 2009

Tom Hurshman
Bureau of Land Management
National Project Manager
2465 South Townsend Avenue
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Re: Ivanpah Solar Electric Generating Systems (Ivanpah SEGS)
Final Memorandum - AECOM Stormwater Modeling Review

Dear Tom:

AECOM has completed the process of performing our review and evaluation of the BrightSource stormwater modeling results, as proposed in our letter on June 1. The purpose of that evaluation, as stated in the letter, was to evaluate the following:

- Stability and integrity of constructed project features such as power blocks, roads, administration buildings, and stormwater management structures (if any);
- Stability and integrity of installed heliostats and associated wiring;
- Project-caused changes in stormwater flow volume or velocity that could impact downstream areas by increasing erosion or sedimentation, which in turn could affect biological resources, the I-15 highway, and recreational uses on Ivanpah Playa.

A memorandum providing the results of our analysis is attached. We performed the modeling using the model input data (i.e. model geometry and parameters) as provided by West Yost Associates, and our process focused on revising assumptions related to infiltration rates (based on vegetation coverage and site compaction) and surface roughness to evaluate the effect of these assumptions on the overall results of the model.

The primary finding is that some number of heliostats are likely to become unstable, due to stormwater-related scour, during the lifetime of the project. This result was identified not only in AECOM's analysis, but in a review of the original West Yost results as well. The primary difference between the West Yost and the AECOM results is in the magnitude and extent of the potential problem. The West Yost results indicate that more than 12,000 heliostats could become unstable in a 100-year storm, while the AECOM results indicate that the number could exceed 18,000.

This conclusion (potential heliostat instability) has been developed only through an evaluation of local scour (i.e. not accounting for general scour and long-term aggradation/degradation) on each individual heliostat. Other factors such as migration of individual channels and interaction of a single damaged heliostat upon adjacent heliostats (either through direct strikes or pulling on wires strung between heliostats) could result in a higher number of unstable heliostats.

Aside from the concern associated with damaged heliostats, we generally find that the proposed Low Impact Development (LID) method allows the facility to be constructed and operated without a significant change in stormwater and sedimentation in areas downstream of the facility. Although we ran the model with an assumption that the proposed LID development would result in widespread compaction and loss of vegetation, these effects did not substantially affect downstream flow impacts. This is largely due to the fact that the increased volume of runoff due to site development is very small compared to the overall volume of stormwater reaching the site from upstream sources. Similarly, although site disturbance and increased velocities would appear to suggest increased erosion on the site, the stormwater reaching the site will be largely saturated with sediment anyway, so additional erosion is not expected to be significant. In addition, increased stormwater velocities on the site are somewhat mitigated once the flow reaches the undisturbed areas downstream of the facility.

We look forward to continuing to support BLM's assessment of the impact of the proposed project on hydrologic conditions. If you have any questions, please contact me at 864-918-2892.

Sincerely,

Robert Dover
Project Manager

xc: George Meckfessel, BLM Needles Field Office
Ken Downing, BLM Needles Field Office
Serkan Mahmutoglu, AECOM

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TECHNICAL MEMORANDUM

Date: July 2, 2009
To: Bob Dover (AECOM)
From: Serkan Mahmutoglu (AECOM)
Subject: Stormwater Runoff and Sediment Transport Sensitivity Analysis- Ivanpah Solar Electric Generating System (ISEGS)

Executive Summary

The following memorandum presents the results of the review and sensitivity testing of the modeling approach used by West Yost Associates Consulting Engineers regarding the "Stormwater Runoff and Sediment Transport Ivanpah Valley, California" report submitted to BrightSourceEnergy, Inc (BSE) on May 15, 2009. The goal of this exercise was to increase the confidence level of the predictions by employing literature-based assumptions where adequate site specific data is not available.

This memo focused on answering the following two questions from an environmental impact perspective:

Can the design handle a 100-year storm (i.e. convey the 100-year flows without causing significant structural failures and resulting impact)?
What are the changes caused by the project on the hydrologic, hydraulic, water quality and sediment transport characteristics of the site?

The results of the sensitivity analysis indicate that during 100-year storm, a significant number (i.e. more than 13,000) of heliostats (i.e., structures that track the movement of the sun) could be damaged due to scour. This could lead to a significant amount of debris. The debris could cause other problems, like causing additional, downstream heliostats to fail and accumulate, forming a dam, etc. In addition to damage to heliostats, damage to other structures such as roads, culverts, and buildings is also expected. As such, scour is a significant concern.

The results indicate the hydrology within the site will change due to the project. The project's effects to onsite ground and vegetation conditions would result in a higher rate of stormwater runoff than the pre-developed condition (9% increase in runoff volume and 1% increase in peak flows). The effects of this anticipated increase in runoff and sediment transport are not as significant as the anticipated scour concerns. This is due to the large

watershed area compared to the project area. Although the increase in runoff volume and peak flow rates is inconsistent with San Bernardino County's design criteria, BLM and CEC appreciate that addressing the increases by physical disruption of the natural stormwater and sediment transport through the site by implementing normal Best Management Practices, such as stormwater detention basins, could create additional challenges and impacts. Therefore, CEC and BLM plan to explore mitigation options that would also consider local effects of the increased stormwater discharge rates.

Introduction

BSE has proposed a 400 megawatt solar electric generating system project in the Eastern Mojave Dessert, Ivanpah Valley, San Bernardino County, California. The ISEGS proposed project site occupies 6.25 square miles with three individual power plants: Ivanpah 1, Ivanpah 2, and Ivanpah 3. The stormwater analysis performed by West Yost Associates Consulting Engineers investigated stormwater processes.

Hydrologic Setting

The site is located within Ivanpah Valley in San Bernardino County California. The surface water drainage from the valley evaporates on the Ivanpah Dry Lake. The location of the proposed ISEGS site is located on an alluvial fan. The site has steep slopes running towards the downstream Ivanpah Dry Lake, located on the east side of the site. The stormwater flow experienced at the site originates in the surrounding mountain watershed and adjacent alluvial fan.

Methodology

Two significant parameters were identified that have significant impact on sensitivity of the model results and associated hydrologic and hydraulic predictions: 1) Roughness and 2) Runoff.

Roughness parameter, in this case Manning's n, was used by the Flo-2D model developed by BSE in calculation of velocities and depths by routing rainfall.

BSE calculated rainfall runoff using SCS curve number (CN) methodology using HEC-1 model for upstream runoff (i.e. inflow into the project site) and using Flo-2D model to calculate runoff within the project site.

There are other parameters that also may have significant impact on the solution (e.g. the type of sediment transport equation that was used, model grid element dimensions, etc.) that could not have been analyzed during the time frame that was available for this exercise. Although the degree of sensitivity associated with these parameters is unknown, their impact in this specific project is expected to be less significant than Manning's n and CN.

Both, Manning's n and CN, parameters were used in sensitivity analysis and are discussed in detail in the following sections.

Manning's Roughness Coefficient

Manning's roughness coefficients were calculated using the USGS Water-supply Paper 2339 entitled "Guide for Selecting Manning's Roughness Coefficients." The guide combines a base value for roughness, categorized by soil bed material, with five adjustment values that affect roughness. The adjustment values include: degree of irregularity, variation in channel cross section, effect of obstruction, amount of vegetation, and degree of meandering. Adjustment values are given independently for channels and floodplains.

Values chosen were estimated based on the conditions of the ISEGS proposed project site. A base value of 0.026 was used for both the channel and floodplain calculations. This number assumes a sand bed material with a median grain size of 1.0 millimeter.

Each adjustment has a range of values representing various conditions. For example, the degree of irregularity conditions can be described as: smooth, minor, moderate or severe. Table 1 and Table 2 show each adjustment type, the condition that applies to the ISEGS site, a range for that given condition and a description of the condition. For the purpose of this sensitivity evaluation, Manning's values were calculated with the base added to each high range value, and also the base plus each low range value.

Adjustment values for the channel and floodplain are shown below in Table 1 and Table 2, respectively.

The formula used for calculating roughness using the above adjustment factors can be found in Table 3; as well as the calculations for high and low range values for channels and floodplains.

Equation (1). Total Manning's n Roughness

$$n=(n_b+n_1+n_2+n_3+n_4)m$$

Scour and flooding are two different design scenarios. While flood design requires higher roughness values for conservative estimates of water level, scour design requires lower roughness values resulting in lower water levels but higher velocities. It appears that the analysis conducted by BSE focused on flooding, and therefore roughness values used by BSE were selected on that basis. Therefore, the sensitivity analysis focused on the velocity design, which is the critical scenario for scour. In order to obtain conservative results indicating impact of the project, roughness values were adjusted by modifying the degree of irregularity, effect of obstruction and amount of vegetation. The base value for existing and proposed conditions was kept the same. These high and low range values were applied to the model used to determine the worst-case impact scenario. For this model, the low range roughness values were applied to the channels and floodplain within the project area representing proposed conditions, and high roughness values were applied to the remaining area. This is a conservative approach because the low range values represent the adjustments made to the site (removal of vegetation and some grading) and the high range values are representative of the existing conditions. Higher range values shown in Table 3 are close to the values that were used in the BSE analysis.

Table 1. Channel Adjustment Values for Manning's Coefficient

Adjustment Type	Conditions	Adjustment Range	Description
Degree of Irregularity (n1)	Minor	0.001-0.005	Good condition, carefully degraded and slightly eroded or scoured side slopes
Variation in Channel Cross Section (n2)	Gradual	0.000	Gradual change in size and slope
Effect of Obstruction (n3)	Negligible	0.000-0.004	Few scattered obstructions
Amount of Vegetation (n4)	Small	0.002-0.010	Average depth of flow is at least two times the vegetation height
Degree of Meandering (m)	Minor	1.00	Ratio of channel length to valley length

Table 2. Floodplain Adjustment Values for Manning's Coefficient

Adjustment Type	Conditions	Adjustment Range	Description
Degree of Irregularity (n1)	Severe	0.011-0.020	Very irregular in shape
Variation in Channel Cross Section (n2)	NA	0.000	Not applicable
Effect of Obstruction (n3)	Minor	0.005-0.015	Few scattered obstructions
Amount of Vegetation (n4)	Small	0.001-0.010	Average depth of flow is at least two times the vegetation height
Degree of Meandering (m)	NA	1.00	Not applicable

Table 3. Manning's Roughness Coefficient Calculations

		Channel		Floodplain	
Variable	Description	Low	High	Low	High
n_b	Base roughness value	0.026	0.026	0.026	0.026
n_1	Degree of Irregularity	0.001	0.005	0.011	0.02
n_2	Variation in Channel Cross Section	0	0	NA	NA
n_3	Effect of Obstruction	0	0.004	0.005	0.015
n_4	Amount of Vegetation	0.002	0.01	0.001	0.01
m	Degree of Meandering	1	1	1	1
total n		0.029	0.045	0.043	0.071

SCS Runoff Curve Number

The SCS Curve Number (CN) Method was used by BSE to calculate runoff values for the Ivanpah Solar Energy Project. Curve number standards were followed as stated in the USDA Technical Release 55 entitled “Urban Hydrology for Small Watersheds”. High curve numbers represent a high runoff potential and, inversely, lower curve numbers have low runoff potential. The factors that affect curve numbers are hydrologic soil group, cover type, treatment, hydrologic condition and antecedent moisture condition.

The San Bernardino County Hydrology Manual addresses the local characteristics of the project area in relation to the SCS CN Method. Section C.5 specifically addresses AMC values regarding different storm periods. The manual states that AMC III shall be used for 100-year storm analysis and a table for adjustment from AMC II to AMC III is shown in Table 5. A rainfall analysis clearly establishing grounds for deviating from the County Manual was not available during the sensitivity analysis, and therefore, only AMC III was considered for the sensitivity analysis. The CN values used for the 100-year storm analysis by BSE were found to have an AMC of II. For sensitivity testing, all AMC values including HEC-1 and Flo-2D models were adjusted to condition III.

Two primary changes in runoff characteristics caused by the project are:

Loss of vegetation; and
Increased imperviousness (e.g. soil compaction, construction of buildings/roads, etc.)

Loss of vegetation

The hydrologic soil groups (HSG) within Ivanpah Valley were categorized by the San Bernardino County Hydrology Manual. Soil groups are classified based on their minimum infiltration rate and are rated A, B, C or D. Table 2-2d from the TR-55 manual (cited above) is used for arid and semiarid rangelands. The cover type chosen to represent the project area is desert shrub. Curve numbers are given in the table for poor, fair and good hydrologic condition, and are shown in Table 4. Treatment is associated with different types of agricultural properties and is not applicable for this project. Hydrologic condition is an indicator for cover type and treatment. The “good” condition is usually associated with a lower runoff potential and “poor” has higher potential. Antecedent moisture condition is related to the runoff potential before precipitation begins. The curve numbers (CN) provided in the TR-55 manual have an antecedent moisture condition (AMC) of II.

For the existing site analysis, “fair” hydrologic conditions were used and for proposed analysis, “poor” hydrologic conditions were used to define the CN values. This accounts for the vegetation that would be removed/damaged during construction. To further account for the loss of vegetation in the proposed conditions, a precipitation abstraction value of 0.1 feet was used for the *existing* conditions, and 0.01 was used for the *proposed* conditions. This accounts for the loss of vegetation interception.

Table 4. TR-55 Table 2-2d

Table 2-2d Runoff curve numbers for arid and semiarid rangelands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition [2]	A [3]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

1 Average runoff condition, and I_a, = 0.2S. For range in humid regions, use table 2-2c.
2 Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: > 70% ground cover.
3 Curve numbers for group A have been developed only for desert shrub.

Table 5. San Bernardino County Hydrology Manual Table C.1

TABLE C.1. CURVE NUMBER RELATIONSHIPS

CN for AMC Condition II	Corresponding CN for AMC Condition I	III
100	100	100
95	87	99
90	78	98
85	70	97
80	63	94
75	57	91
70	51	87
65	45	83
60	40	79
55	35	75
50	31	70
45	27	65
40	23	60
35	19	55
30	15	50
25	12	45
20	9	39
15	7	33
10	4	26
5	2	17
0	0	0

Increased imperviousness

A value of 85 was initially used to represent the power blocks and substations. This value was adjusted to 98 to represent an impervious area. Within the project area of the proposed sensitivity analysis, a combination of impervious conditions was blended with the base curve number for the site. This combination represents the impact of the access roads and heliostats on infiltration. Essentially, 19% of each heliostat field was assumed to be impervious by using the BSE-proposed configurations for access roads, and assuming complete compaction across each 10 foot wide access roads. There are other factors that may be changing runoff characteristics (e.g. use of soil binders, soil compaction/disturbance due to expected inefficiencies during construction and operation, modification of direct rainfall by the presence of mirrors, etc.); however, the impervious area ratio seems to be realistic, yet conservative.

The following table summarizes the curve numbers that were used for sensitivity analysis of both the existing and proposed conditions. Values in parenthesis indicate CN associated with areas outside of the project site.

Table 6. Existing and Proposed Condition Curve Numbers

Case	Desert Shrub Cover	Hydrologic Soil Group			
		A	B	C	D
Existing Condition	Fair	75 (75)	NA (89)	NA	NA (97)
Proposed Condition	Poor	84* (75)	NA (89)	NA	NA (97)

*Adjusted for increased imperviousness using an area ratio as shown below:

Project Site	CN	Blended CN
19% impervious area	98	84
81% HSG A (poor)	81	

Scour Analysis

There are three major components of scour: 1) local scour, which takes place in the immediate vicinity of a structure primarily due to horseshoe vortex, 2) general scour, which is the scour caused by larger scale phenomenon like contraction of the conveyance area by roadway embankments, and 3) long-term aggradation/degradation, which is the lateral and vertical stability of the channel bed.

For the purposes of this sensitivity analysis, only the local scour was calculated. Other components of the scour should also be considered by BSE. Scour analysis was performed using a local pier scour equation from the fourth edition of “Evaluating Scour at Bridges” issued by the Federal Highway Administration. Output values from the proposed condition Flo-2D models for velocity and depth were used for these scour calculations. Scour was calculated individually for each element in the model within the project area. It should be noted that the velocities predicted by the model are values averaged across the entire element (i.e. 200 feet by 200 feet area). In reality, velocities would be concentrated at certain portions of that element, and no safety factor was applied to these velocities. In other words, the scour depths could be higher and may result in the failure of more heliostats than what is predicted by the sensitivity analysis.

The equation as given in the above reference, as well as the values used, are shown below.

Equation (2). Scour around simple piers

$y_s/a = 2.0K_1K_2K_3K_4(y1/a)^{0.35}Fr_1^{0.43}$

Where:

K_1 = Correction Factor for Pier Nose Shape	(1.0 for Circular Cylinder)
K_2 = Correction Factor for Angle of Attack of Flow	(1.0 for Circular Cylinder)
K_3 = Correction Factor for Bed Condition	(1.3 for Large Dunes)
K_4 = Correction Factor for Armoring	(1.0 for D_{50} < 2mm)
a = Pier Width	(6.5 inches)
y1 = flow depth	(taken from model results)
Fr_1 = Froude no. (function of flow depth/velocity)	(calculated using model results)
y_s = scour depth	

Scour input values are determined using velocity and depth which are outputs from the model. The scour values were used to determine the number of heliostats that could potentially be damaged. The potential number of heliostats damaged is reported within a range, based on the number of heliostats to be installed at the site (i.e. 214,000 to 280,000).

Channel elements do not occupy the entire 200 foot by 200 foot cell. To ensure that a single grid element is not duplicated as critical scour value for both the floodplain and channel, the critical channel values that paired with a critical floodplain element were excluded. The number of heliostats located in an element containing channel (that were not also associated with a critical floodplain element) was reduced to 15 percent of total number of heliostats located in an element. This is due to the channel width to grid element width ratio.

Results

The values reported in Table 8 regarding the affected heliostats are reported as a total of floodplain and channel, with “channel only” values in parenthesis. Presently, per BSE’s design, the pylons that have been designed for the heliostat arrays can withstand a scour of up to two feet. This value was exceeded in many cells within the project area. This shows that there are a large number of heliostats that could fail due to scour during a 100-year event. In addition to the calculation results from AECOM’s calculations, Table 8 presents a summary of the number of heliostats that could potentially fail based on the calculations performed by West Yost.

Table 7 is a summary of the results from the conservative analysis performed by adjusting values for manning’s coefficient and curve number. The Manning’s n coefficient and Curve Numbers were adjusted as discussed in the above sections. The resulting model outputs for proposed and existing conditions were analyzed in comparison. It appears that the increase in runoff volume and peak flow does not result in an impact that is as significant as the scour issue.

Table 7. Impact on Runoff Volume and Peak

Runoff Volume	Existing	(acre-feet)	4242
	Proposed	(acre-feet)	4637
	Increase	(acre-feet)	394
	Increase	%	9%*
Peak Flow	Existing	(cfs)	18939
	Proposed	(cfs)	19204
	Increase	(cfs)	266
	Increase	%	1%*

*Averaged over entire project site. Increases in individual channels are higher.

Table 8. Scour at Heliostats

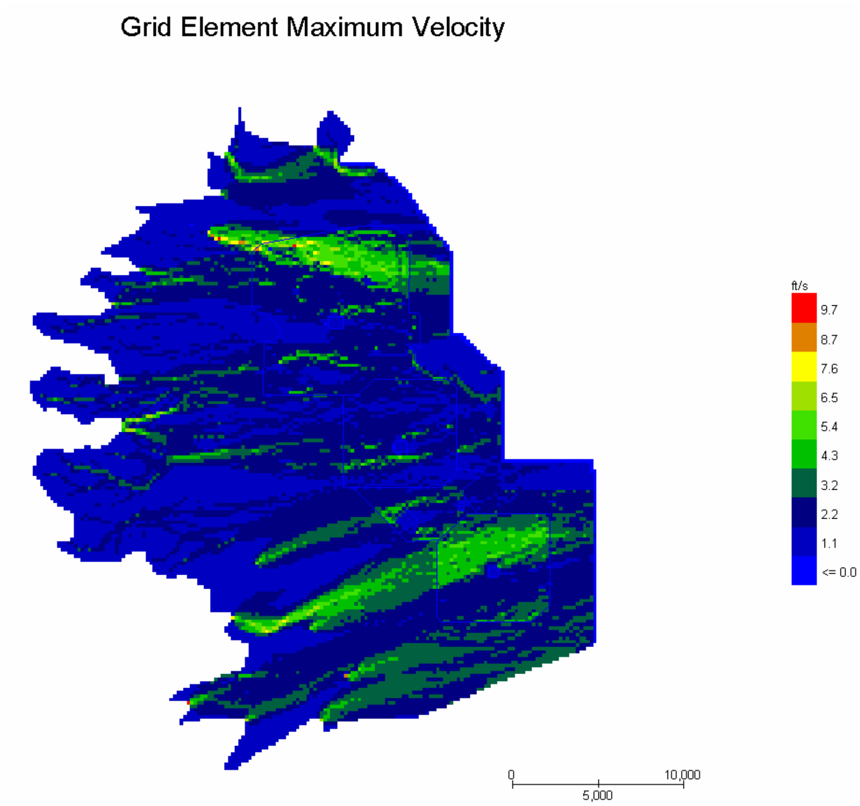
Condition	Max Velocity Flood Plain	Max Velocity Channel	Heliostats Potentially Failing: % of total heliostats	Heliostats Potentially Failing: # of heliostats installed 214000	Heliostats Potentially Failing: # of heliostats installed 280000
Existing	7	14			
Proposed	9	25	6% (1%)	13889 (2902)	18172 (3797)
West Yost Most Likely Case	5.9	26.6	2% (1%)	3934 (2436)	4260 (2300)
West Yost Worst Case	8.0	25.5	4% (1%)	10250 (3188)	12249 (3009)

Figure 1 and Figure 2 show the existing and proposed conditions floodplain velocity and floodplain flow depth, and Figure 3 and Figure 4 show the existing and proposed conditions floodplain flow depth, respectively. Figure 3 and Figure 4 show the change in velocity and depth, respectively. Positive numbers indicate an increase in velocity or depth due to proposed conditions.

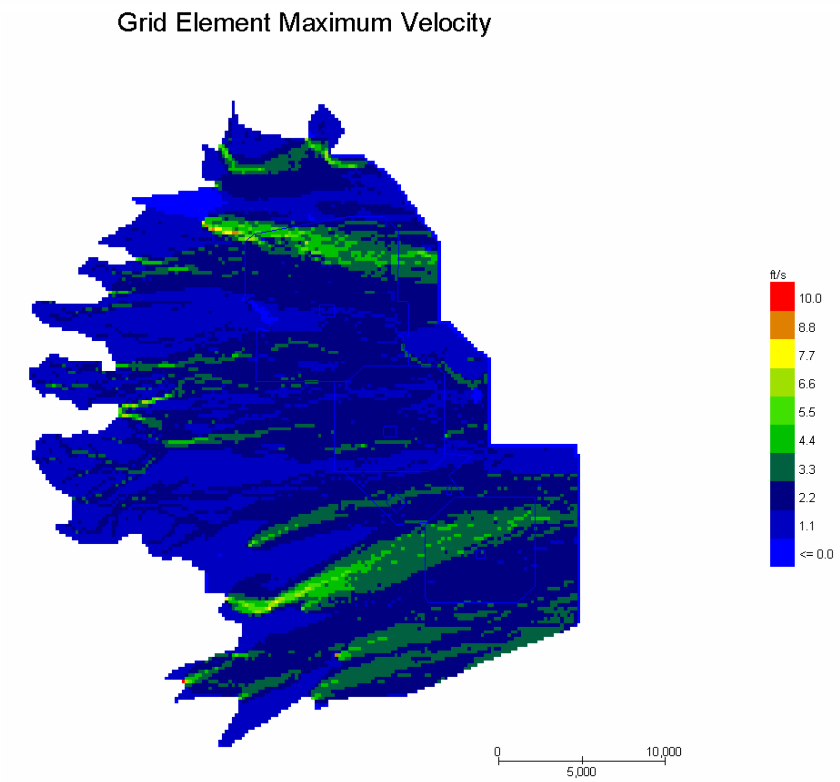
The results of this conservative analysis suggest that further consideration will be necessary for stormwater runoff protection. In the event of a 100-year storm the Ivanpah Solar Energy System would suffer significant damage as designed causing significant environmental impact potential.

In addition to the 100-year storm, 10-year storm was also considered in order to understand the impact associated with more frequent storms. The results for the 10-year storm are included in Appendix A.

Figure 1. Floodplain Velocity (Existing and Proposed)

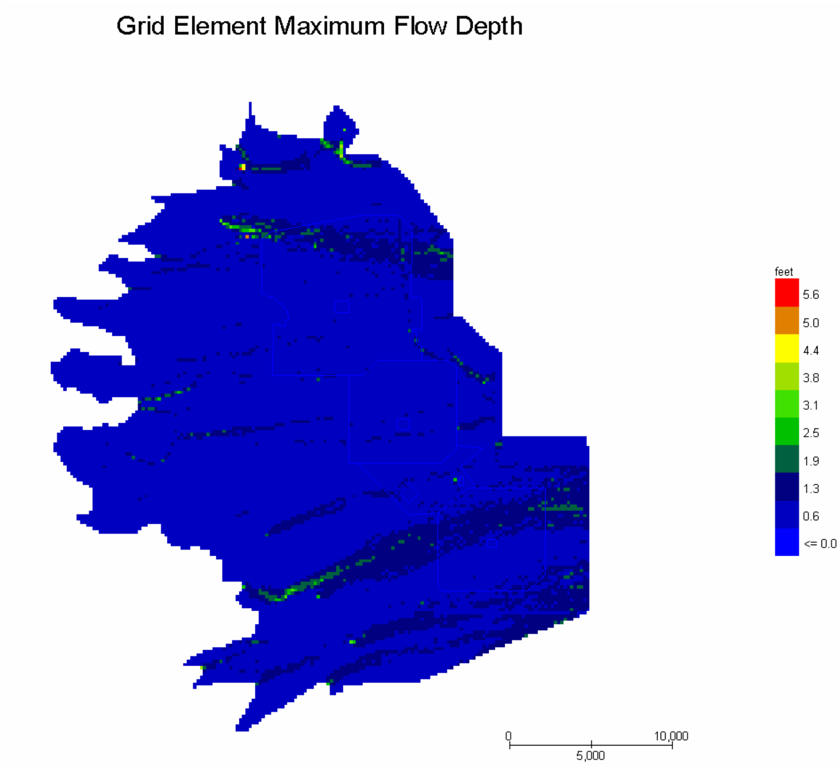


Existing

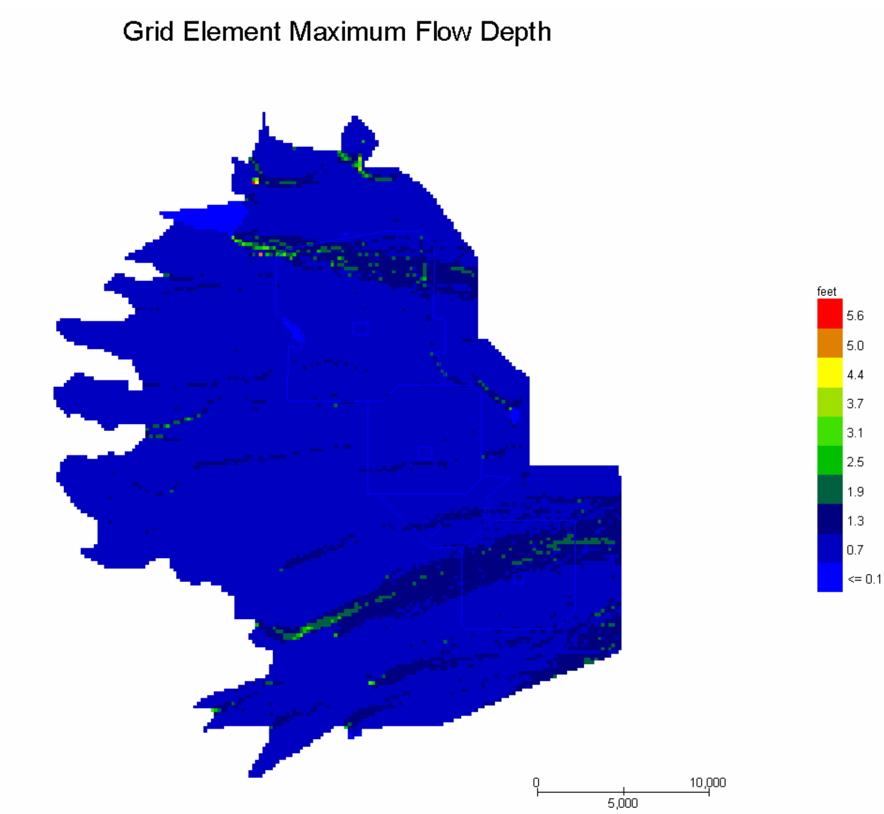


Proposed

Figure 2. Floodplain Flow Depth (Existing and Proposed)



Existing



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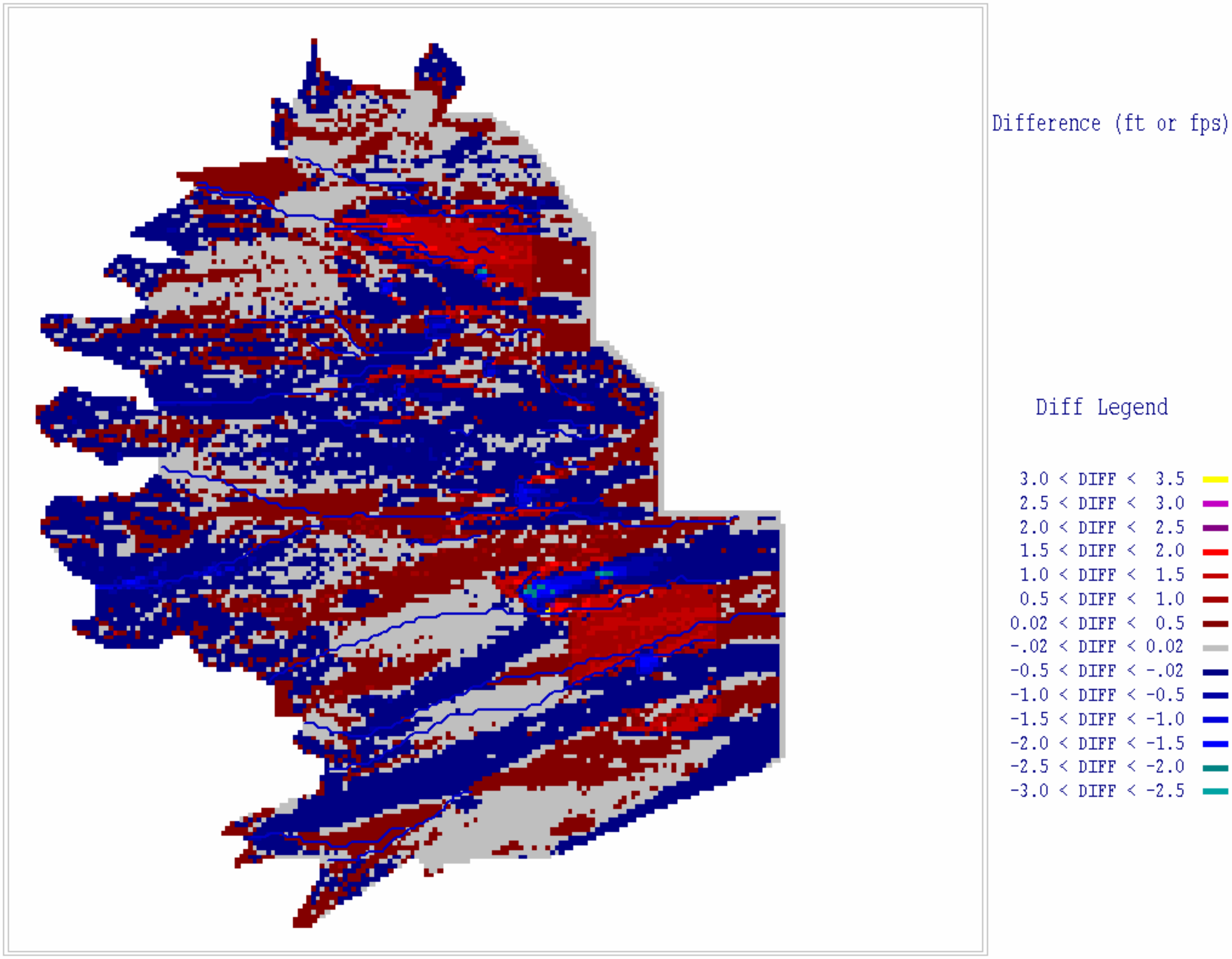


Figure 3. Change in Velocity on the Floodplain (Proposed vs. Existing)

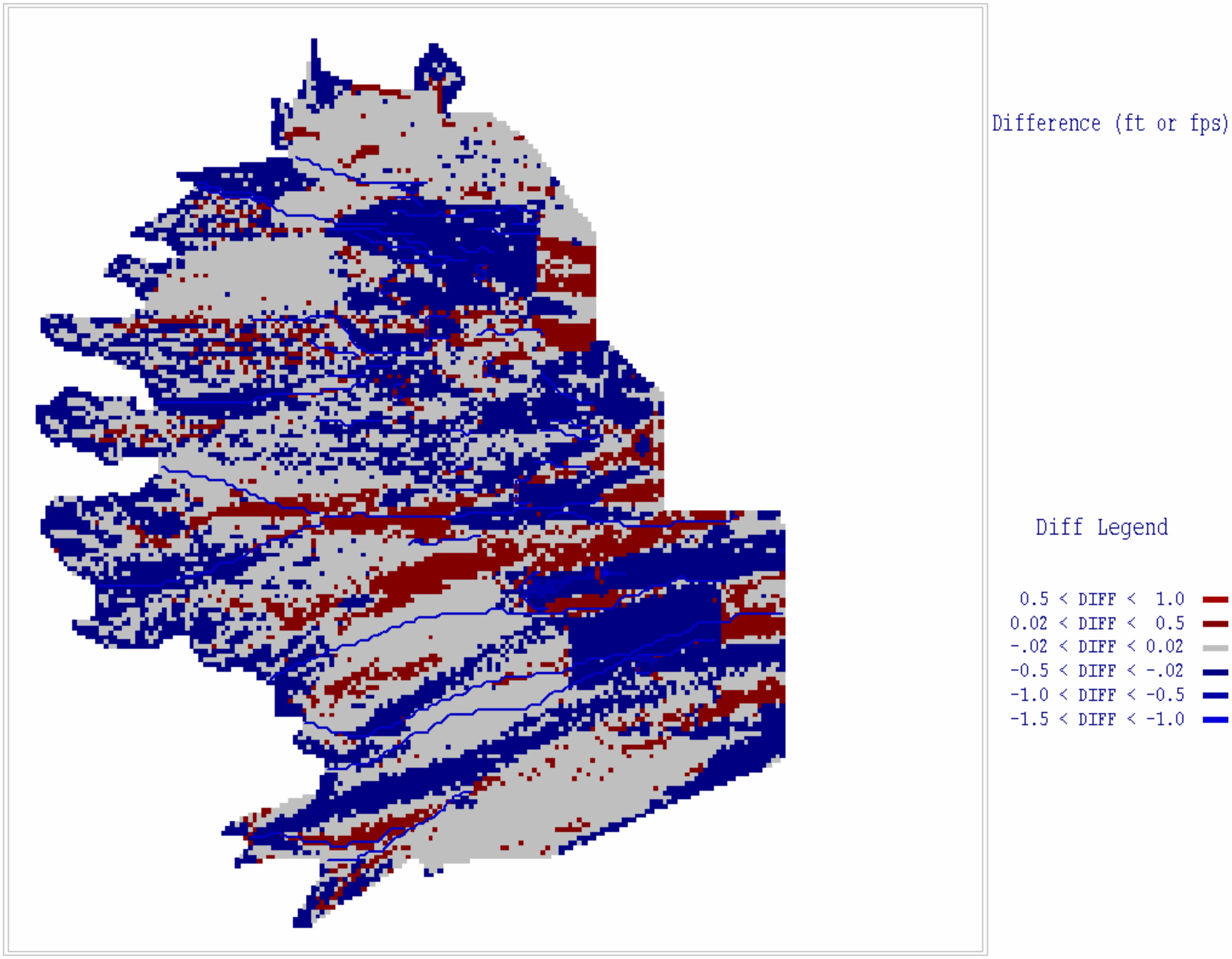


Figure 4. Change in Flow Depth on the Floodplain (Proposed vs. Existing)

References

Arcement, G.J., Jr., Schneider, V.R., USGS “Guide for Selecting Manning’s Roughness Coefficients for Natural Channels and Flood Plains.” United States Geological Survey Water-Supply Paper 2339. accessed from: http://www.fhwa.dot.gov/bridge/wsp2339.pdf on June 10, 2009

“Urban Hydrology for Small Watersheds,” United States Department of Agriculture. Technical Release 55. June 1986.

Hromadka, T.V. “San Bernardino County Hydrology Manual.” William and Schmid, Civil Engineers. Irvine, California. August 1986

Richardson, E.V., Davis, S.R. Evaluating Scour At Bridges Fourth Edition. Federal Highway Administration. May 2001.

“Stormwater Runoff and Sediment Transport Ivanpah Valley, California. “ West Yost Associates. May 15, 2009.

Appendix A. 10-year Storm Results

The Manning's roughness coefficient values for the ten year storm event analysis are the same as the one-hundred year analysis. Same methodology was used to calculate CN values. Curve numbers were adjusted to "fair" vegetation cover for HEC-1 and for Flo-2D existing conditions. For the proposed conditions "poor" conditions were used inside the project area.

The SCS Curve Numbers for the ten year event do not need to be adjusted to AMC III. The San Bernardino County Hydrology Manual states the following "For the case of 10-, 25-, 50-year return frequency design storms, AMC II will be used." Therefore, the curve numbers were not adjusted to AMC III.

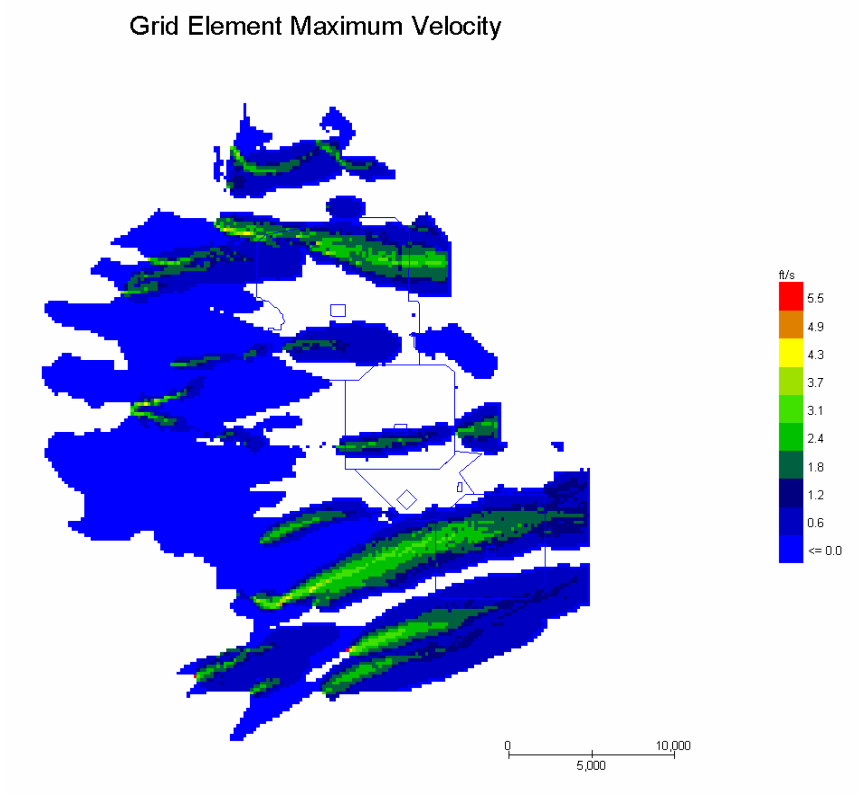
The impact on runoff is shown in Table 9, local scour at heliostats are shown in Table 10, floodplain velocities are shown in Figure 5, floodplain flow depths are shown in Figure 6, change in velocity on the floodplain is shown in Figure 7, and change in flow depth is shown in Figure 8.

Table 9. Impact on Runoff Volume and Peak

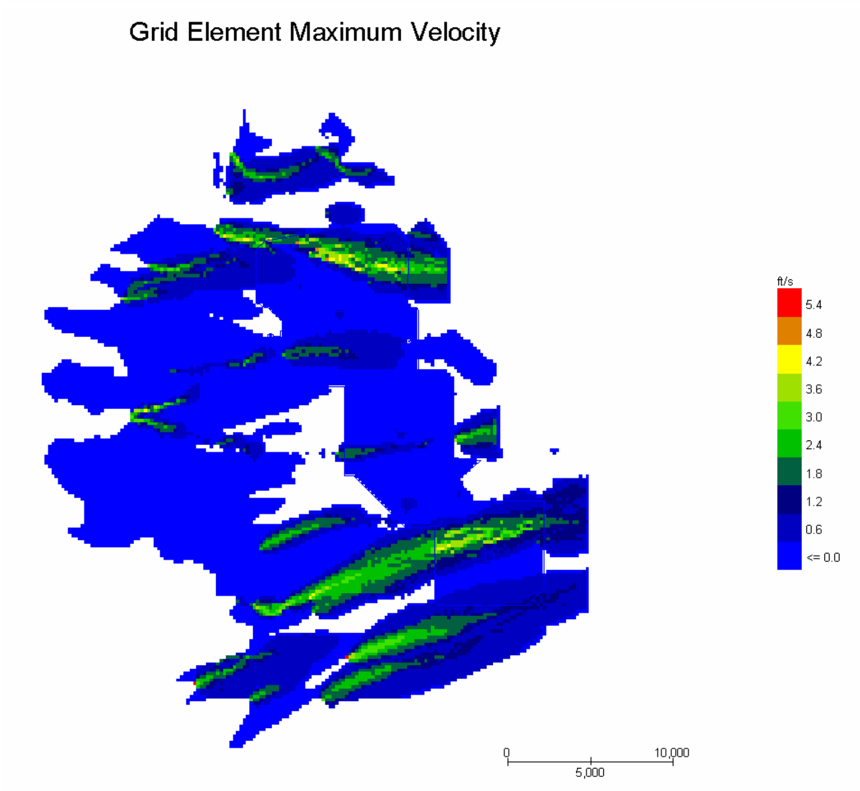
Runoff Volume	Existing	(acre-feet)	1962
	Proposed	(acre-feet)	1973
	Increase	(acre-feet)	11
	Increase	%	1%
Peak Flow	Existing	(cfs)	8653
	Proposed	(cfs)	8924
	Increase	(cfs)	271
	Increase	%	3%

Table 10. Scour at Heliostats

Condition	Max Velocity		Heliostats Potentially Failing		
			% of total heliostats	# of heliostats installed	
	Flood Plain	Channel		214000	280000
Existing	4.7	13.9			
Proposed	4.9	16.5	0.8% (0.8%)	1808 (1712)	2366 (2241)

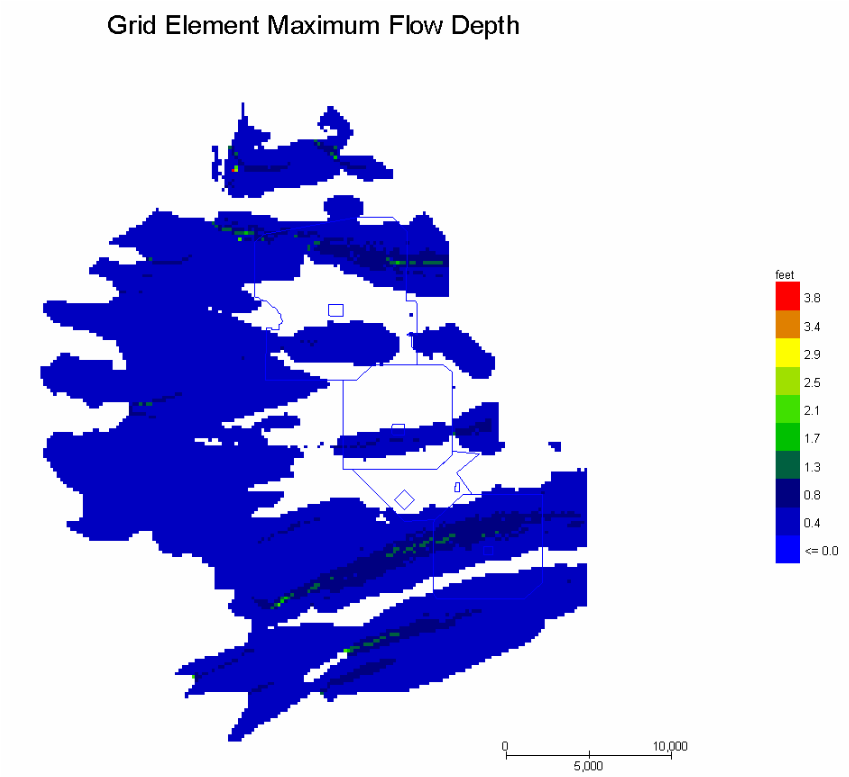


Existing

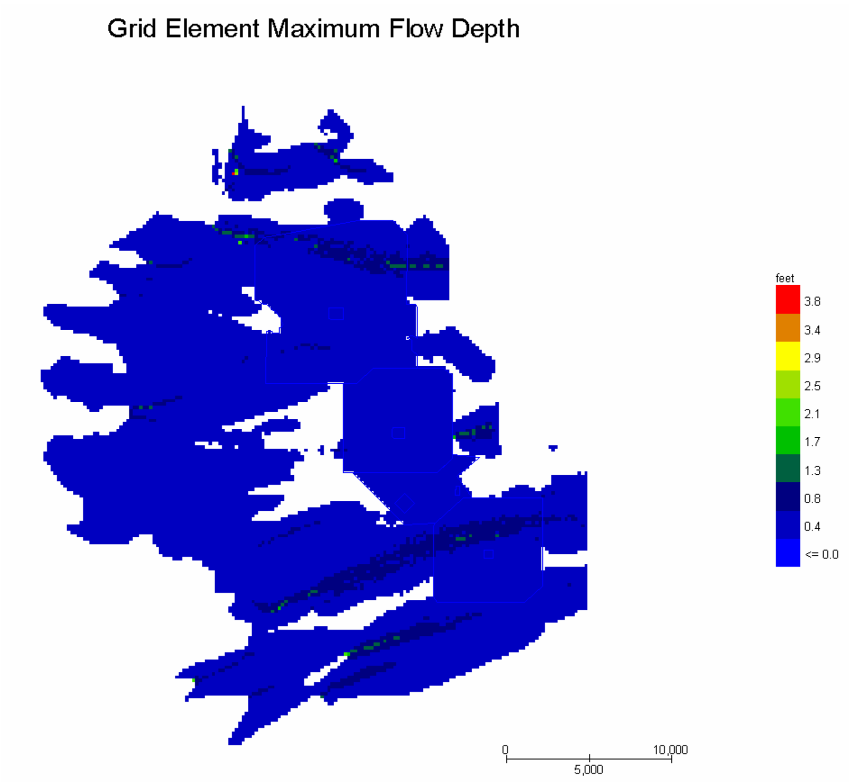


Proposed

Figure 5. Floodplain Velocity (Existing and Proposed)



Existing



Proposed

Figure 6. Floodplain Flow Depth (Existing and Proposed)

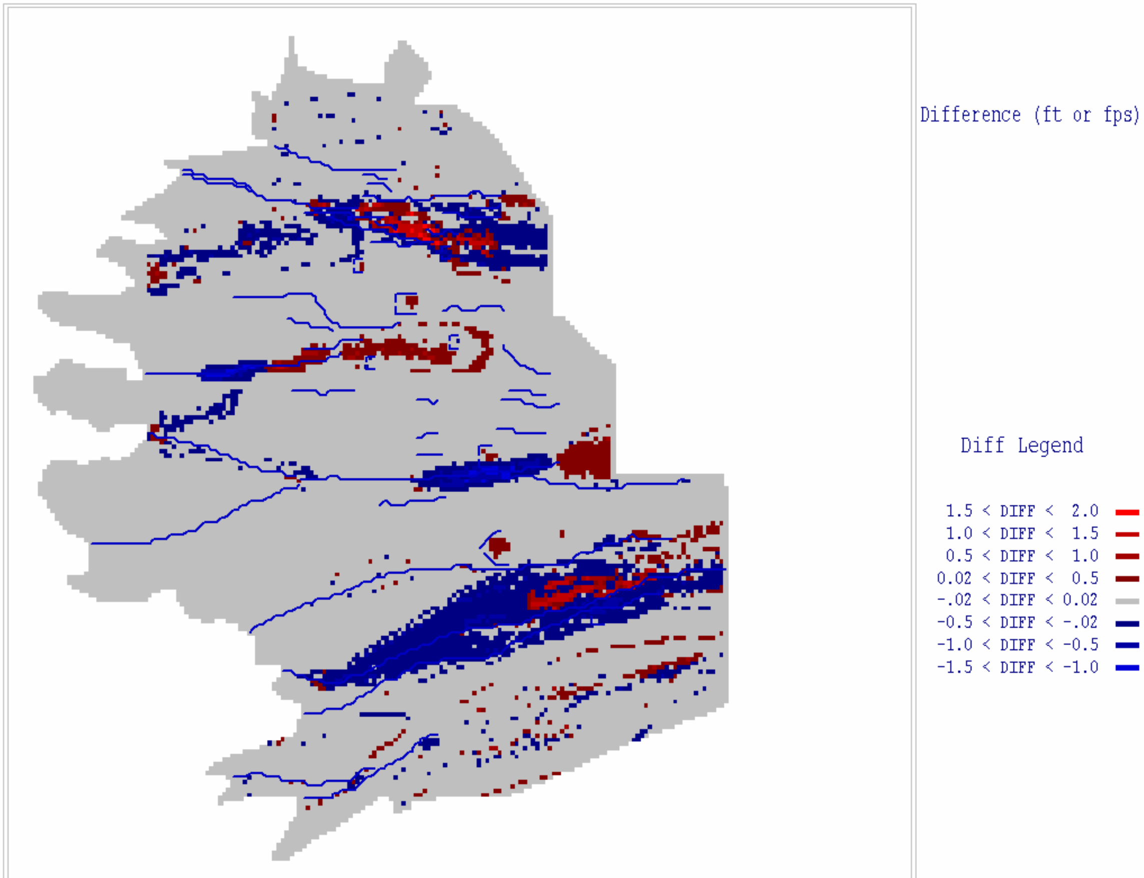


Figure 7. Change in Velocity on the Floodplain (Proposed vs. Existing)

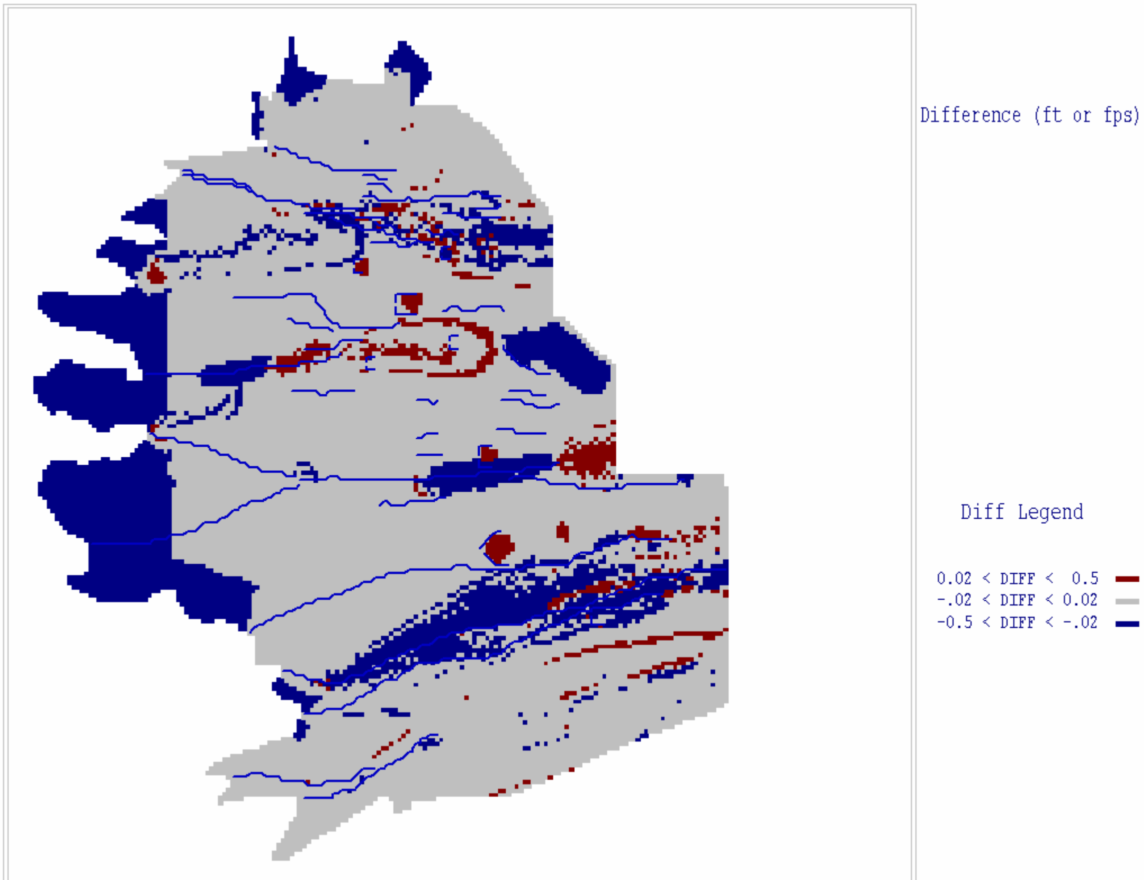


Figure 8. Change in Flow Depth on the Floodplain (Proposed vs. Existing)

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
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APPLICATION FOR CERTIFICATION
FOR THE *IVANPAH SOLAR ELECTRIC GENERATING SYSTEM*

DOCKET NO. 07-AFC-5
PROOF OF SERVICE
(Revised 7/2/09)

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DECLARATION OF SERVICE

I, Teraja` Golston, declare that on June 03, 2009, I served and filed copies of the attached, (07-AFC-5) Ivanpah – Final Memorandum – AECOM Stormwater Modeling Review dated June 02, 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:
[www.energy.ca.gov/sitingcases/ivanpah].

The documents have 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 Sacramento, California 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. 07-AFC-5
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 Signature in Dockets
Teraja` Golston