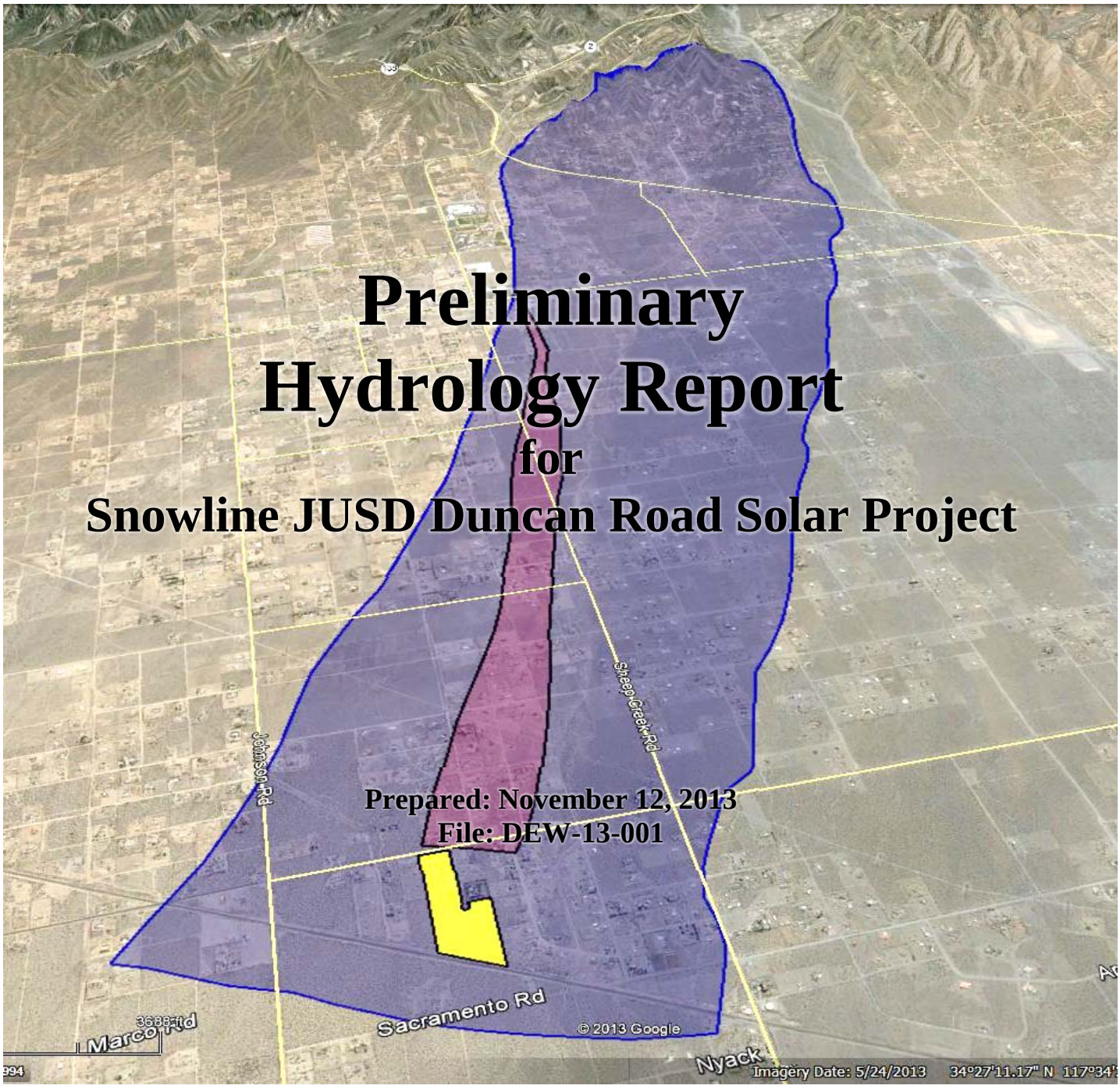

Preliminary Hydrology Report

for

Snowline JUSD Duncan Road Solar Project

Prepared: November 12, 2013
File: DEW-13-001

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Water Resource Engineering • Drainage Studies and Design • Sewer Design • Pump Station Design • FEMA Studies • Plan and Map Checking Services • Municipal Consulting

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EXECUTIVE SUMMARY

Meyer Civil Engineering, Inc. has prepared this executive summary solely to provide a general overview of the Hydrology Report for the JUSD Duncan Road Solar Project. The report itself should be relied upon for information about the findings, conclusions, recommendations and other concerns.

The Project - The JUSD Duncan Road Solar Project is located in San Bernardino County in the southern portion of the Mojave Dessert. The project receives drainage from the San Gabriel Mountains south and east of Pinon Hills, California. The project is located Northeast of the community of Phelan. Constructed project area is approximately 25.9 acres.

The solar generation facility includes the solar arrays (solar PV panels, or modules), inverters, intermediate voltage transformers, access roads, and electrical wiring that collects and consolidates power from across the project. A solar array is composed of multiple PV panels. Each panel will be approximately 3.5 feet in width and 6.5 feet in height. The panels will be supported by driven steel pipes, spaced approximately 15 feet apart. The length of each row of panels is approximately 128 feet. Spacing between each row would be approximately 15 feet. The project also includes access roads, a minimum of 20 feet wide. Rainwater that falls onto PV panels will drain freely to the ground. Panels will slope and rainwater will run off the lower edge. Based on the small volume of water falling from each panel, the height of the fall, and the soil conditions, it is not expected that erosion beyond a minimal level will occur. It is expected that water will fall from the PV panels and pond at a drip point before infiltrating or gradually migrating into the existing drainage patterns.

The PV panel supports are assumed to be small-diameter steel or aluminum members and are not anticipated to be a significant hindrance to flow and were therefore not modeled. Access roads are proposed to be flush or slightly elevated above existing grade. Small changes in elevation (less than 4 inches) are too minor to model and, as such, all proposed roadways were omitted.

Development of Hydrology - Hydrology for this report was developed utilizing San Bernardino County standards as required in the San Bernardino County Hydrology Manual (SBCHM). The SBCHM provides a detailed procedure for a one dimensional hydrograph analysis for large watersheds located in San Bernardino County. Due to the complexity of the project watersheds, a two dimensional analysis was preferred and performed. The two dimensional model utilized is a program recognized by FEMA for detailed development of theoretical flows, velocities and depths on an ungaged watershed. This program, know as FLO-2D, provides advantages as compared to a one dimensional analysis as it internally develops watershed lag time and splits and collects flows based on actual digital terrain features. The model also provides detailed depths, velocities and flows on a digital basis over the entire watershed. The FLO-2D model was calibrated to the San Bernardino County method by adjusting the Manning's n-values and NRCS Curve Number (CN) factors to match runoff flows as dictated in the SBCHM. A smaller more definitive calibration area of about 2380 acres was utilized to do this. Actual one dimensional values were computed in accordance with the SBCHM and calculated using the Army Corps of Engineers' HEC-HMS hydrograph engine. Resultant values are provided on page 6 of this report. Values for the 100 year event compare relatively closely and thus the FLO-2D model was considered to be calibrated correctly. The FLO-2D values were utilized for analysis. NRCS AMC III Curve Numbers used in the model did not need adjusting as the model to closely matched infiltration calculated from the SBCHM, resultant values are provided on page 6 of this report.

The results of the Unit Hydrograph calculation were compared against regression formulas prepared by FEMA. The FEMA equation is based on data from only the Antelope Valley, which includes Mojave area. The smaller data set generally provides peak flows substantially less than determined with the USGS equation. The FEMA equation is considered the lower bound for probable peak flow.

Drainage and Streambed Crossings - No culverts are proposed for the project.

Freeboard Requirements - San Bernardino County Standards require that all structures be located at least 2 foot above the water surface elevation determined as part of the hydraulic model.

(Continued next page.)

EXECUTIVE SUMMARY, Continued

Scour and Erosion Requirements San Bernardino County Standards require that design of all facilities (such as PV array piles/posts and inverter pads) include protection from scour and erosion. Scour and erosion depths can be calculated from the runoff velocities included as part of the hydraulic model and site soils condition analysis. The "With" Project plotting in Appendix C also shows velocity of flows. These velocity vectors have been enhanced with a color shading to indicate values over 2.0 fps to assist the designer in identifying potentional erosion locations.

On-Site Detention Requirements - Construction of proposed facilities will typically increase storm water runoff generated from the existing parcel without the implementation of best management practices. The County requires that any increase in runoff be mitigated, typically with a detention basin. As was previously mentioned in Section 1.2, the PV panels are placed above the existing ground, allowing infiltration to occur beneath each panel, so infiltration is not significantly reduced.

Conclusions - The following summarizes key conclusions based on the hydrologic and hydraulic analyses performed for the site and documented in this report.

a. The proposed project does not increase water surface elevation of flows through the site by more than 1-foot. Indeed, most calculations showed no measureable increase.

b. The County will require that any new runoff generated as a result of this project be mitigated on-site in a detention basin. However, calculations showed no signifcant increase of flow as compared to the "Without Project" analysis.

c. The County will require that all facilities be elevated at least 2 foot above the 100-year, 24-hour peak flood elevation. Appendix C provides water surface depths, to which freeboard of 2-foot must be added.

d. The County will require that scour and erosion potential be included in the design of PV array piles or posts, and protective features at the inverter pads and substation. Runoff velocity for this analysis is provided in Appendix C.

Based on preliminary design information, the total proposed impermeable surface can be estimated at 0.5% of the project area and thus is 0.13 acres. Runoff volume can be calculated per the 10 year 5 day rainfall. It is assumed that no impermeable surfaces exist prior to construction.

Runoff Volume = 0.12 (D10) (ai) (Area)
Area = 25.9 acres
D10 = 3.04 inches (10-year, 24-hour rainfall)
ai = 0.5% of project site
Runoff Volume = 0.05 acre-feet

Based on the above volume and the hydrologic and hydraulics calculations performed herein, increased runoff values can be considered negligible. Please refer to Sheet C-4 in Appendix C. The Comparable Outfall Flows graph, which graphs the outflow from the model on the downstream edges of the project, illustrates the neglible effect of the project. Therefore it is our recommendation that no detention facilities need be constructed.

The recommendations within this report are based on estimated values for the 100 return years. Estimates are based on procedural recommendations from the SBCHM and based on this engineer's experience. Compliance with these recommendations is essential for the successful construction and operation of the project.

Respectfully Submitted,

Richard Meyer RCE 28104, Expires 3-31-2012

Purpose:

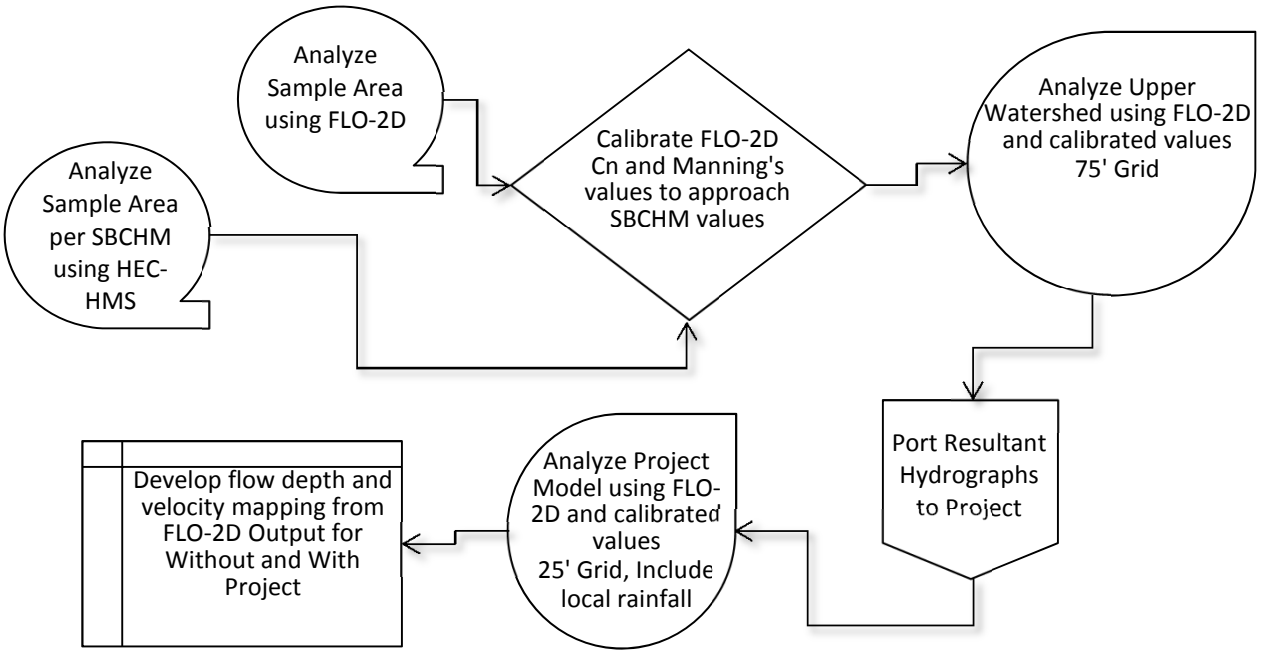
1. Analyze the project to determine the runoff rates for design of the project.
   a. Determine project requirements for flow depths and velocities.
   b. The 100 year event was studied.

Approach:

2. Utilize the San Bernardino County Hydrology Manual to determine flows.
   a. Develop runoff patterns and corresponding lag times utilizing the San Bernardino County Hydrology Manual (SBCHM) for a sample of the watershed, the calibration area (about 285 acres was sampled).

   b. Develop rainfall, NRCS Curve Numbers (Cn) and effective rainfall per SBCHM. Cn values are to be AMC III.

   c. Utilize HEC-HMS to model the hydrograph flows by inputting the unit graph and effective rainfall as developed in the KCHM.
   d. Develop the primary FLO-2D model (Watershed Model, digitized grid at 75' x 75') utilizing the provided topographic information along with a USGS Digital Elevation Model and apply Cn's to calculate rainfall loss in the model.
   e. Develop the secondary FLO-2D model for the smaller project area (Project Model) on a 25' x 25' digitized grid. Local topography was utilized for this model.
   f. Manning's N values were applied to the floodplain and the channel conveyances and adjusted as necessary to calibrate to the SBCHM as closely as possible. Lower limits were reached at slightly lower discharge values as generated by the SBCHM model.
   g. Hydrographs were ported to the Project Model from the Watershed Model. The Watershed Model generated these on an 75' digitized spacing. Since the Project Model has 25' spacing, the hydrographs were input at every other cell so as to align with the Watershed Model. The flows were then quickly distributed over the next 1 or 2 cells.



Assumptions:

3. The following information was assumed to apply.
   a. NRCS Soil Groups varied over the project watershed. Refer to the attached Soil Group Map.
   b. NOAA Atlas 14 rainfall values applies.
   c. The Desert S-graph was studied.
   d. NRCS CN's varied over the project watershed. Shape files were utilized to combine effects of soil type, cover and percent imperviousness (zoning).
   e. Aerial adjustment of rainfall was applied for the calibrated area of 0.45 square miles.

Summary:

4. The analysis showed the following:
   a. Five (5) minute time increment was utilized.
   b. An average SCS Curve Number of 88.47 for the entire watershed area of the primary FLO-2D model was used. The San Bernardino County prescribed values, an average of 86.23, were used to calculate the SBCHM rainfall infiltration and was compared to the main FLO-2D model rainfall infiltration for the entire watershed. The average varied between the two models due to the larger model having less receptive soils on the average. The 100 year event infiltration values from FLO2d matched fairly closely with the SBCHM, see table below. HEC-HMS was used to calculate the SBCHM peak runoff of the calibration area and compared to the FLO-2D peak runoff of the same calibration area. These runoff comparison values were used to adjust the Manning's n values for the entire watershed to calibrate the FLO-2D model to the SBCHM. Final Manning's n values vary from 0.055 to 0.080. Adjustment to the Manning's n values was provided so peak FLO-2D values would be reduced to better match that of the SBCHM method.

   c. Comparative infiltration values for SBCHM and FLO-2D:

Storm	SBCHM Infiltration, inches	FLO-2D Infiltration, inches	% Deviance
100 Year Event:	1.40	1.28	-8%

   d. Comparative Values for HEC-HMS (KCHM) and FLO2D:

Storm	FEMA Regression $Q_{100}=662(Area)^{0.62}$	Desert S-graph HEC-HMS (SBCHM)		FLO2D		
	Flow, CFS	Flow, CFS	Time of Peak, Hrs	Flow, CFS	Time of Peak, Hrs	% Deviance
100 Year Event:	401	321	16:25	395	17:55	-1% 23%

   e. Modeling approach pursued in this study is based on deep hydrology experience of this engineer. Difficult analysis, such as occurs on this project, is best addressed using two-dimensional combination hydrology and hydraulic modeling. The chosen program "FLO-2D" provides this venue. The larger Watershed Model was designed to deliberately oversample the contributing area to assure that difficult to define flow paths are included that might otherwise be missed on a one-dimensional modeling basis. FLO-2D has the intrinsic ability to model expected flows accurately as this analysis does not depend on an engineer's estimate of such things as times of concentration or watershed definition. Since the Manning's n values were reduced to the minimums as recommend by the program developer, it is the opinion of this engineer that resultant estimation of the peak flows are accurate even though these values are slightly lower than provided by the FEMA equation or the SBCHM method. Another advantage to this approach is proper distribution of flows over the project area. Computed hydrographs from the Watershed Model were directly ported and placed accurately as input for the Project Model. The Project Model then distributed these flows based on a more detailed topography basis and thus provides for accurate depths and velocities in the correct geographic location. Introduction of a single point hydrograph from a one-dimension model would not have accurately distributed these flows. Final estimates of depth and velocity of flows are very reasonable in regard to conveyed discharge. These values have been graphically plotted for use in design. In addition ESRI shape files have been made available to the designer for their use.

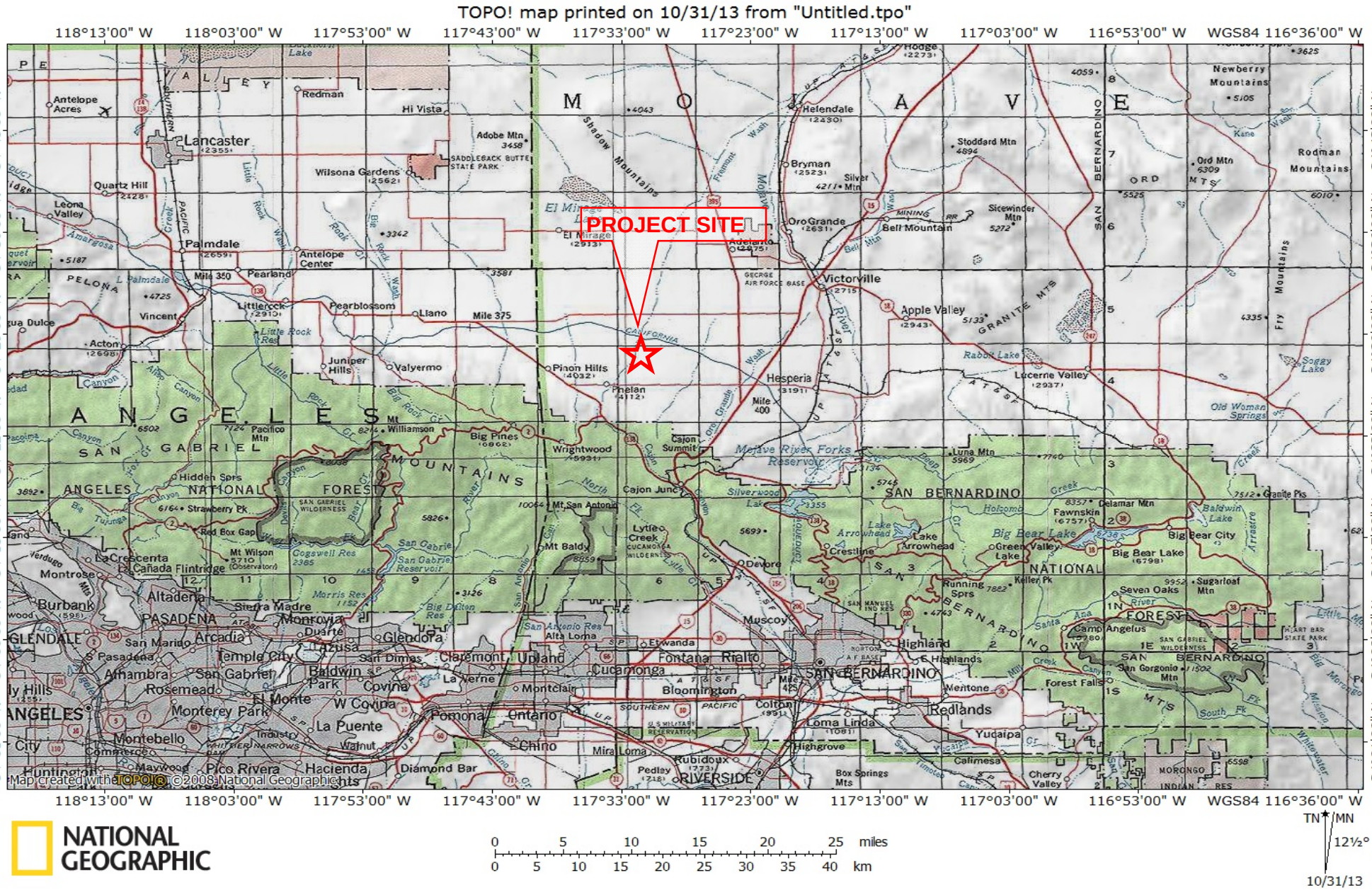
(Continued next page.)

f. The Project Model Run FLO-2d Results are as follows:

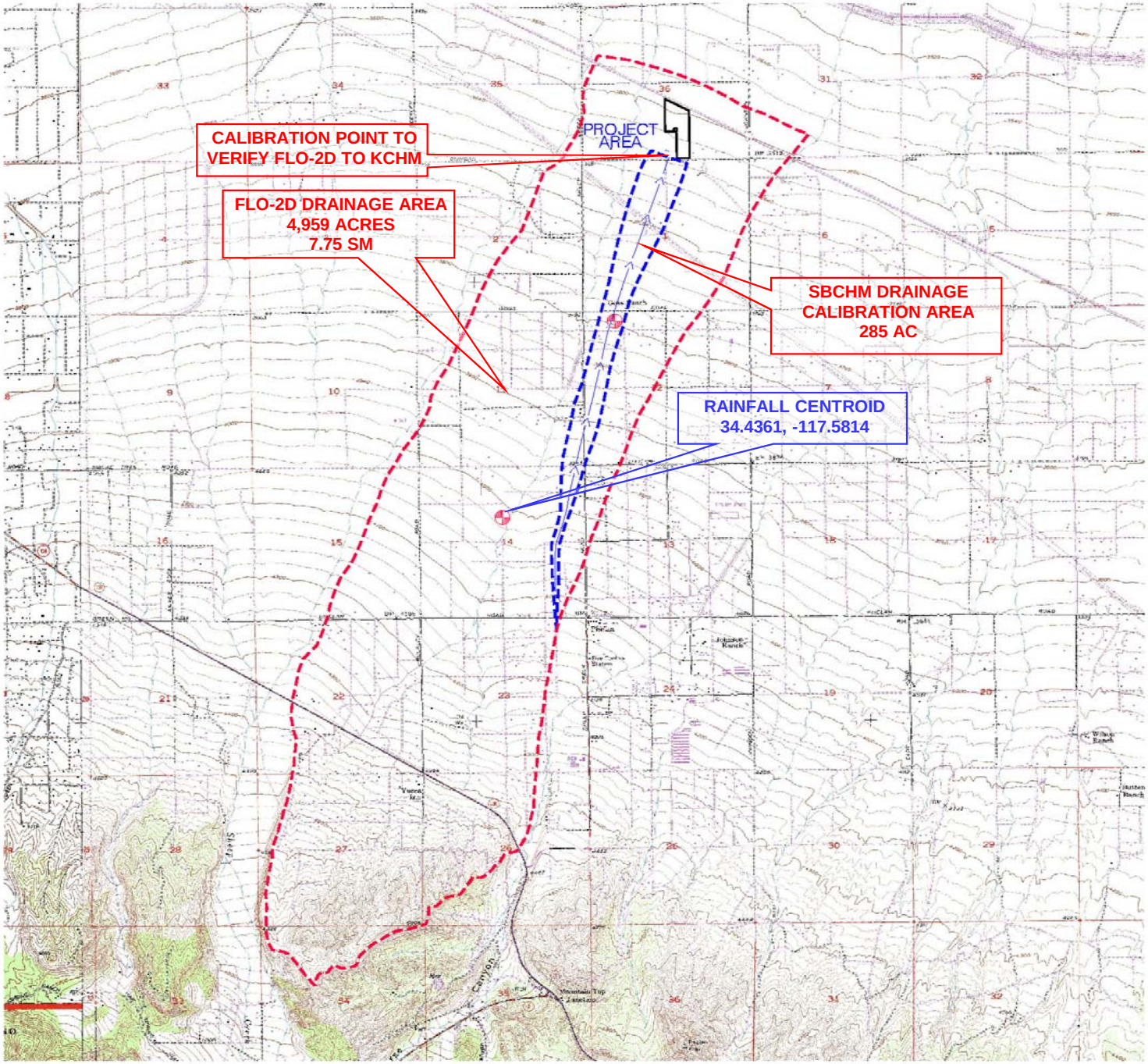
Scenario	Point Rainfall, Inches	Rainfall Volume, AF	Inflow H-graph Volume, AF	Infiltration & Interception, Inches	Infiltration & Interception, AF	Floodplain Storage, AF	Floodplain Outflow Volume, AF	Sum of Peak Outlet Flows, CFS
Without Project:	4.79	14.77	386.80	1.50	4.61	2.49	394.47	928.00
With Project:	4.79	14.77	386.80	1.49	4.59	2.42	394.56	911.00

g. Results have been graphically plotted for easier interpretation. These maps are included in Appendix C of this report. Included on the maps are outfall hydrographs that illustrate that the project has no significant effect on increase of peak flows.

h. The "With" Project plotting in Appendix C also shows velocity of flows. These velocity vectors have been enhanced with a color shading to indicate values over 2.0 fps to assist the designer in identifying potentional erosion locations.



Project Location Map


CALIBRATION POINT TO VERIFY FLO-2D TO KCHM
PROJECT AREA
FLO-2D DRAINAGE AREA
4,959 ACRES
7.75 SM
SBCHM DRAINAGE CALIBRATION AREA
285 AC
RAINFALL CENTROID
34.4361, -117.5814

NOAA Atlas 14, Volume 6, Version 2
Location name: Phelan, California, US*
Coordinates: 34.4361, -117.5814
Elevation: 4013 ft*
* source: Google Maps

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]											Area Weighted*
Duration	Average recurrence interval(years)										
	1	2	5	10	25	50	100	200	500	1000	100
5-min	0.079 (0.065-0.096)	0.111 (0.092-0.136)	0.157 (0.129-0.192)	0.196 (0.160-0.242)	0.252 (0.200-0.322)	0.298 (0.231-0.389)	0.348 (0.263-0.465)	0.4 (0.294-0.550)	0.474 (0.334-0.680)	0.534 (0.363-0.793)	0.353
10-min	0.113 (0.093-0.137)	0.159 (0.132-0.194)	0.225 (0.185-0.275)	0.281 (0.230-0.346)	0.362 (0.286-0.462)	0.428 (0.331-0.558)	0.498 (0.376-0.666)	0.573 (0.421-0.788)	0.68 (0.479-0.975)	0.765 (0.521-1.14)	
15-min	0.136 (0.113-0.166)	0.192 (0.159-0.235)	0.272 (0.224-0.333)	0.339 (0.278-0.419)	0.438 (0.346-0.559)	0.517 (0.401-0.675)	0.602 (0.455-0.805)	0.693 (0.509-0.953)	0.822 (0.579-1.18)	0.925 (0.629-1.37)	
30-min	0.195 (0.162-0.238)	0.276 (0.228-0.337)	0.389 (0.321-0.477)	0.486 (0.398-0.601)	0.627 (0.496-0.801)	0.742 (0.574-0.967)	0.863 (0.652-1.15)	0.993 (0.730-1.37)	1.18 (0.830-1.69)	1.33 (0.902-1.97)	0.875
60-min	0.268 (0.222-0.327)	0.379 (0.314-0.463)	0.536 (0.442-0.656)	0.669 (0.547-0.826)	0.863 (0.683-1.10)	1.02 (0.790-1.33)	1.19 (0.897-1.59)	1.37 (1.00-1.88)	1.62 (1.14-2.32)	1.82 (1.24-2.71)	1.203
2-hr	0.394 (0.327-0.481)	0.54 (0.446-0.659)	0.741 (0.612-0.908)	0.913 (0.747-1.13)	1.16 (0.918-1.48)	1.36 (1.05-1.77)	1.57 (1.19-2.10)	1.8 (1.32-2.47)	2.11 (1.49-3.03)	2.36 (1.61-3.51)	
3-hr	0.491 (0.407-0.598)	0.663 (0.549-0.810)	0.901 (0.743-1.10)	1.1 (0.903-1.36)	1.39 (1.10-1.78)	1.63 (1.26-2.12)	1.87 (1.42-2.50)	2.14 (1.57-2.94)	2.5 (1.76-3.59)	2.79 (1.90-4.15)	1.883
6-hr	0.702 (0.582-0.856)	0.941 (0.778-1.15)	1.27 (1.05-1.55)	1.54 (1.26-1.90)	1.93 (1.53-2.47)	2.25 (1.74-2.93)	2.57 (1.95-3.44)	2.92 (2.15-4.02)	3.41 (2.40-4.89)	3.79 (2.58-5.63)	2.583
12-hr	0.931 (0.772-1.14)	1.29 (1.06-1.57)	1.76 (1.46-2.16)	2.16 (1.77-2.67)	2.72 (2.15-3.47)	3.16 (2.45-4.12)	3.62 (2.74-4.84)	4.1 (3.01-5.64)	4.76 (3.35-6.83)	5.28 (3.59-7.84)	
24-hr	1.21 (1.08-1.40)	1.74 (1.54-2.01)	2.45 (2.16-2.83)	3.04 (2.66-3.54)	3.85 (3.26-4.64)	4.49 (3.72-5.52)	5.15 (4.17-6.48)	5.84 (4.60-7.56)	6.79 (5.13-9.16)	7.53 (5.50-10.5)	5.155
2-day	1.42 (1.26-1.63)	2.06 (1.83-2.38)	2.93 (2.59-3.39)	3.66 (3.20-4.26)	4.66 (3.95-5.62)	5.45 (4.53-6.71)	6.27 (5.08-7.90)	7.13 (5.62-9.24)	8.32 (6.29-11.2)	9.25 (6.75-12.9)	
3-day	1.53 (1.35-1.76)	2.24 (1.98-2.58)	3.21 (2.83-3.71)	4.01 (3.52-4.68)	5.14 (4.35-6.19)	6.02 (5.00-7.41)	6.95 (5.63-8.75)	7.92 (6.24-10.3)	9.26 (7.00-12.5)	10.3 (7.55-14.4)	
4-day	1.62 (1.44-1.86)	2.38 (2.11-2.75)	3.44 (3.04-3.98)	4.32 (3.79-5.04)	5.56 (4.71-6.70)	6.54 (5.42-8.04)	7.56 (6.12-9.52)	8.64 (6.80-11.2)	10.1 (7.67-13.7)	11.3 (8.28-15.8)	
7-day	1.77 (1.57-2.04)	2.63 (2.33-3.03)	3.84 (3.39-4.44)	4.87 (4.27-5.68)	6.34 (5.38-7.64)	7.52 (6.24-9.25)	8.75 (7.09-11.0)	10.1 (7.93-13.0)	11.9 (9.01-16.1)	13.4 (9.79-18.7)	
10-day	1.81 (1.61-2.09)	2.72 (2.41-3.13)	4.01 (3.54-4.64)	5.12 (4.49-5.97)	6.73 (5.70-8.11)	8.03 (6.66-9.87)	9.4 (7.61-11.8)	10.9 (8.56-14.1)	13 (9.80-17.5)	14.6 (10.7-20.5)	
20-day	2.08 (1.85-2.40)	3.19 (2.82-3.67)	4.8 (4.24-5.55)	6.21 (5.44-7.24)	8.31 (7.04-10.0)	10 (8.33-12.3)	11.9 (9.64-15.0)	13.9 (11.0-18.0)	16.8 (12.7-22.7)	19.1 (14.0-26.8)	
30-day	2.4 (2.13-2.76)	3.68 (3.25-4.24)	5.57 (4.92-6.44)	7.26 (6.36-8.46)	9.8 (8.30-11.8)	11.9 (9.88-14.6)	14.2 (11.5-17.9)	16.7 (13.1-21.6)	20.2 (15.3-27.3)	23.1 (16.9-32.3)	
45-day	2.82 (2.50-3.24)	4.29 (3.80-4.95)	6.5 (5.74-7.51)	8.49 (7.44-9.90)	11.5 (9.76-13.9)	14.1 (11.7-17.3)	16.8 (13.6-21.2)	19.9 (15.6-25.7)	24.2 (18.3-32.7)	27.8 (20.3-38.8)	
60-day	3.12 (2.77-3.60)	4.7 (4.16-5.42)	7.1 (6.27-8.20)	9.28 (8.12-10.8)	12.6 (10.7-15.2)	15.4 (12.8-19.0)	18.5 (15.0-23.3)	21.8 (17.2-28.3)	26.7 (20.2-36.0)	30.7 (22.4-42.9)	

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

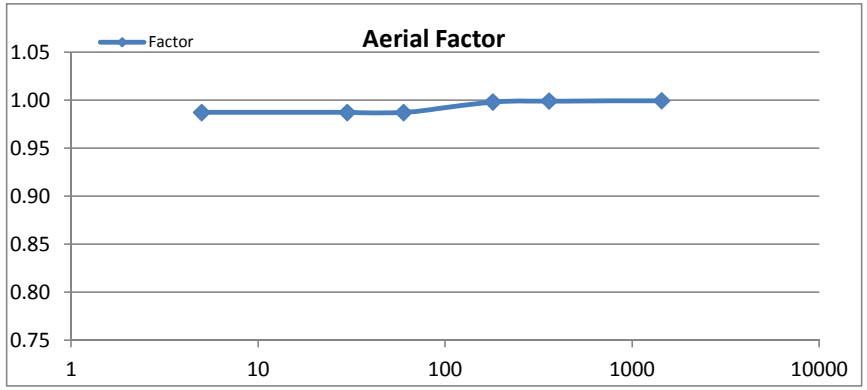
Please refer to NOAA Atlas 14 document for more information.

**Area Weighted Values used in analysis. Centroid values used as a check only.*

Develop Rainfall Curve

Aerial Adjustment
Area: 0.45 sqr mi

Duration	Factor
5	0.98727
30	0.98727
60	0.98727
180	0.99809
360	0.99905
1440	0.99943



Duration		5 year Values:			10 year Values:			25 year Values:			50 year Values:			100 year Values:		
		per hour	NOAA 14	Adusted	per hour	NOAA 14	Adusted	per hour	NOAA 14	Adusted	per hour	NOAA 14	Adusted	per hour	NOAA 14	Adusted
5min	0.08hr	1.884"	0.157"	0.155"	2.352"	0.196"	0.194"	3.024"	0.252"	0.249"	3.576"	0.298"	0.294"	4.231"	0.353"	0.348"
30min	0.50hr	0.778"	0.389"	0.384"	0.972"	0.486"	0.480"	1.254"	0.627"	0.619"	1.484"	0.742"	0.733"	1.751"	0.875"	0.864"
60min	1hr	0.536"	0.536"	0.529"	0.669"	0.669"	0.660"	0.863"	0.863"	0.852"	1.020"	1.020"	1.007"	1.203"	1.203"	1.188"
180min	3hr	0.300"	0.901"	0.899"	0.367"	1.100"	1.098"	0.463"	1.390"	1.387"	0.543"	1.630"	1.627"	0.628"	1.883"	1.879"
360min	6hr	0.212"	1.270"	1.269"	0.257"	1.540"	1.539"	0.322"	1.930"	1.928"	0.375"	2.250"	2.248"	0.431"	2.583"	2.581"
1440min	24hr	0.102"	2.450"	2.449"	0.127"	3.040"	3.038"	0.160"	3.850"	3.848"	0.187"	4.490"	4.487"	0.215"	5.155"	5.152"

NOAA Atlas 14, Volume 6, Version 2
Location name: Phelan, California, US*
Coordinates: 34.4730, -117.5626
Elevation: 3614 ft*
* source: Google Maps

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval(years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.075 (0.062-0.091)	0.104 (0.086-0.127)	0.144 (0.119-0.176)	0.178 (0.146-0.220)	0.227 (0.180-0.290)	0.267 (0.207-0.348)	0.309 (0.233-0.413)	0.354 (0.260-0.487)	0.417 (0.293-0.598)	0.467 (0.318-0.694)
10-min	0.107 (0.088-0.130)	0.148 (0.123-0.181)	0.206 (0.170-0.253)	0.255 (0.209-0.315)	0.326 (0.258-0.416)	0.383 (0.296-0.499)	0.443 (0.335-0.592)	0.507 (0.372-0.697)	0.597 (0.421-0.857)	0.67 (0.456-0.994)
15-min	0.129 (0.107-0.158)	0.179 (0.148-0.219)	0.249 (0.206-0.306)	0.309 (0.252-0.381)	0.394 (0.312-0.503)	0.463 (0.358-0.604)	0.536 (0.405-0.716)	0.613 (0.450-0.843)	0.722 (0.509-1.04)	0.81 (0.551-1.20)
30-min	0.185 (0.153-0.226)	0.257 (0.212-0.314)	0.357 (0.294-0.437)	0.442 (0.361-0.546)	0.564 (0.446-0.720)	0.662 (0.513-0.864)	0.767 (0.579-1.03)	0.878 (0.644-1.21)	1.03 (0.728-1.48)	1.16 (0.789-1.72)
60-min	0.254 (0.211-0.311)	0.353 (0.292-0.432)	0.491 (0.405-0.602)	0.608 (0.497-0.751)	0.776 (0.613-0.991)	0.911 (0.705-1.19)	1.06 (0.797-1.41)	1.21 (0.887-1.66)	1.42 (1.00-2.04)	1.6 (1.09-2.37)
2-hr	0.37 (0.306-0.452)	0.503 (0.416-0.615)	0.688 (0.567-0.842)	0.844 (0.690-1.04)	1.07 (0.845-1.37)	1.25 (0.968-1.63)	1.44 (1.09-1.93)	1.65 (1.21-2.26)	1.93 (1.36-2.77)	2.16 (1.47-3.21)
3-hr	0.462 (0.383-0.564)	0.623 (0.515-0.761)	0.844 (0.696-1.03)	1.03 (0.844-1.28)	1.3 (1.03-1.66)	1.52 (1.18-1.99)	1.75 (1.32-2.34)	2 (1.47-2.75)	2.34 (1.65-3.36)	2.62 (1.78-3.88)
6-hr	0.659 (0.546-0.805)	0.882 (0.729-1.08)	1.19 (0.978-1.45)	1.45 (1.18-1.79)	1.82 (1.44-2.32)	2.11 (1.64-2.76)	2.43 (1.83-3.25)	2.76 (2.03-3.80)	3.23 (2.28-4.64)	3.61 (2.45-5.36)
12-hr	0.876 (0.725-1.07)	1.2 (0.988-1.46)	1.63 (1.35-2.00)	2 (1.63-2.47)	2.51 (1.99-3.21)	2.93 (2.26-3.82)	3.36 (2.54-4.49)	3.81 (2.80-5.24)	4.44 (3.13-6.38)	4.95 (3.37-7.35)
24-hr	1.18 (1.04-1.36)	1.65 (1.46-1.90)	2.29 (2.03-2.65)	2.83 (2.48-3.30)	3.58 (3.03-4.31)	4.18 (3.46-5.13)	4.79 (3.88-6.04)	5.45 (4.29-7.06)	6.36 (4.81-8.59)	7.08 (5.17-9.90)
2-day	1.38 (1.22-1.58)	1.96 (1.73-2.25)	2.75 (2.42-3.17)	3.41 (2.98-3.97)	4.33 (3.67-5.22)	5.07 (4.21-6.23)	5.84 (4.73-7.35)	6.65 (5.24-8.62)	7.79 (5.88-10.5)	8.69 (6.34-12.1)
3-day	1.48 (1.31-1.70)	2.12 (1.88-2.44)	3 (2.65-3.46)	3.73 (3.27-4.35)	4.77 (4.04-5.74)	5.59 (4.64-6.87)	6.45 (5.23-8.13)	7.37 (5.80-9.54)	8.65 (6.54-11.7)	9.68 (7.07-13.5)
4-day	1.57 (1.39-1.81)	2.26 (2.00-2.61)	3.22 (2.84-3.72)	4.03 (3.53-4.69)	5.16 (4.37-6.21)	6.06 (5.03-7.46)	7.01 (5.68-8.84)	8.02 (6.32-10.4)	9.45 (7.14-12.8)	10.6 (7.73-14.8)
7-day	1.71 (1.52-1.97)	2.49 (2.20-2.87)	3.57 (3.16-4.13)	4.5 (3.94-5.24)	5.81 (4.93-7.00)	6.87 (5.70-8.44)	7.97 (6.45-10.0)	9.14 (7.20-11.8)	10.8 (8.16-14.6)	12.1 (8.85-16.9)
10-day	1.78 (1.58-2.05)	2.61 (2.31-3.00)	3.77 (3.33-4.36)	4.77 (4.18-5.56)	6.21 (5.26-7.48)	7.36 (6.11-9.05)	8.58 (6.95-10.8)	9.87 (7.78-12.8)	11.7 (8.85-15.8)	13.2 (9.63-18.4)
20-day	2.05 (1.82-2.36)	3.05 (2.70-3.52)	4.5 (3.97-5.20)	5.76 (5.04-6.71)	7.59 (6.44-9.15)	9.1 (7.55-11.2)	10.7 (8.66-13.5)	12.4 (9.78-16.1)	14.9 (11.2-20.1)	16.8 (12.3-23.5)
30-day	2.33 (2.07-2.68)	3.49 (3.09-4.02)	5.18 (4.57-5.98)	6.66 (5.83-7.76)	8.86 (7.50-10.7)	10.7 (8.85-13.1)	12.6 (10.2-15.9)	14.7 (11.6-19.0)	17.6 (13.3-23.8)	20 (14.6-28.0)
45-day	2.75 (2.43-3.16)	4.09 (3.62-4.71)	6.07 (5.36-7.01)	7.83 (6.86-9.12)	10.5 (8.87-12.6)	12.7 (10.5-15.6)	15 (12.2-18.9)	17.6 (13.8-22.7)	21.2 (16.0-28.6)	24.2 (17.6-33.8)
60-day	3.08 (2.73-3.54)	4.53 (4.01-5.22)	6.71 (5.92-7.75)	8.66 (7.58-10.1)	11.6 (9.81-13.9)	14 (11.6-17.3)	16.7 (13.5-21.0)	19.5 (15.4-25.3)	23.7 (17.9-32.0)	27 (19.7-37.8)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

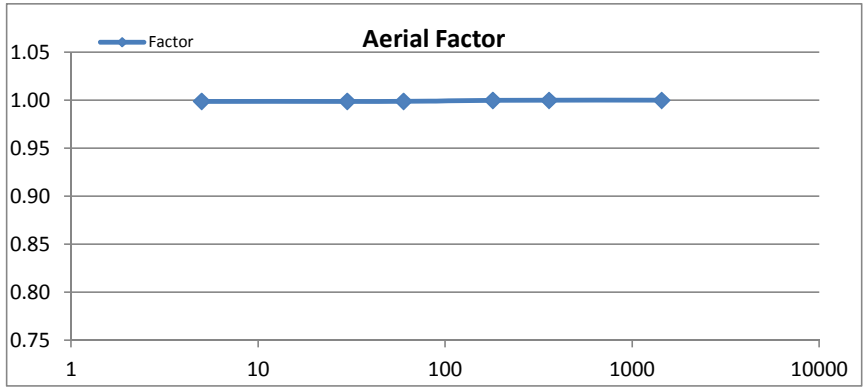
Please refer to NOAA Atlas 14 document for more information.

**Area Weighted Values used in analysis. Centroid values used as a check only.*

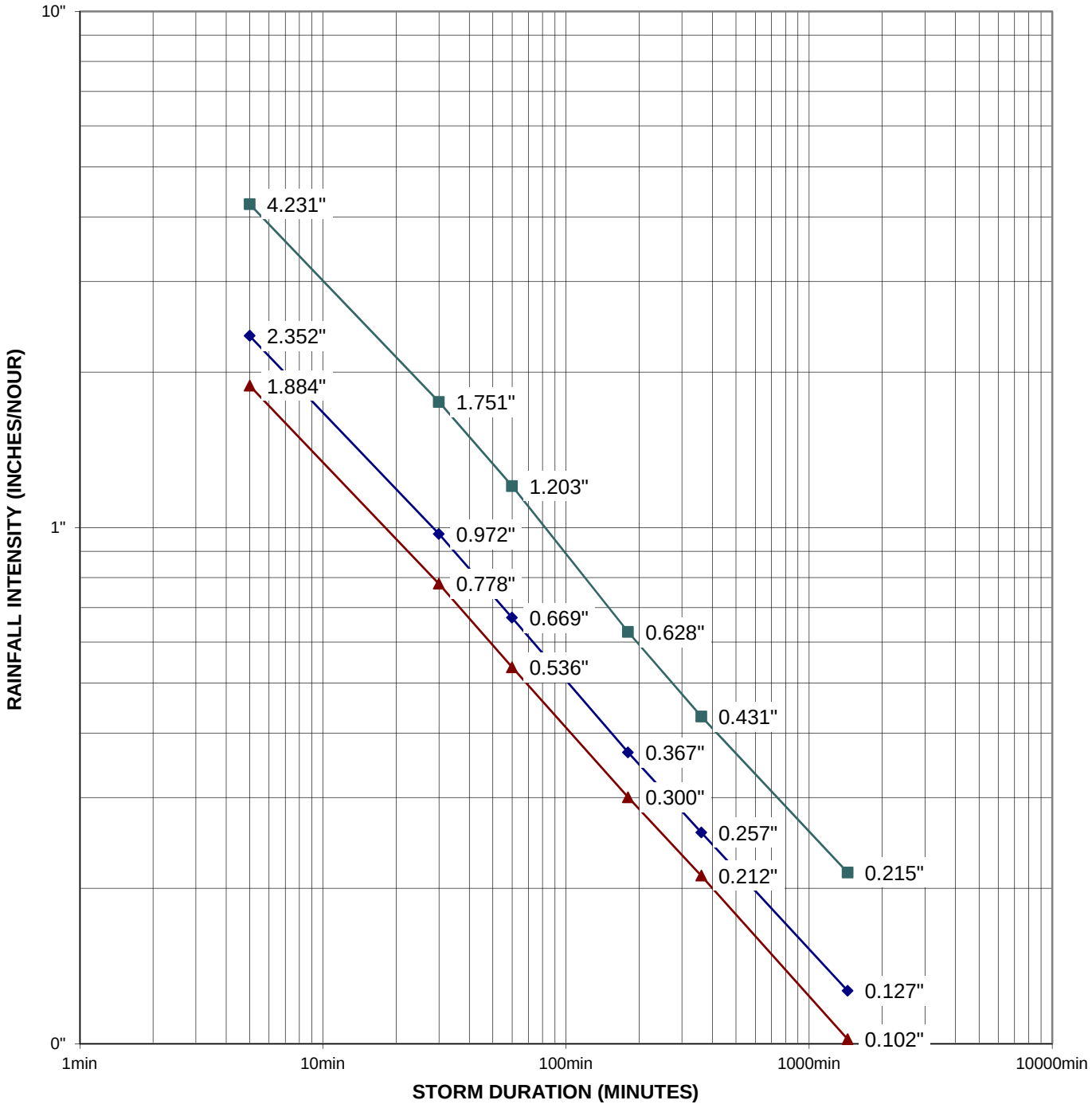
Develop Rainfall Curve

Aerial Adjustment
Area: 0.04 sqr mi

Duration	Factor
5	0.99884
30	0.99884
60	0.99884
180	0.99983
360	0.99991
1440	0.99995



Duration		5 year Values:			10 year Values:			25 year Values:			50 year Values:			100 year Values:		
		per hour	NOAA 14	Adusted	per hour	NOAA 14	Adusted	per hour	NOAA 14	Adusted	per hour	NOAA 14	Adusted	per hour	NOAA 14	Adusted
5min	0.08hr	1.728"	0.144"	0.144"	2.136"	0.178"	0.178"	2.724"	0.227"	0.227"	3.204"	0.267"	0.267"	3.708"	0.309"	0.309"
30min	0.50hr	0.714"	0.357"	0.357"	0.884"	0.442"	0.441"	1.128"	0.564"	0.563"	1.324"	0.662"	0.661"	1.534"	0.767"	0.766"
60min	1hr	0.491"	0.491"	0.490"	0.608"	0.608"	0.607"	0.776"	0.776"	0.775"	0.911"	0.911"	0.910"	1.060"	1.060"	1.059"
180min	3hr	0.281"	0.844"	0.844"	0.343"	1.030"	1.030"	0.433"	1.300"	1.300"	0.507"	1.520"	1.520"	0.583"	1.750"	1.750"
360min	6hr	0.198"	1.190"	1.190"	0.242"	1.450"	1.450"	0.303"	1.820"	1.820"	0.352"	2.110"	2.110"	0.405"	2.430"	2.430"
1440min	24hr	0.095"	2.290"	2.290"	0.118"	2.830"	2.830"	0.149"	3.580"	3.580"	0.174"	4.180"	4.180"	0.200"	4.790"	4.790"



DESIGN STORM FREQUENCY:	5	10	100	YEARS
ONE HOUR POINT RAINFALL:	0.54	0.67	1.20	INCHES

PROJECT LOCATION: Duncan Hills Solar

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

INTENSITY-DURATION CURVES
CALCULATION SHEET

PROJECT:	**JUSD, Duncan Rd - 100 Year Event (Sample Calibration Area)**
ENGINEER:	**Richard Meyer, RCE 28104**

1.	Enter the design storm return frequency (years)	**100**
2.	Enter the catchment lag (hours)	**0.595**
3.	Enter the catchment area (acres)	**285**
4.	Enter the baseflow (cfs/square mile)	**0**
5.	Enter the S-Graph proportions (decimal)	
	Valley: Developed	
	Foothill	
	Mountain	
	Valley: Undeveloped	
	Desert	**1**
6.	Enter maximum loss rate, Fm (inch/hour)	**0.268**
7.	Enter low loss fraction, Ybar (decimal)	**0.295**
8.	Enter the watershed area-averaged 5-minute point rainfall (inches)*	**0.35**
	Enter the watershed area-averaged 30-minute point rainfall (inches)*	**0.86**
	Enter the watershed area-averaged 1-hour point rainfall (inches)*	**1.19**
	Enter the watershed area-averaged 3-hour point rainfall (inches)*	**1.87**
	Enter the watershed area-averaged 6-hour point rainfall (inches)*	**2.57**
	Enter the watershed area-averaged 24-hour point rainfall (inches)*	**5.15**
9.	Enter the 24-hour storm unit interval (minutes)	**5**

*Note: enter values unadjusted by depth-area factors

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

WATERSHED INFORMATION FORM

RAINFALL CURVE: **100 Year**

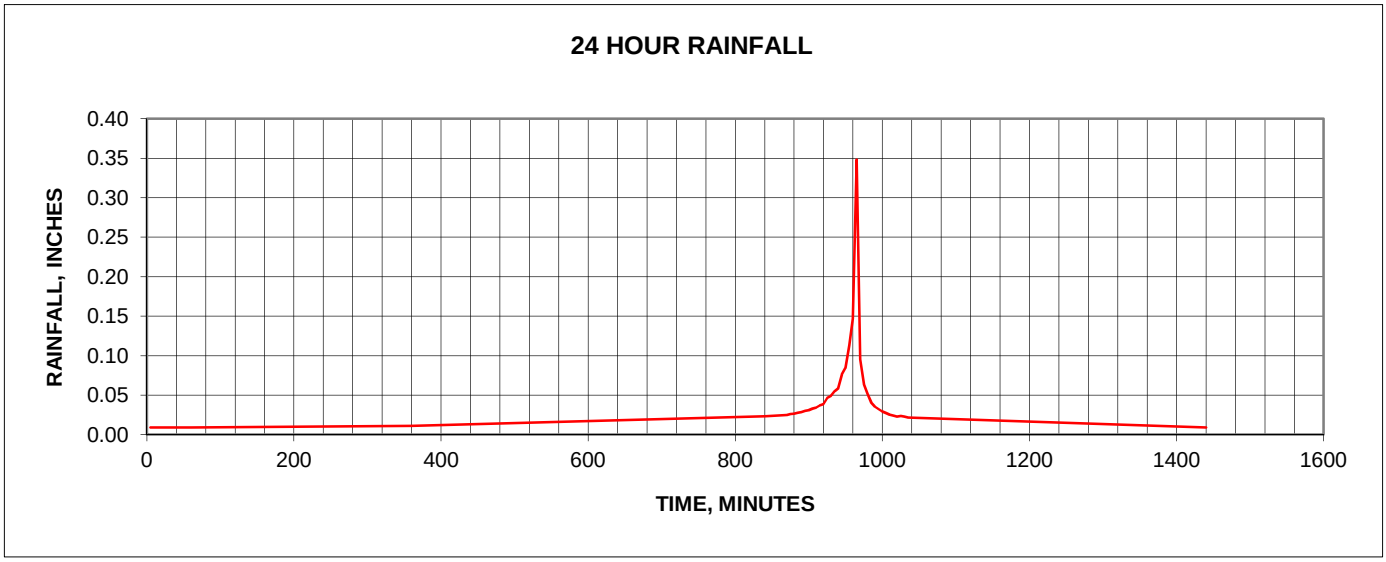
Delta T: 5 min.

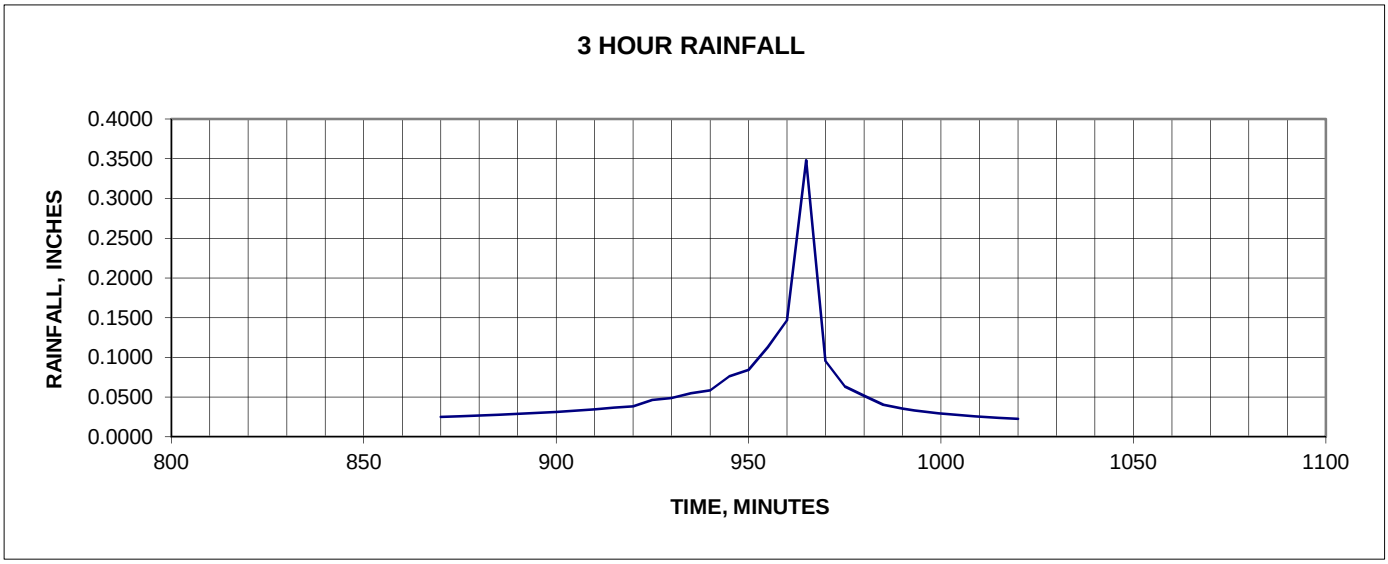
RAINFALL UNIT NUMBER	STORM TIME, MIN.	MASS POINT RAINFALL	POINT TIME	UNIT RAINFALL
1.	5	0.35	965	0.348
6.	30	0.86	945	0.076
12.	60	1.19	925	0.047
36.	180	1.88	845	0.022
72.	360	2.58	725	0.016
168.	840	3.94	405	0.012
174.	870	4.01	385	0.011
175.	875	4.02	1255	0.011
176.	880	4.03	380	0.011
177.	885	4.04	375	0.011
178.	890	4.05	1260	0.011
179.	895	4.06	370	0.011
180.	900	4.08	365	0.011
181.	905	4.09	1265	0.011
182.	910	4.10	360	0.011
183.	915	4.11	355	0.011
184.	920	4.12	1270	0.011
185.	925	4.13	350	0.011
186.	930	4.14	345	0.011
187.	935	4.15	1275	0.011
188.	940	4.16	340	0.011
189.	945	4.18	335	0.011
190.	950	4.19	1280	0.011
191.	955	4.20	330	0.011
192.	960	4.21	325	0.011
193.	965	4.22	1285	0.011
194.	970	4.23	320	0.011
195.	975	4.24	315	0.011
196.	980	4.25	1290	0.011
197.	985	4.26	310	0.011
198.	990	4.27	305	0.011
199.	995	4.28	1295	0.011
200.	1000	4.30	300	0.011
201.	1005	4.31	295	0.011
202.	1010	4.32	1300	0.011
203.	1015	4.33	290	0.011
204.	1020	4.34	285	0.011
205.	1025	4.35	1305	0.011
206.	1030	4.36	280	0.011
207.	1035	4.37	275	0.011
288.	1440	5.15	5	0.009
				5.15

REORDERED delta T=5min

POINT TIME	24 HR UNIT RAINFALL		3 HR UNIT RAINFALL
5	0.008926		
30	0.009037		
60	0.009186		
180	0.009865		
360	0.011241		
840	0.023369	*	0
870	0.024965		0.0250
875	0.026046		0.0260
880	0.026637		0.0266
885	0.027935		0.0279
890	0.028652		0.0287
895	0.030250		0.0302
900	0.031144		0.0311
905	0.033172		0.0332
910	0.034330		0.0343
915	0.037015		0.0370
920	0.038590		0.0386
925	0.046533		0.0465
930	0.048882		0.0489
935	0.054810		0.0548
940	0.058657		0.0587
945	0.076381		0.0764
950	0.084358		0.0844
955	0.113071		0.1131
960	0.146765		0.1468
965	0.348132		0.3481
970	0.095568		0.0956
975	0.063390		0.0634
980	0.051605		0.0516
985	0.040361		0.0404
990	0.035604		0.0356
995	0.032115		0.0321
1000	0.029422		0.0294
1005	0.027265		0.0273
1010	0.025490		0.0255
1015	0.023997		0.0240
1020	0.022721	*	0.0227
1025	0.023714		0
1030	0.022720		1.879
1035	0.021836		
1440	0.008957		
	5.15		

RAINFALL CURVE: **100 Year**





RAINFALL CURVE: **100 Year**

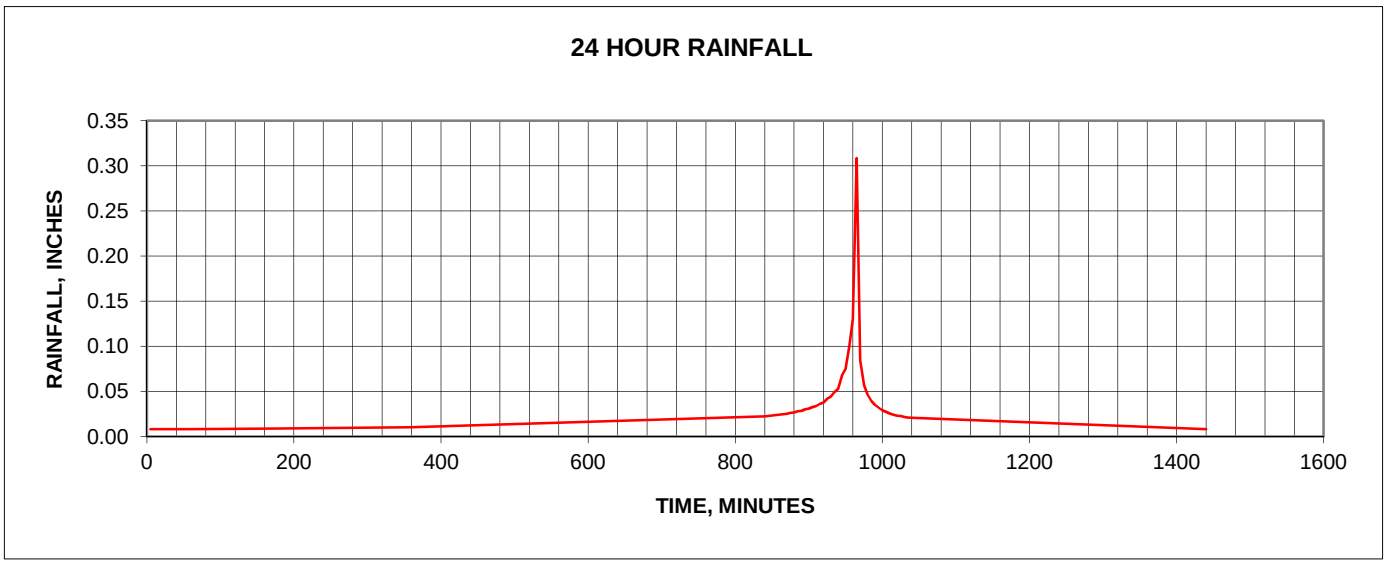
Delta T: 5 min.

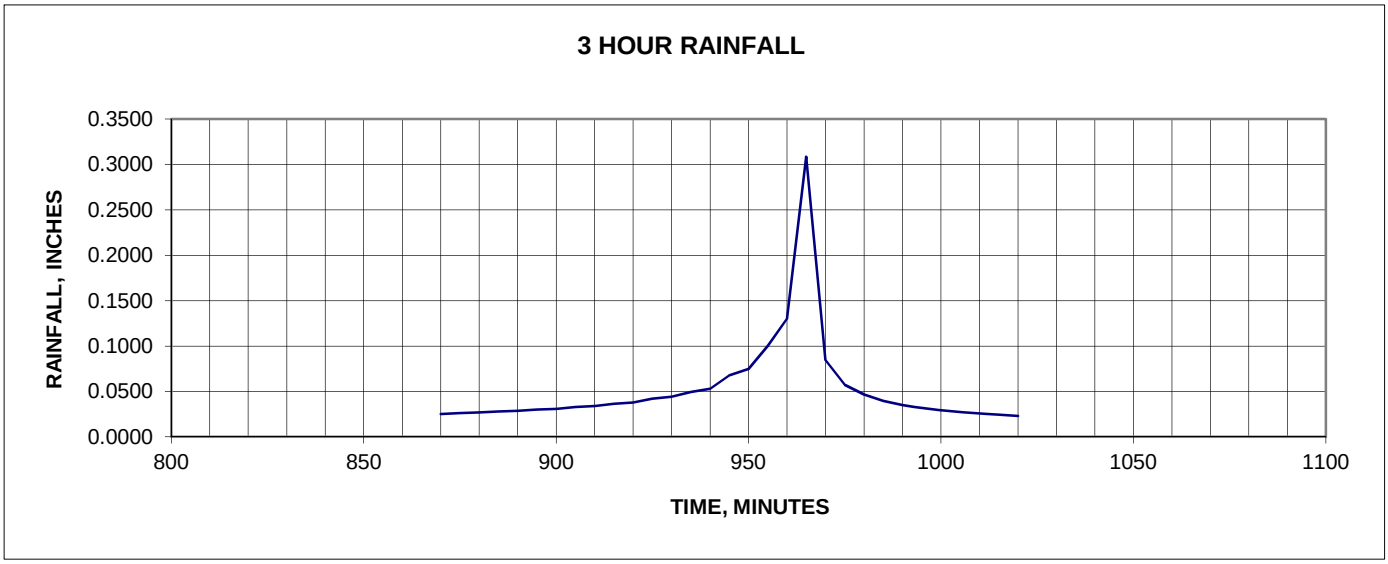
RAINFALL UNIT NUMBER	STORM TIME, MIN.	MASS POINT RAINFALL	POINT TIME	UNIT RAINFALL
1.	5	0.31	965	0.309
6.	30	0.77	945	0.068
12.	60	1.06	925	0.042
36.	180	1.75	845	0.022
72.	360	2.43	725	0.016
168.	840	3.68	405	0.011
174.	870	3.74	385	0.011
175.	875	3.75	1255	0.011
176.	880	3.76	380	0.010
177.	885	3.77	375	0.010
178.	890	3.78	1260	0.010
179.	895	3.79	370	0.010
180.	900	3.81	365	0.010
181.	905	3.82	1265	0.010
182.	910	3.83	360	0.010
183.	915	3.84	355	0.010
184.	920	3.85	1270	0.010
185.	925	3.86	350	0.010
186.	930	3.87	345	0.010
187.	935	3.88	1275	0.010
188.	940	3.89	340	0.010
189.	945	3.90	335	0.010
190.	950	3.91	1280	0.010
191.	955	3.92	330	0.010
192.	960	3.93	325	0.010
193.	965	3.94	1285	0.010
194.	970	3.95	320	0.010
195.	975	3.96	315	0.010
196.	980	3.97	1290	0.010
197.	985	3.98	310	0.010
198.	990	3.99	305	0.010
199.	995	4.00	1295	0.010
200.	1000	4.01	300	0.010
201.	1005	4.02	295	0.010
202.	1010	4.03	1300	0.010
203.	1015	4.04	290	0.010
204.	1020	4.05	285	0.010
205.	1025	4.06	1305	0.010
206.	1030	4.07	280	0.010
207.	1035	4.07	275	0.010
288.	1440	4.79	5	0.008
				4.79

REORDERED delta T=5min

POINT TIME	24 HR UNIT RAINFALL		3 HR UNIT RAINFALL
5	0.008149		
30	0.008252		
60	0.008391		
180	0.009023		
360	0.010306		
840	0.022536	*	0
870	0.025228		0.0252
875	0.026245		0.0262
880	0.026799		0.0268
885	0.028014		0.0280
890	0.028683		0.0287
895	0.030170		0.0302
900	0.031000		0.0310
905	0.032876		0.0329
910	0.033944		0.0339
915	0.036411		0.0364
920	0.037852		0.0379
925	0.042139		0.0421
930	0.044236		0.0442
935	0.049520		0.0495
940	0.052945		0.0529
945	0.067694		0.0677
950	0.074765		0.0748
955	0.100218		0.1002
960	0.130090		0.1301
965	0.308643		0.3086
970	0.084703		0.0847
975	0.057155		0.0572
980	0.046664		0.0467
985	0.039468		0.0395
990	0.035116		0.0351
995	0.031899		0.0319
1000	0.029400		0.0294
1005	0.027387		0.0274
1010	0.025722		0.0257
1015	0.024317		0.0243
1020	0.023109	*	0.0231
1025	0.022858		0
1030	0.021928		1.750
1035	0.021099		
1440	0.008178		
	4.79		

RAINFALL CURVE: **100 Year**





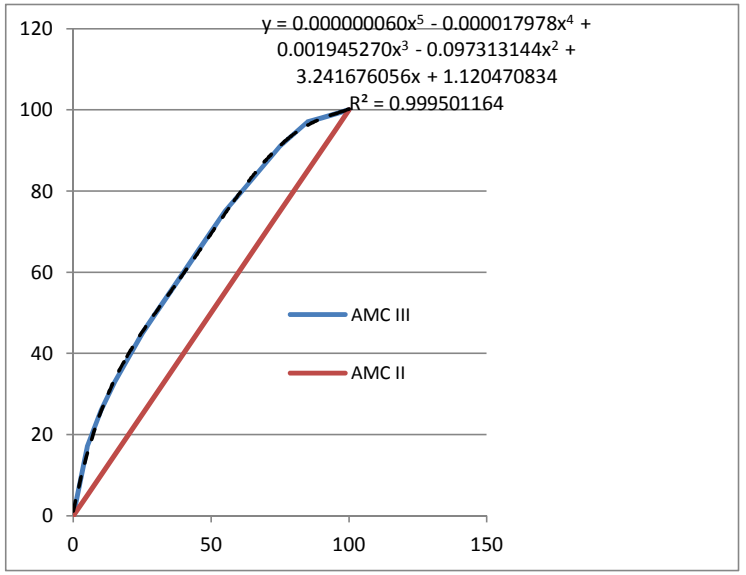
WATERSHED LOSS DETERMINATIONS
100 Year

P_{24}: 5.15 inches

Item	Land Use & Condition	A_f, Area Fraction for F_m	Soil Group	Fp, in/hr	ap, Pervious Area Fraction	Fm, in/hr	F_m x A_f	A_f, Area Fraction for Y	CN, Curve Number	S, (1000/CN)-10	Y, Pervious Area Yield Fraction	Y x A_f
1.	Combined	1.00	Varies	0.268	1	0.268	0.268	1.00	86.23	1.60	0.71	0.71
		1.00			**Area Averaged Loss Rate:**		**0.268**	**1.00**			**Area Averaged Yield Fraction:**	**0.71**
				Area Averaged Percent Pervious:	**1.00**			**Area Averaged Low Loss Fraction (Ybar):**				**0.295**

AMC Condition

AMC II	AMC I	AMC III	Curve Fit
100	100	100	99.63
95	87	99	98.60
90	78	98	97.49
85	70	97	95.97
80	63	94	93.86
75	57	91	91.07
70	51	87	87.62
65	45	83	83.60
60	40	79	79.13
55	35	75	74.37
50	31	70	69.47
45	27	65	64.55
40	23	60	59.70
35	19	55	54.95
30	15	50	50.21
25	12	45	45.30
20	9	39	39.91
15	7	33	33.55
10	4	26	25.58
5	2	17	15.13
0	0	0	1.12



	Average	Maximum	Minimum	Sandard Deviation
SBCHM Model Cn Values:	86.23	98.82	85.68	2.36
Whole FLO-2D Model Cn Values:	88.47	98.82	85.68	4.29

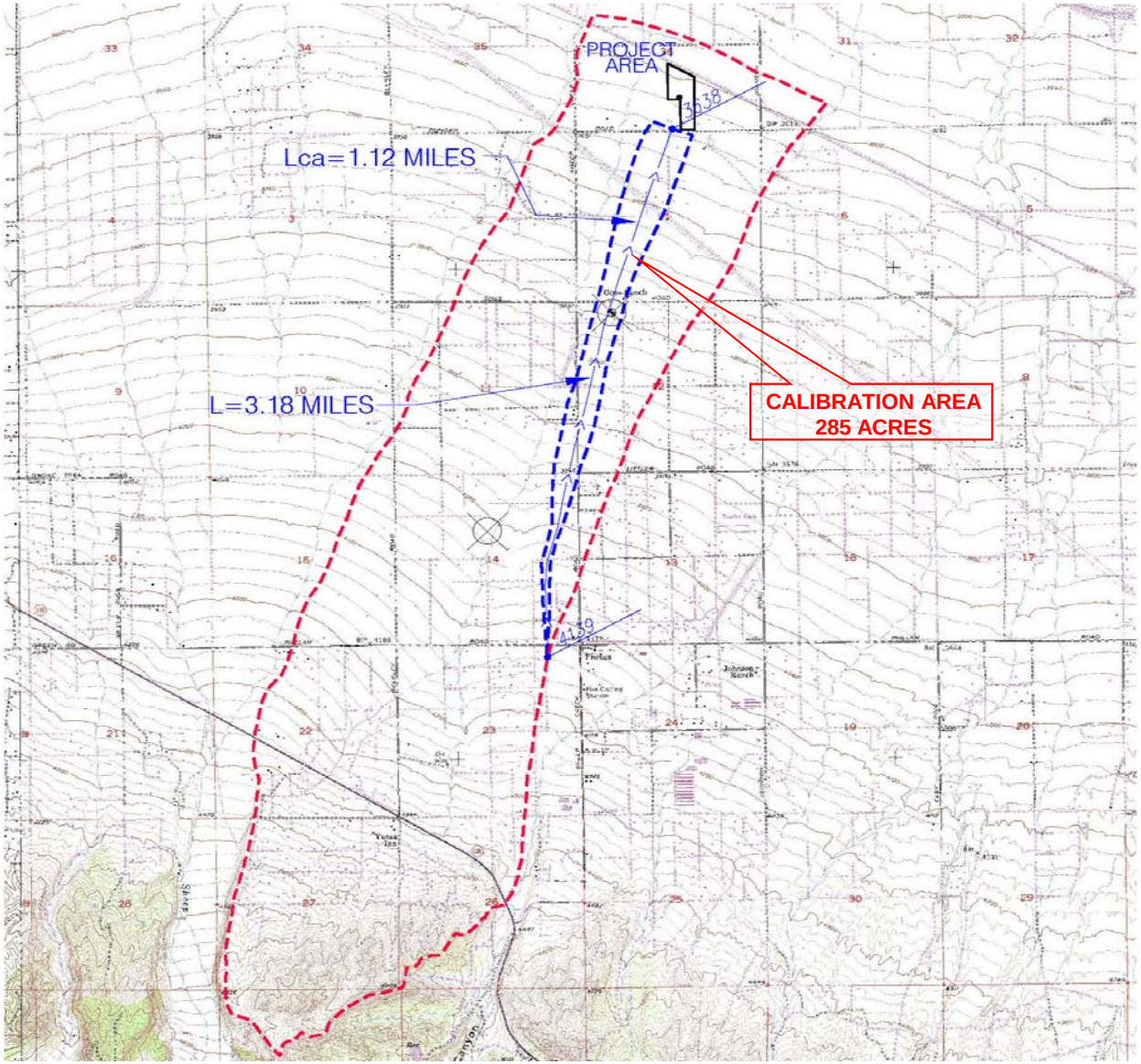
LAG

LAG EQUATION: Lag (hours)=24n[(L*Lca)/s^0.5]^m

n:	0.04	n			
L:	3.18	miles	**100yr Lag (hours):**	**0.595 hours**	
Lca:	1.12	miles	**10yr Lag (hours):**	**0.679 hours**	
elev1:	4139.0	msl			
elev2:	3638.0	msl			
H:	501.0	ft			
s:	157.4	ft/mile			
m:	0.38	m			

Tc(T)=Tc(100)*KT

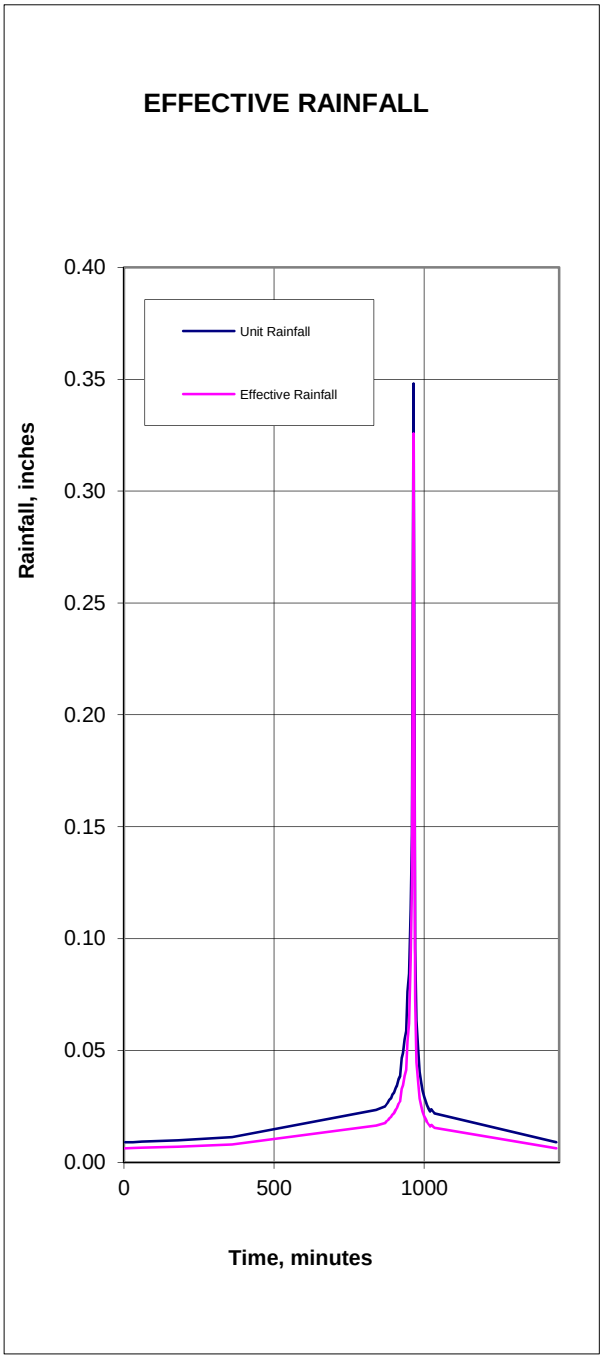
Return Period	KT Value
2	1.32
5	1.20
10	1.14
25	1.07
50	1.03
100	1.00



24 HOUR EFFECTIVE RAINFALL
100 Year Event

delta T:	5	min.
Fm:	0.268	in/hr
Y(bar):	0.295	
Max Loss:	0.0223	inches

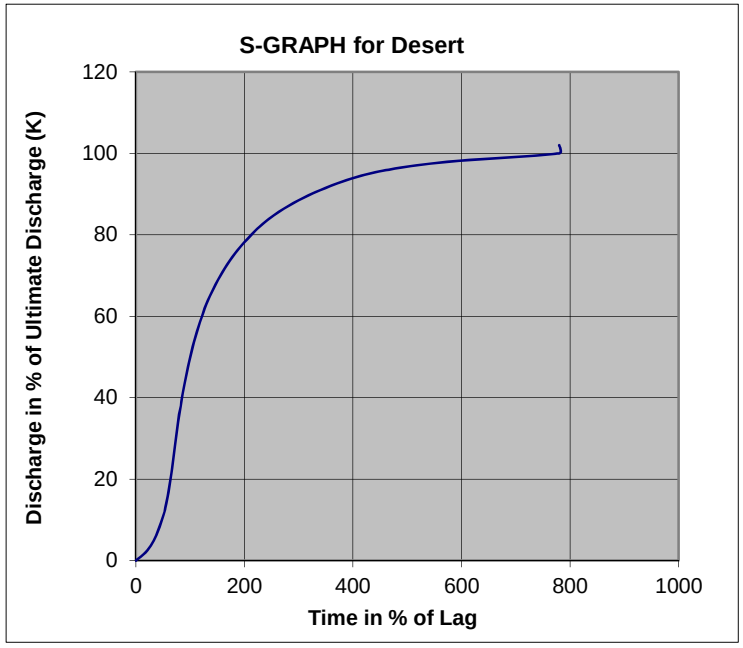
Time, min.	Unit Rainfall	Unit Losses	Effective Rainfall
5	0.0089	0.0026	0.00629
30	0.0090	0.0027	0.00637
60	0.0092	0.0027	0.00648
180	0.0099	0.0029	0.00695
360	0.0112	0.0033	0.00793
840	0.0234	0.0069	0.01648
870	0.0250	0.0074	0.01760
875	0.0260	0.0077	0.01836
880	0.0266	0.0079	0.01878
885	0.0279	0.0082	0.01969
890	0.0287	0.0085	0.02020
895	0.0302	0.0089	0.02133
900	0.0311	0.0092	0.02196
905	0.0332	0.0098	0.02339
910	0.0343	0.0101	0.02420
915	0.0370	0.0109	0.02610
920	0.0386	0.0114	0.02721
925	0.0465	0.0137	0.03281
930	0.0489	0.0144	0.03446
935	0.0548	0.0162	0.03864
940	0.0587	0.0173	0.04135
945	0.0764	0.0223	0.05406
950	0.0844	0.0223	0.06204
955	0.1131	0.0223	0.09075
960	0.1468	0.0223	0.12444
965	0.3481	0.0223	0.32581
970	0.0956	0.0223	0.07325
975	0.0634	0.0187	0.04469
980	0.0516	0.0152	0.03638
985	0.0404	0.0119	0.02846
990	0.0356	0.0105	0.02510
995	0.0321	0.0095	0.02264
1000	0.0294	0.0087	0.02074
1005	0.0273	0.0080	0.01922
1010	0.0255	0.0075	0.01797
1015	0.0240	0.0071	0.01692
1020	0.0227	0.0067	0.01602
1025	0.0237	0.0070	0.01672
1030	0.0227	0.0067	0.01602
1035	0.0218	0.0064	0.01539
1440	0.0090	0.0026	0.00631
	5.1516	1.3986	**3.7529**

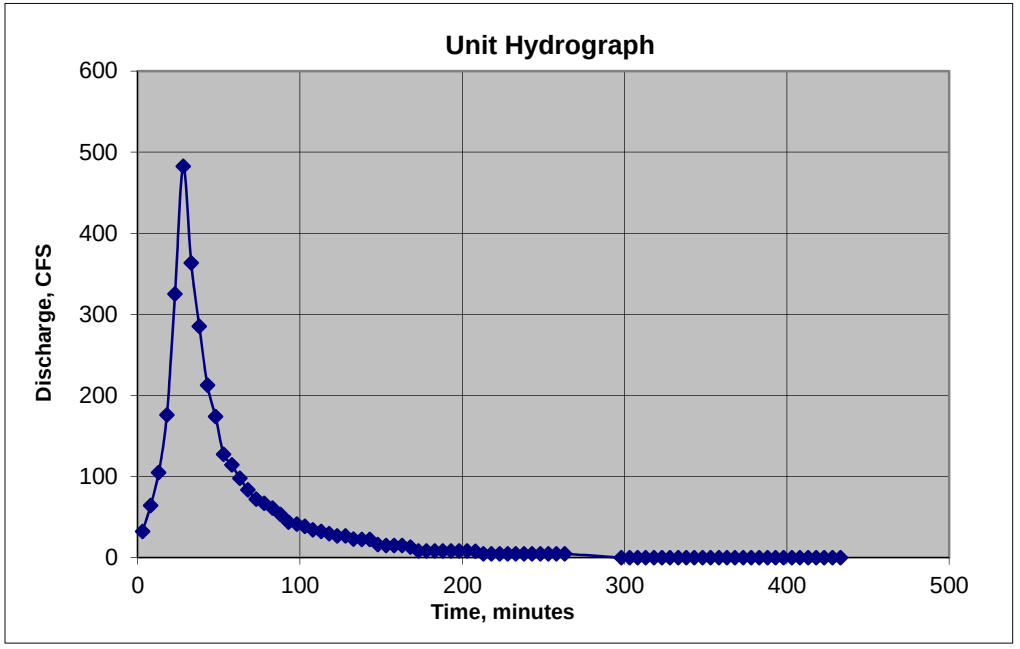


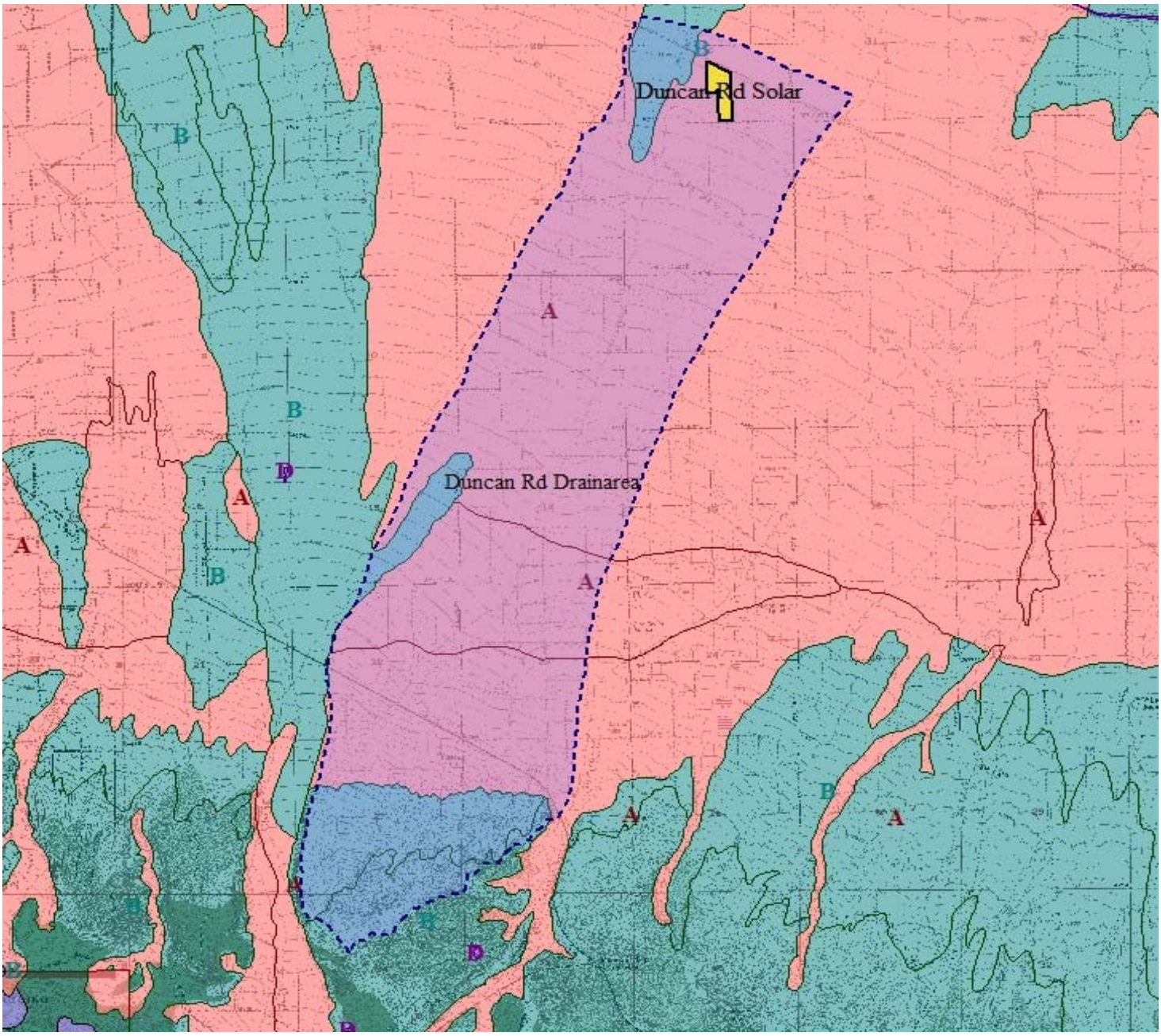
TIME, % of LAG	DISCHARGE %of ULTIMATE (MASS)	INPUT VALUES		Time Increment, min.	% lag	lower limit % mass	upper limit % mass	lower limit % lag	upper limit % lag	% Mass	Unit Hydrograph, CFS
0.00	0.00	Lag Time:	**0.595** hours	3	8.40	0.00	2.00	0.00	18.00	0.93	32.18
18.00	2.00	delta T:	**5** minutes	8	22.39	2.00	4.00	18.00	29.00	2.80	64.35
29.00	4.00	Acreage:	**285.21** acres	13	36.39	4.00	6.00	29.00	37.00	5.85	105.14
37.00	6.00	K:	**3449.258**	18	50.38	10.00	12.00	48.00	53.00	10.95	176.12
43.00	8.00	Max Q:	482.72	23	64.38	20.00	22.00	64.00	66.00	20.38	325.05
48.00	10.00			28	78.37	34.00	36.00	78.00	80.00	34.37	482.72
53.00	12.00			33	92.37	44.00	46.00	91.00	94.00	44.91	363.54
56.00	14.00			38	106.36	52.00	54.00	104.00	108.00	53.18	285.25
59.00	16.00			43	120.36	58.00	60.00	117.00	122.00	59.34	212.54
62.00	18.00			48	134.35	64.00	66.00	133.00	140.00	64.39	173.97
64.00	20.00			53	148.35	68.00	70.00	148.00	156.00	68.09	127.64
66.00	22.00			58	162.34	70.00	72.00	156.00	165.00	71.41	114.60
68.00	24.00			63	176.33	74.00	76.00	175.00	186.00	74.24	97.75
70.00	26.00			68	190.33	76.00	78.00	186.00	199.00	76.67	83.59
72.00	28.00			73	204.32	78.00	80.00	199.00	213.00	78.76	72.25
74.00	30.00			78	218.32	80.00	82.00	213.00	228.00	80.71	67.21
76.00	32.00			83	232.31	82.00	84.00	228.00	246.00	82.48	61.06
78.00	34.00			88	246.31	84.00	86.00	246.00	268.00	84.03	53.42
80.00	36.00			93	260.30	84.00	86.00	246.00	268.00	85.30	43.88
83.00	38.00			98	274.30	86.00	88.00	268.00	293.00	86.50	41.51
85.00	40.00			103	288.29	86.00	88.00	268.00	293.00	87.62	38.62
88.00	42.00			108	302.29	88.00	90.00	293.00	323.00	88.62	34.35
91.00	44.00			113	316.28	88.00	90.00	293.00	323.00	89.55	32.18
94.00	46.00			118	330.28	90.00	92.00	323.00	359.00	90.40	29.39
97.00	48.00			123	344.27	90.00	92.00	323.00	359.00	91.18	26.82
100.00	50.00			128	358.27	90.00	92.00	323.00	359.00	91.96	26.82
104.00	52.00			133	372.26	92.00	94.00	359.00	402.00	92.62	22.68
108.00	54.00			138	386.26	92.00	94.00	359.00	402.00	93.27	22.45
112.00	56.00			143	400.25	92.00	94.00	359.00	402.00	93.92	22.45
117.00	58.00			148	414.25	94.00	96.00	402.00	466.00	94.38	16.00
122.00	60.00			153	428.24	94.00	96.00	402.00	466.00	94.82	15.08
127.00	62.00			158	442.24	94.00	96.00	402.00	466.00	95.26	15.08
133.00	64.00			163	456.23	94.00	96.00	402.00	466.00	95.69	15.08
140.00	66.00			168	470.23	96.00	98.00	466.00	580.00	96.07	13.09
148.00	68.00			173	484.22	96.00	98.00	466.00	580.00	96.32	8.47

TIME, % of LAG	DISCHARGE %of ULTIMATE (MASS)	INPUT VALUES	Time Increment, min.	% lag	lower limit % mass	upper limit % mass	lower limit % lag	upper limit % lag	% Mass	Unit Hydrograph, CFS
156.00	70.00		178	498.22	96.00	98.00	466.00	580.00	96.57	8.47
165.00	72.00		183	512.21	96.00	98.00	466.00	580.00	96.81	8.47
175.00	74.00		188	526.21	96.00	98.00	466.00	580.00	97.06	8.47
186.00	76.00		193	540.20	96.00	98.00	466.00	580.00	97.30	8.47
199.00	78.00		198	554.20	96.00	98.00	466.00	580.00	97.55	8.47
213.00	80.00		203	568.19	96.00	98.00	466.00	580.00	97.79	8.47
228.00	82.00		208	582.19	98.00	100.00	580.00	780.00	98.02	7.90
246.00	84.00		213	596.18	98.00	100.00	580.00	780.00	98.16	4.83
268.00	86.00		218	610.17	98.00	100.00	580.00	780.00	98.30	4.83
293.00	88.00		223	624.17	98.00	100.00	580.00	780.00	98.44	4.83
323.00	90.00		228	638.16	98.00	100.00	580.00	780.00	98.58	4.83
359.00	92.00		233	652.16	98.00	100.00	580.00	780.00	98.72	4.83
402.00	94.00		238	666.15	98.00	100.00	580.00	780.00	98.86	4.83
466.00	96.00		243	680.15	98.00	100.00	580.00	780.00	99.00	4.83
580.00	98.00		248	694.14	98.00	100.00	580.00	780.00	99.14	4.83
780.00	100.00		253	708.14	98.00	100.00	580.00	780.00	99.28	4.83
780.00	102.00		258	722.13	98.00	100.00	580.00	780.00	99.42	4.83
780.00	104.00		263	736.13	98.00	100.00	580.00	780.00	99.56	4.83
			298	834.09	104.00	0.00	780.00	0.00	100.00	0.00
			303	848.09	104.00	0.00	780.00	0.00	100.00	0.00
			308	862.08	104.00	0.00	780.00	0.00	100.00	0.00
			313	876.08	104.00	0.00	780.00	0.00	100.00	0.00
			318	890.07	104.00	0.00	780.00	0.00	100.00	0.00
			323	904.07	104.00	0.00	780.00	0.00	100.00	0.00
			328	918.06	104.00	0.00	780.00	0.00	100.00	0.00
			333	932.06	104.00	0.00	780.00	0.00	100.00	0.00
			338	946.05	104.00	0.00	780.00	0.00	100.00	0.00
			343	960.05	104.00	0.00	780.00	0.00	100.00	0.00
			348	974.04	104.00	0.00	780.00	0.00	100.00	0.00
			353	988.04	104.00	0.00	780.00	0.00	100.00	0.00
			358	1002.03	104.00	0.00	780.00	0.00	100.00	0.00
			363	1016.03	104.00	0.00	780.00	0.00	100.00	0.00
			368	1030.02	104.00	0.00	780.00	0.00	100.00	0.00
			373	1044.01	104.00	0.00	780.00	0.00	100.00	0.00
			378	1058.01	104.00	0.00	780.00	0.00	100.00	0.00

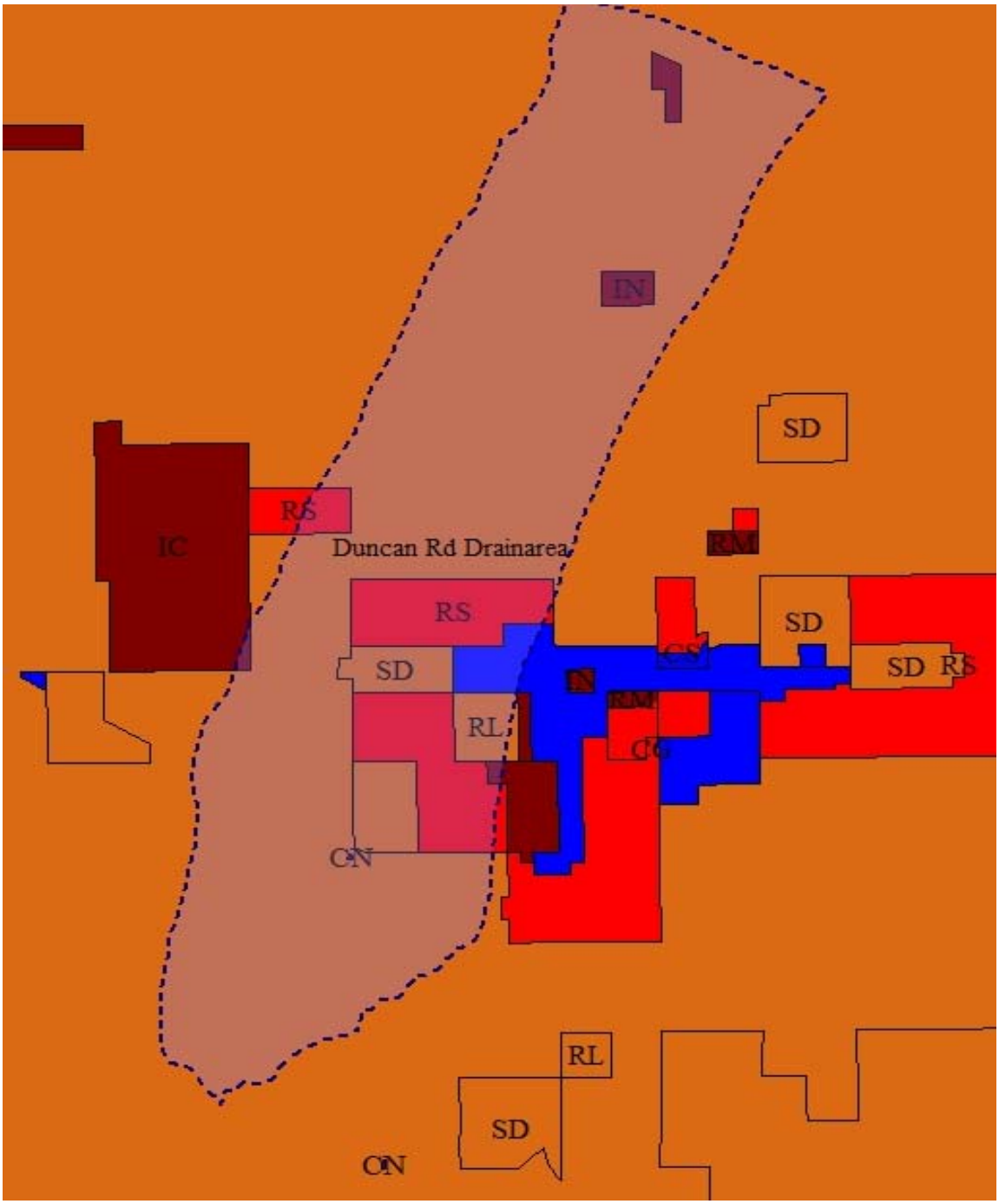
TIME, % of LAG	DISCHARGE %of ULTIMATE (MASS)	INPUT VALUES	Time Increment, min.	% lag	lower limit % mass	upper limit % mass	lower limit % lag	upper limit % lag	% Mass	Unit Hydrograph, CFS
			383	1072.00	104.00	0.00	780.00	0.00	100.00	0.00
			388	1086.00	104.00	0.00	780.00	0.00	100.00	0.00
			393	1099.99	104.00	0.00	780.00	0.00	100.00	0.00
			398	1113.99	104.00	0.00	780.00	0.00	100.00	0.00
			403	1127.98	104.00	0.00	780.00	0.00	100.00	0.00
			408	1141.98	104.00	0.00	780.00	0.00	100.00	0.00
			413	1155.97	104.00	0.00	780.00	0.00	100.00	0.00
			418	1169.97	104.00	0.00	780.00	0.00	100.00	0.00
			423	1183.96	104.00	0.00	780.00	0.00	100.00	0.00
			428	1197.96	104.00	0.00	780.00	0.00	100.00	0.00
			433	1211.95	104.00	0.00	780.00	0.00	100.00	0.00
			653	1827.73	104.00	0.00	780.00	0.00	100.00	0.00







Base Value Cn	
Soil Type	**Complex Applied for Cn**
A	B Ponderosa Pine
B	B Desert Brush
C	C Desert Brush
D	D Desert Brush



Zoning	Description	Fraction Cover	Fraction Impervious	Map Color
CG	General Commercial	0.10	0.900	Blue
CN	Neighborhood Commercial	0.10	0.900	Blue
CO	Office Commercial	0.10	0.900	Blue
CS	Service Commercial	0.10	0.900	Blue
FW	Floodway	0.20	0.001	Yellow
IC	Community Industrial	0.15	0.800	Brown
IN	Institutional	0.15	0.800	Brown
RC	Resource Conservation	0.40	0.001	Yellow
RL	Rural Living	0.30	0.100	Orange
RM	Multiple Residential	0.25	0.800	Brown
RS	Single Residential	0.30	0.400	Red
SD	Special Development	0.30	0.100	Orange

APPENDIX A
HEC-HMS Results

APPENDIX B
FLO-2D SUMMARY

APPENDIX C
FLO-2D DRAWINGS

APPENDIX D
FLO-2D FILES