Appendix L

Preliminary Drainage Report

Kimley»Horn

PRELIMINARY DRAINAGE REPORT

Lear Community Solar and Battery Energy Storage System Project

APN: 0612-131-01

Southeast Corner of Lear Ave. and Mesa Dr.
San Bernardino County, CA 92277

Permit #: 2023-00170

July 2024

PREPARED FOR

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PREPARED BY

EXPIRES 09/30/2024

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INTRODUCTION

RPCA Solar 15, LLC is proposing a community solar project capable of producing up to 9.99-megawatts (MW). The subject tract is to be located at the southeast corner of Mesa Drive and Lear Avenue in unincorporated San Bernardino County at APN 0612-131-01. The subject tract is bounded by developed parcels, including residential uses, to the north, west, and south. An existing utility scale solar project is located immediately southwest of the subject tract parcel. Refer to **Figure 1** for the Vicinity Map.

PURPOSE

The purpose of this report is to summarize the results of the hydrologic and hydraulic analysis conducted for the subject tract for the 100-year storm and 85th percentile storm water quality events. RPCA Solar 15, LLC is intending to develop the property as a ground-mount photovoltaic solar power generation facility. This analysis included offsite runoff from the nearby mountains. The hydrologic analysis was used to develop a hydraulic analysis to determine the site drainage limits and characteristics.

METHODOLOGY

Hydrologic calculations were completed per the Natural Resources Conservation Service (NRCS) National Engineering Handbook (NEH) Part 630 – Hydrology and the San Bernardino County Hydrology Manual and Addendum. The Hydrowin Advanced Engineering Software (AES) program was used to calculate the loss rate values, effective rainfall, S-graph, and onsite hydrologic model based off of arid region San Bernardino County guidelines. The unsteady two-dimensional function in United States Army Corps of Engineers HEC-RAS computer program (Version 6.2) was used for the hydraulic modeling. The following parameters and/or assumptions were used for the hydrologic and hydraulic models:

- Watersheds were delineated utilizing USGS 1-meter National Elevation Dataset (NED) digital elevation models (DEM).
- Hydrologic Soil Data was digitized and geo-referenced from the San Bernardino County Hydrology Manual Hydrologic Soils Group Map (Figure C-11).
- Existing land uses based on the 2021 National Land Cover Database from the Multi-Resolution Land Characteristics Consortium (MRLC).
- Rainfall data from National Oceanic and Atmospheric Administration (NOAA) Atlas 14.
- The San Bernardino County Desert S-Graph 24-hour synthetic storm pattern was used to model the precipitation for the model.
- The San Bernardino County Hydrology Manual design storm loss rate method was used to estimate rainfall losses and direct runoff.
- The curve numbers were assigned based on existing land use, defined by aerial imagery and the National Land Cover Database (Attachment A).

FEMA FLOODPLAIN CLASSIFICATIONS

The Special Flood Hazard Areas (SFHA) are outlined in the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps. The subject tract within FEMA Flood Zone X (unshaded). FEMA

Flood Zone X (unshaded) is defined as areas outside the 0.2% annual chance floodplain. The subject tract is located on FEMA Flood Insurance Rate Map FIRM Community Panel No. 06071C8175H, effective August 28, 2008. Refer to the FEMA FIRM panel for the site in **Attachment A.** The subject tract was considered in the HEC-RAS model to determine the extent of the potential flood hazards. From the HEC-RAS inundation model, it is unlikely that a flood hazard will occur within the property area.

HYDROLOGY

A detailed hydrologic analysis was completed for the subject tract and the contributing offsite watershed. Refer to **Figure 6** for the Drainage Area Map.

Site Characteristics

The property generally drains from east to west. The total contributing watershed to this property is limited by ditches to the north, south, east, and west, with limited anticipated run-on from the eastern offsite areas. The soil data collection from the San Bernardino County Hydrology Manual Hydrologic Soils Group Map plate data indicates that the subject tract's hydrologic soil group is classified as hydrologic soil group (HSG) C.

Rainfall

The 100-year, 24-hour storm event was modeled for this analysis. Per the San Bernardino County Hydrology Manual, the synthetic storm pattern was used to model the precipitation for onsite flows. Refer to Table 1 and **Attachment A** for the NOAA 14 precipitation data.

Table 1: NOAA 14 Precipitation Data

Storm Event	Precipitation (in)
100-year	3.83

Parameters

The low loss fraction and maximum watershed loss rate for each sub-basin were estimated using the San Bernardino County Hydrology method, existing conditions land use, and soil data collection from the San Bernardino County Hydrology Manual Hydrologic Soils Group Map data. The Hydrowin Advanced Engineering Software (AES) program was used to calculate the loss parameters for each subbasin. The vegetative cover was estimated using aerial imagery and engineering judgement. Refer to **Figure 3** and **Figure 4** for the land cover and soils maps, respectively**.** The lag time was calculated using the San Bernardino County method, depending on sub-basin characteristics.

Results

Table 2 is a summary of the hydrologic results. The single area unit hydrograph output from AES provided the effective rainfall for the drainage area. Refer to **Attachment A** for full effective rainfall calculations.

Table 2: Hydrologic Sub-basin Results

Subbasin	Area (mi^2)	Basin Factor	S-Graph Type	Lag (hr)	Max. Loss Rate (in/hr)
2D	9.76	0.030	Desert	0.286	0.138

HYDRAULICS

The results of the hydrologic modelling were used to develop a detailed hydraulic model for the site. HEC-RAS v.6.2 can model two-dimensional unsteady flow. The two-dimensional model uses the effective rainfall to route the runoff through the property in any of the sub-critical, critical and super-critical states. The program uses a computed mesh with irregular polygon cells to pass the runoff.

2D Mesh

The mesh was built in HEC-RAS using the topography obtained for this project. The cells were generated at 50-foot by 50-foot intervals for the majority of the site and at 5-foot by 5-foot intervals for all defined existing channels and other areas requiring more detail. The different zones within the property were assigned a curve number value based on the existing land cover of the site.

Boundary Conditions

Boundary conditions were set using the effective precipitation time series throughout the 2D model domain. A normal depth condition was used to set the downstream boundary at points where the runoff exits the model domain. All slopes were determined using the sub-basin topography.

2D MODEL RESULTS (OFFSITE WATERSHED)

The 100-year inundation boundary and maximum velocities were mapped based on the modeling results, refer to **Figure 7** and **Figure 8.**

During the 100-year event, inundation occurs in the natural washes and channels that run from west to east, in the immediate vicinity located north of the site. The subject tract is located adjacent to an ephemeral waterbody. The inundation depth ranges between six inches and three feet in the immediate vicinity of the subject tract. Sheet flow occurs across most of the subject tract, with depths less than six inches prevalent across most of the site. In some areas of channelized flow north of the site along Mesa Drive, inundation depths range between six inches and two feet.

The maximum velocities range from zero to five feet per second throughout the site. Most of the site experiences velocities less than one foot per second. Within the major wash, velocity ranges between 0.5 and 3 feet per second. In some areas of channelized flow throughout the site, velocity ranges between 0.5 and 3 feet per second.

ONSITE DRAINAGE ANALYSIS

Existing

The existing unit hydrograph calculations were completed to quantify the volume and peak flow rates for the subject tract for the 100-year, 24-hours storm event. **Table 3** contains a summary of the existing conditions hydrograph for the 100-year, 24-hour event. Refer to **Figure 2a** for the Existing Conditions Onsite Hydrology Map.

Table 3: Existing Conditions Peak Flow Summary

Drainage Area ID	Area (ac)	Impervious (%)	100-yr Peak Discharge (cfs)
DA-1	68.25	0	205.63

Proposed

The proposed unit hydrograph was developed using AES and the flood routing analysis was completed in Bentley's Pondpack software. Refer to **Table 4** for the summary of the 100-year, 24-hour proposed conditions peak flow. Approximately 161 cubic feet of storage is required for the change in runoff due to the 0.5% increase in imperviousness of the proposed site design and approximately 1,399 cubic feet is provided as summarized in **Table 5.** Stormwater storage areas are anticipated to be provided via a shallow detention basin. See **Figure 2b** for the Proposed Conditions Onsite Hydrology Map and **Appendix C** for the proposed imperviousness calculations.

Table 4: Proposed Conditions Peak Flow Summary

Drainage Area ID	Area (ac)	Impervious (%)	100-yr Unmitigated Peak Discharge (cfs)	100-yr Mitigated Peak Discharge (cfs)
DA-1	68.25	0.5	205.69	195.04

Table 5: Detention Design Summary

Basin	Water Storage Depth (ft)	Existing Peak Discharge (cfs)	Proposed Unmitigated Peak Discharge (cfs)	Proposed Mitigated Peak Discharge (cfs)	Weir Length (ft)	Storage Required (Cu-Ft)	Storage Provided (Cu-Ft)
1	0.5	205.63	205.69	195.04	800	161	1,399

See additional calculations in PondPack output in **Attachment B**.

WATER QUALITY DESIGN

The subject tract is located within unincorporated San Bernardino County, California and within the boundaries of the Colorado River Regional Water Quality Control Board (RWQCB). Per the California Stormwater Quality Association (CASQA) Low Impact Development (LID) Manual, and the Mojave River Watershed Region Stormwater Quality Best Management Practice Design Handbook for Low Impact Development, project development must include sufficient water quality design to mimic the pre-development hydrology to the maximum extent practicable.

The proposed site must comply with the post-construction standards set forth in the NPDES General Permit for Stormwater Discharges in California NPDES NO. CAS00002 (General Permit). Within the Post-Construction Section I.U of the Construction General Permit, the post-development runoff must match the pre-development runoff for the 85th percentile, 24-hour storm event. The proposed lease limit of the subject tract is used to delineate the site area for water quality purposes. The water quality target volume required to be treated by the site is the calculated difference between the 85th percentile volume produced by the post and pre-development conditions. Per the San Bernardino County Mojave River Watershed Infiltration Basin BMP guidelines, the volume required to be treated combined with the infiltration basin drawdown parameters within Table 5-4 of the Mojave River Watershed Technical Guidance Document determines the minimum bottom surface area of the basin. See **Table 6** for the summary of the water quality requirements and **Attachment C** for the detailed calculations.

Table 6: Water Quality Summary

Basin	Area (Ac)	Water Storage Depth (ft)	Pre-Development 85th Percentile Volume (cu-ft)	Post-Development 85th Percentile Volume (cu-ft)	Required Treatment Volume (cu-ft)	Volume Provided (cu-ft)	Minimum Bottom Surface Area Required (sq-ft)
1	68.25	0.5	13,694	15,021	1,328	1,399	416

Temporary erosion and sediment control best management practices (BMPs) will generally be placed on the downstream limits of the site and within and adjacent to areas of mass grading until the site is restabilized per jurisdictional requirements. BMPs that may be used on this project are stabilized construction entrances, vehicle washouts, earthen dikes, fiber rolls, silt fence, and/or erosion control matting.

DISCUSSION OF POTENTIAL IMPACTS

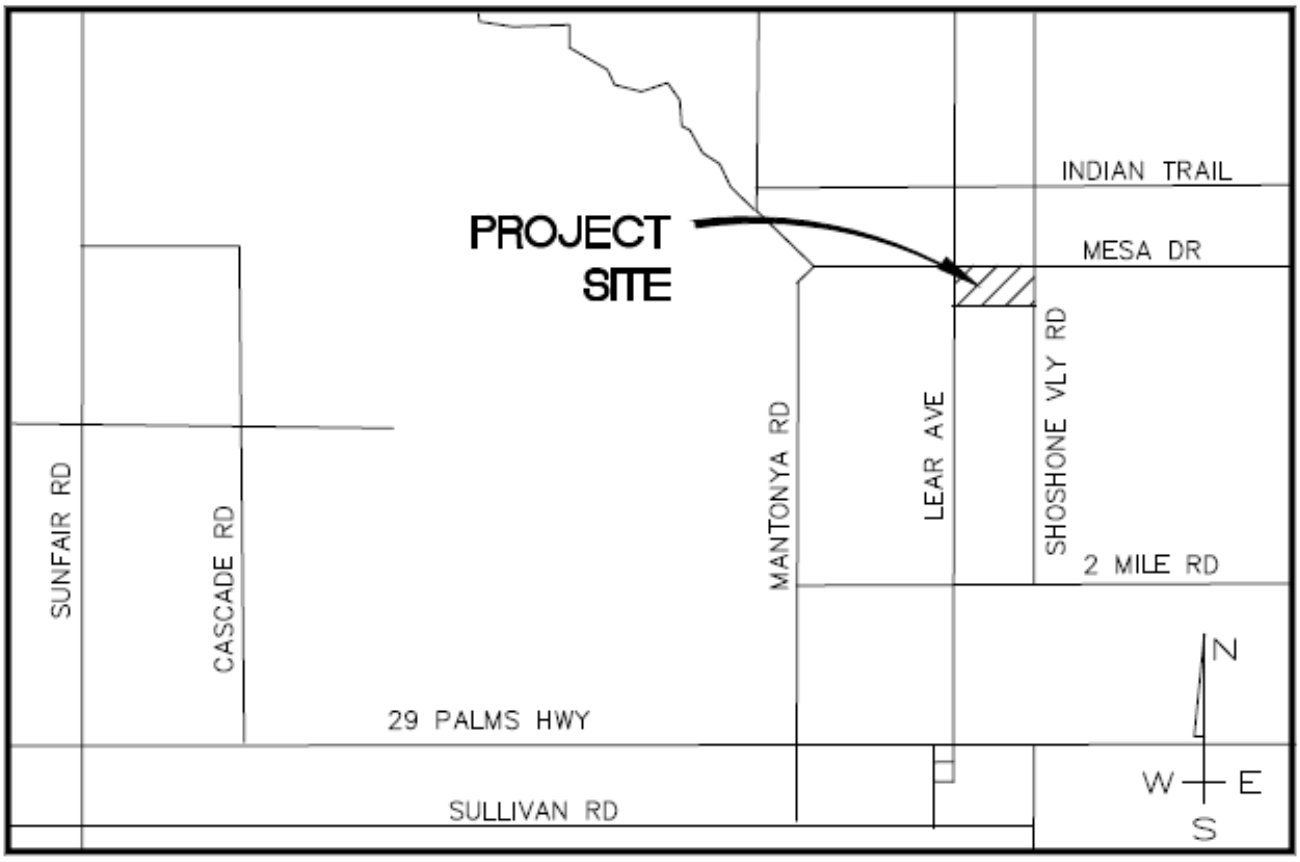
RPCA Solar 15, LLC is proposing a 9.99 MW community solar project. The subject tract is to be located at the southeast corner of Lear Ave and Mesa Dr, within unincorporated San Bernardino County. The hydrologic and hydraulic analyses were used to determine inundation limits and depths of flow for the 100-year storm in the existing conditions. The hydrologic analyses and water quality calculations were used to determine detention basin sizes for the subject tract.

As discussed in this study, approximately 161 cubic feet of storage would be required to account for the increase in runoff due to the 0.5% increase in imperviousness of the proposed site design. Approximately 1,399 cubic feet would be provided as stormwater storage areas in the form of a shallow detention basin. Therefore, the detention basin would accommodate the potential increase in stormwater such that development of the Project would not result in an increase of surface runoff.

Figures

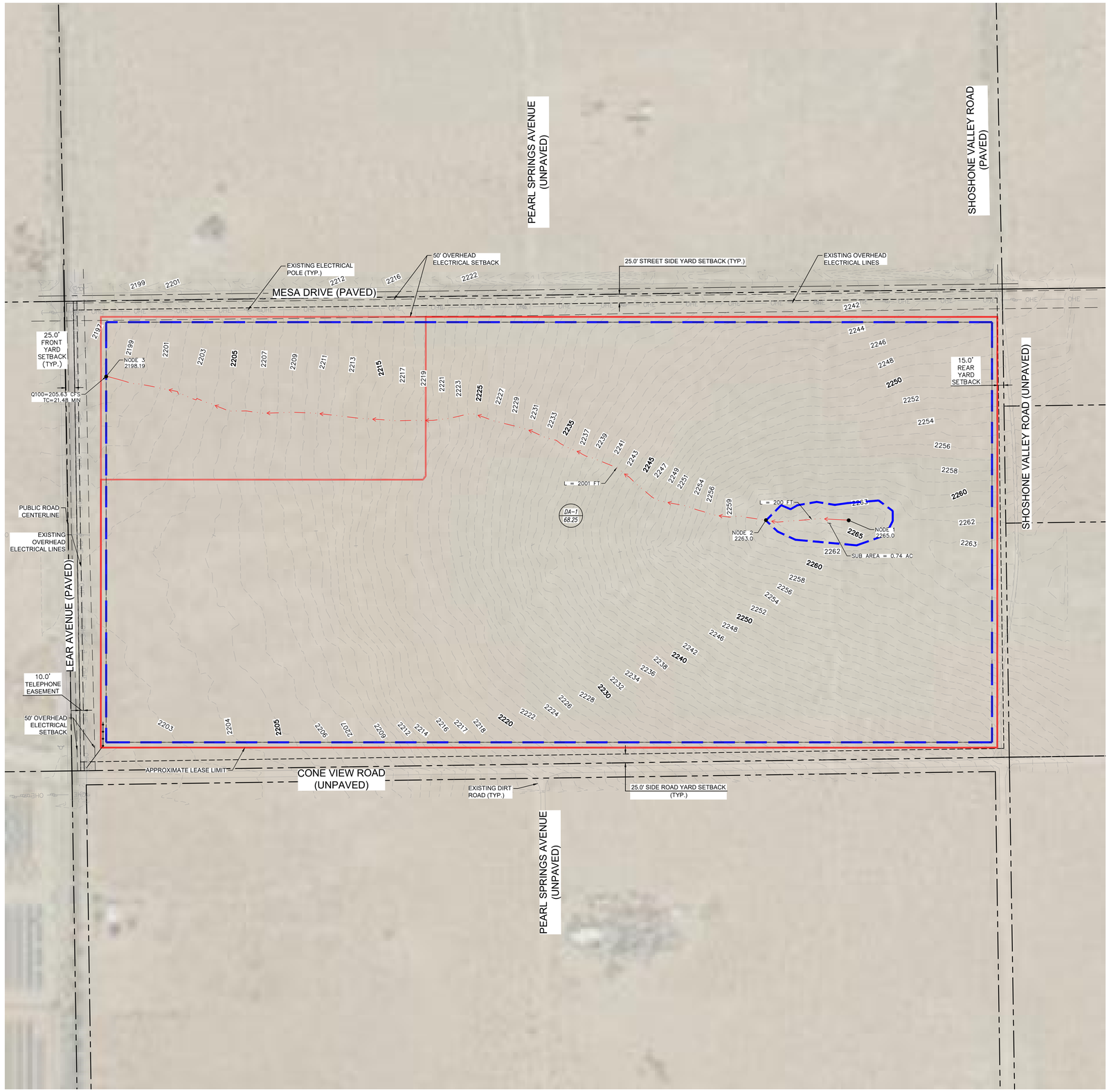
Attachments

FIGURE 1



VICINITY MAP

NTS



LEGEND

- EXISTING PROPERTY LINE
- APPROXIMATE LEASE LIMIT
- PROPERTY LINE SETBACK
- PROPOSED ROAD CENTERLINE
- EXISTING OVERHEED LINE
- 50' OVERHEAD LINE SETBACK
- EXISTING ROADS (VARYING WIDTHS)
- EXISTING CONTOUR
- ONSITE DRAINAGE AREA WITH APPROXIMATE ACREAGE
- ONSITE DRAINAGE AREA LIMIT
- ONSITE FLOW PATH

SITE INFORMATION

PROJECT ADDRESS:	SOUTHEAST CORNER OF LEAR AVENUE AND MESA DRIVE, TWENTYNINE PALMS, CA 92277
APN:	0612-131-01
SITE AREA :	68.25 AC
FLOOD NOTE:	THIS PROPERTY IS IN ZONE "X" OF THE FLOOD INSURANCE RATE MAP, PANEL NO. 06071C8175H PANEL DATED AUGUST 28, 2008. THIS PROPERTY IS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.

WATER QUALITY CALCULATIONS

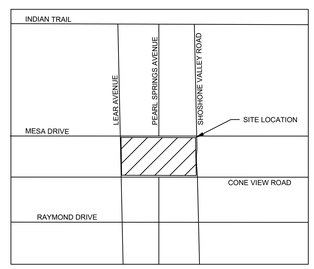
INPUT PARAMETER	VALUE
PARAMETER APPLICATION	ONSITE BASIN SIZING
DEVELOPMENT CONDITIONS	EXISTING
ON-SITE AREA	68.25 ACRES
STORM FREQUENCY	85TH PERCENTILE
RAINFALL DEPTH (2-YEAR, 1-HOUR)	0.569 INCHES
85TH PERCENTILE DEPTH	0.704 INCHES
PERCENT IMPERVIOUS	0%
CLIMATIC REGION	DESERT
A1 (DESERT)	1.2371
A2 (48-HOUR DRAWDOWN)	1.9630
COMPOSITE RUNOFF C VALUE	0.04
85TH PERCENTILE WATER QUALITY VOLUME	13694 CF

NOTES: N/A

ON-SITE HYDROLOGIC CALCULATIONS

INPUT PARAMETER	VALUE
PARAMETER APPLICATION	ONSITE BASIN SIZING
DEVELOPMENT CONDITIONS	EXISTING
SITE AREA	68.25 ACRES
STORM FREQUENCY	100-YEAR, 24-HOUR
RAINFALL DEPTH (100-YEAR, 24-HOUR)	3.83 INCHES
PERCENT IMPERVIOUS	0%
100-YEAR, 24-HOUR PEAK FLOW	205.63 CFS

NOTES: N/A



VICINITY MAP
NTS

NORTH

GRAPHIC SCALE IN FEET
0 60 120 240

No.	REVISIONS	DATE	BY

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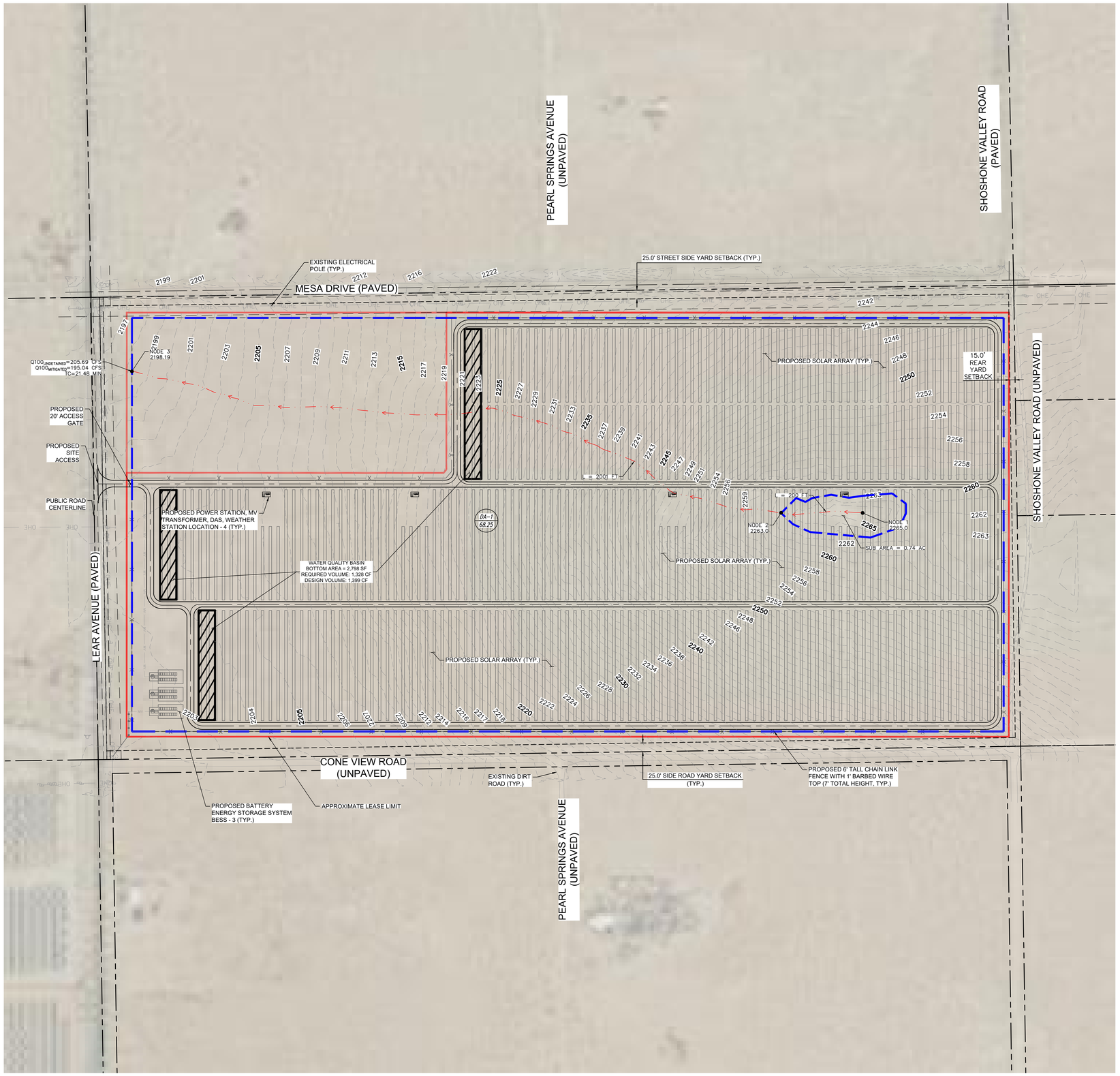
DATE 05/13/2024
SCALE AS SHOWN
DESIGNED BY BY
DRAWN BY BRS
CHECKED BY RR

PREPARED FOR
RPCA SOLAR 15, LLC
SAN BERNARDINO COUNTY CALIFORNIA

EXISTING CONDITIONS ONSITE HYDROLOGY MAP

FIGURE 2A

LEAR SOLAR



LEGEND

- EXISTING PROPERTY LINE
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- PROPOSED ROAD CENTERLINE
- EXISTING OVERHEED LINE
- 50' OVERHEAD LINE SETBACK
- EXISTING ROADS (VARYING WIDTHS)
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- ONSITE DRAINAGE AREA WITH APPROXIMATE ACREAGE
- ONSITE DRAINAGE AREA LIMIT
- ONSITE FLOW PATH

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WATER QUALITY CALCULATIONS

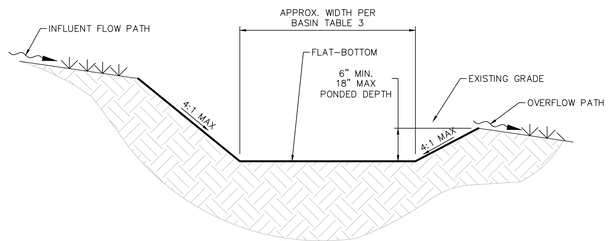
INPUT PARAMETER	VALUE
PARAMETER APPLICATION	ONSITE BASIN SIZING
DEVELOPMENT CONDITIONS	PROPOSED
ON-SITE AREA	68.25 ACRES
STORM FREQUENCY	85TH PERCENTILE
RAINFALL DEPTH (2-YEAR, 1-HOUR)	0.569 INCHES
85TH PERCENTILE DEPTH	0.704 INCHES
PERCENT IMPERVIOUS	0.50%
CLIMATIC REGION	DESERT
A1 (DESERT)	1.2371
A2 (48-HOUR DRAWDOWN)	1.9630
COMPOSITE RUNOFF C VALUE	0.044
85TH PERCENTILE WATER QUALITY VOLUME	15021 CF

NOTES: N/A

ON-SITE HYDROLOGIC CALCULATIONS

INPUT PARAMETER	VALUE
PARAMETER APPLICATION	ONSITE BASIN SIZING
DEVELOPMENT CONDITIONS	PROPOSED
SITE AREA	68.25 ACRES
STORM FREQUENCY	100-YEAR, 24-HOUR
RAINFALL DEPTH (100-YEAR, 24-HOUR)	3.83 INCHES
PERCENT IMPERVIOUS	0.50%
100-YEAR, 24-HOUR PEAK FLOW (UNDETAINED)	205.69 CFS
100-YEAR, 24-HOUR PEAK FLOW (MITIGATED)	195.04 CFS

NOTES: N/A



NOTES:
1. THIS DETAIL REPRESENTS GENERAL INTENT; BASINS TO BE FURTHER DETAILED DURING FINAL DESIGN.
2. SPOILS FROM BASIN EXCAVATION ARE TO REMAIN ON-SITE, SHOULD BE PLACED ON RIDGELINES WHERE POSSIBLE.
3. BASINS TO BE CONSTRUCTED IN ELONGATED RECTANGULAR LAYOUT AS SHOWN PER PLAN.
4. PROPOSED ONSITE ACCESS ROADS SHALL REMAIN AT EXISTING GRADE, ELEVATED ABOVE BASIN INUNDATION ELEVATIONS IN ORDER TO DISCOURAGE INUNDATION OF TRAVELED WAY.
5. EARTHWORK REQUIRED FOR BASIN GRADING AND DAYLIGHT SLOPES MAY EXCEED THE MINIMUM REQUIRED STORAGE OR RETENTION VOLUME AND IS SUBJECT TO CHANGE DURING THE FINAL DEISGN

TYPICAL INFILTRATION RETENTION BASIN

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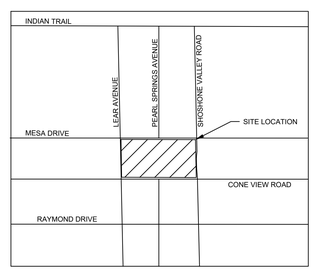

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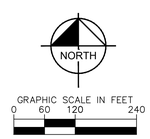

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KHA PROJECT 099950006
DATE 05/13/2024
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RPCA SOLAR 15, LLC
CALIFORNIA
SAN BERNARDINO COUNTY

PROPOSED CONDITIONS ONSITE HYDROLOGY MAP

FIGURE 2B

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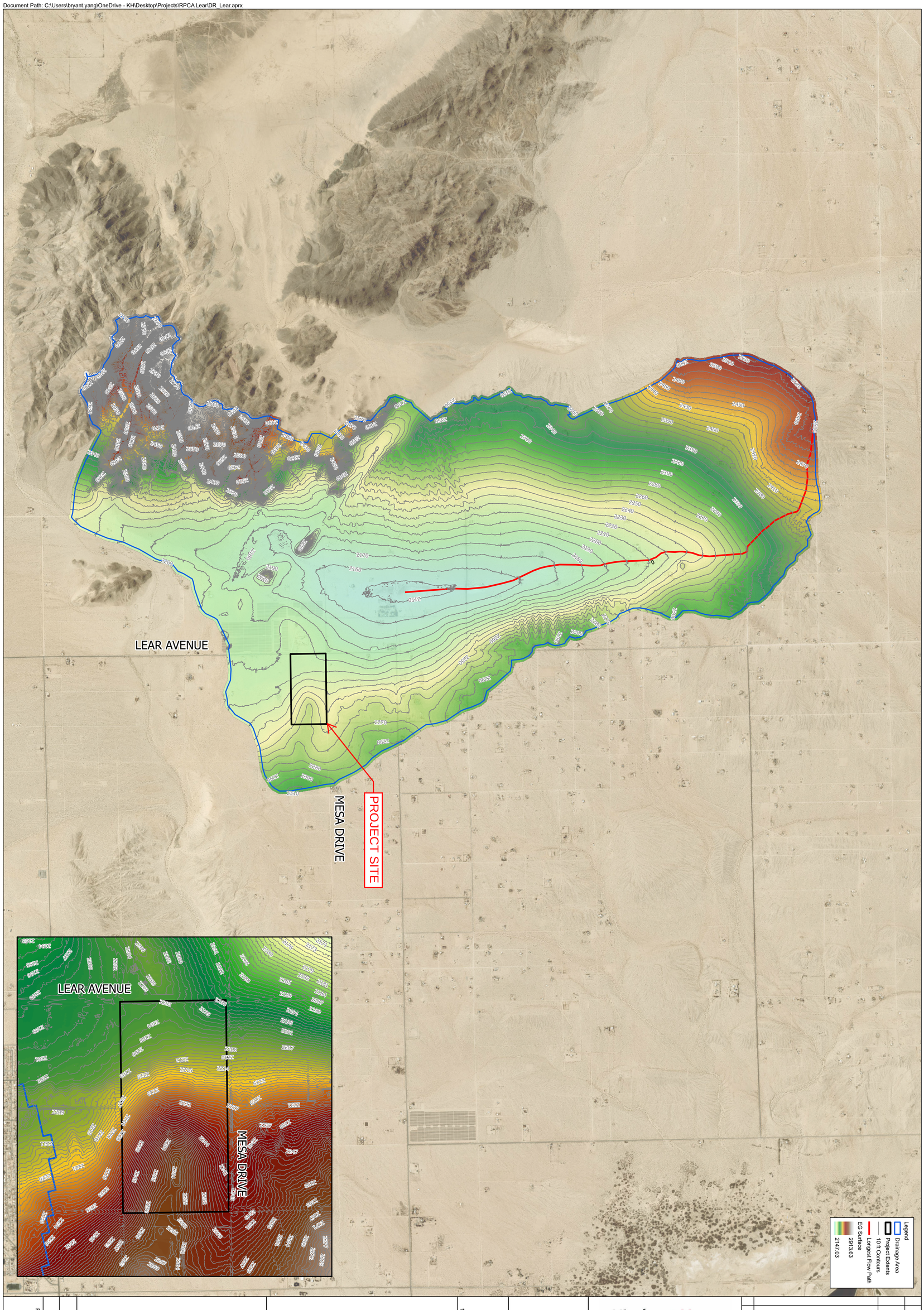

DRAINAGE AREA MAP

LEAR SOLAR
SAN BERNARDINO COUNTY, CA

1 inch = 1,500 feet

N

FIGURE NUMBER 3

PROJECT NO. 099997003

DATE MAY 2024

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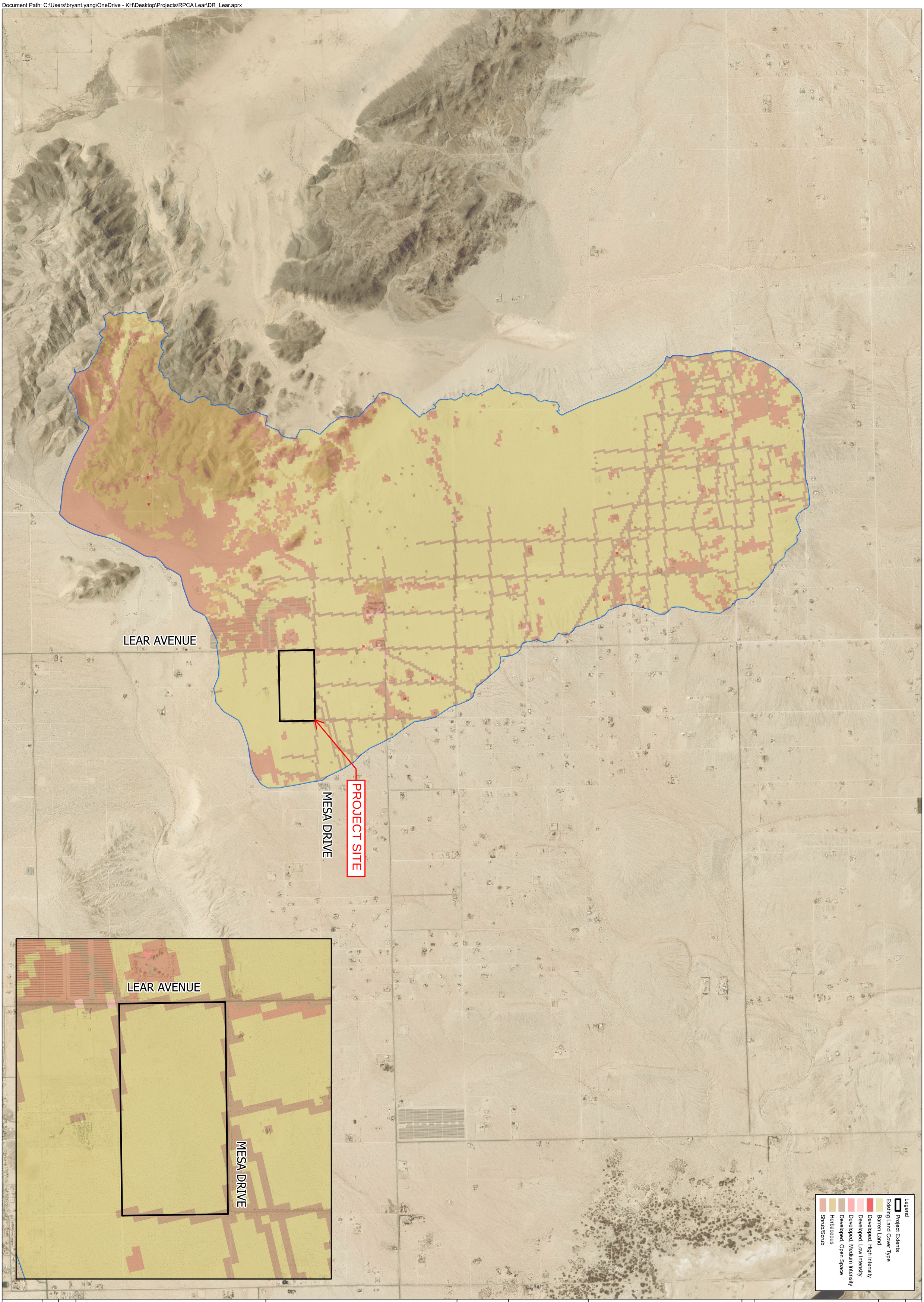

4	EXISTING LAND COVER MAP	LEAR SOLAR SAN BERNARDINO COUNTY, CA	1 inch = 1,500 feet

FIGURE NUMBER 4
PROJECT NO. 099997003
DATE MAY 2024

N

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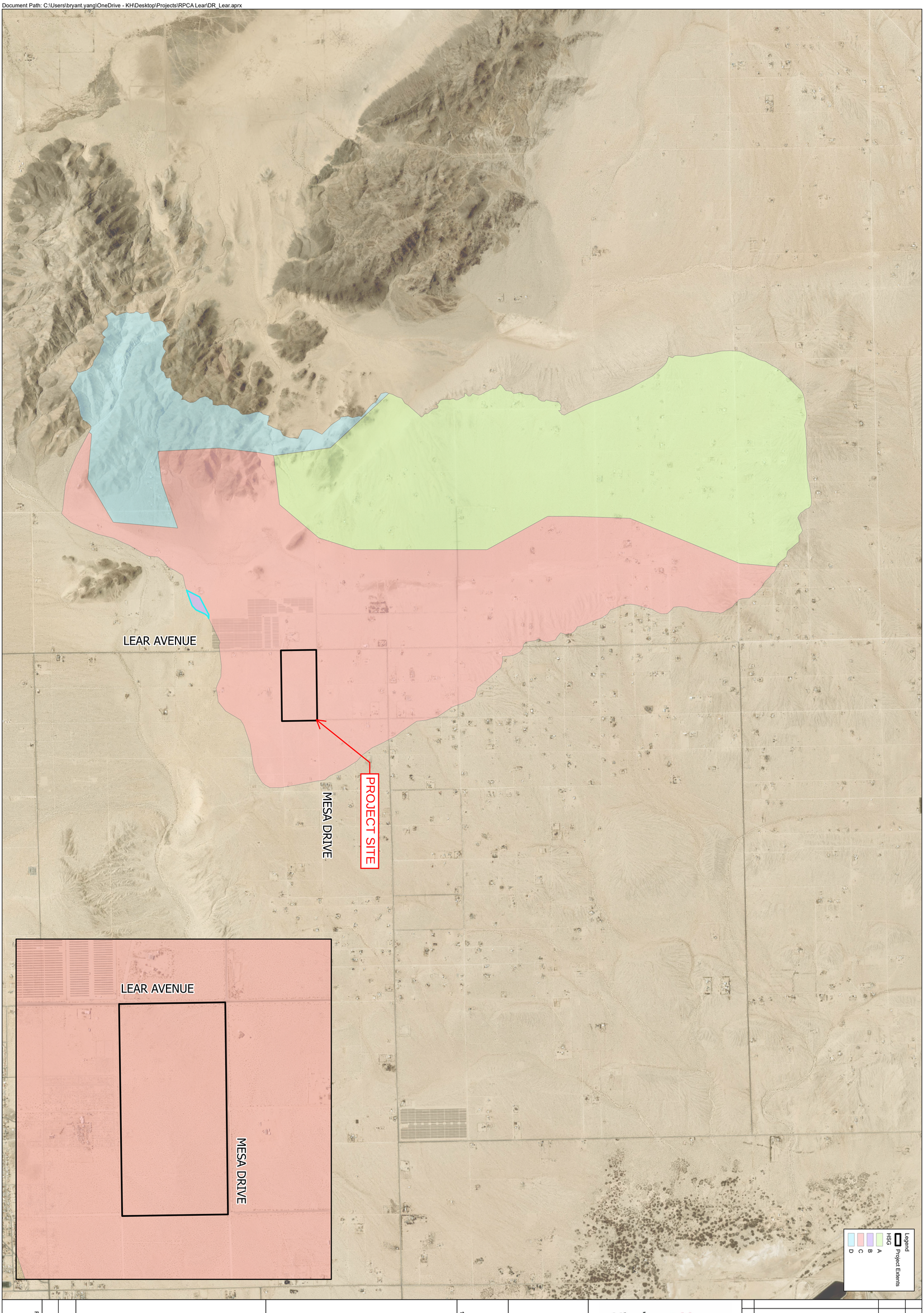

HYDROLOGIC SOILS GROUP MAP

LEAR SOLAR
SAN BERNARDINO COUNTY, CA

1 inch = 1,500 feet

N

FIGURE NUMBER 5

PROJECT NO. 099997003

DATE MAY 2024

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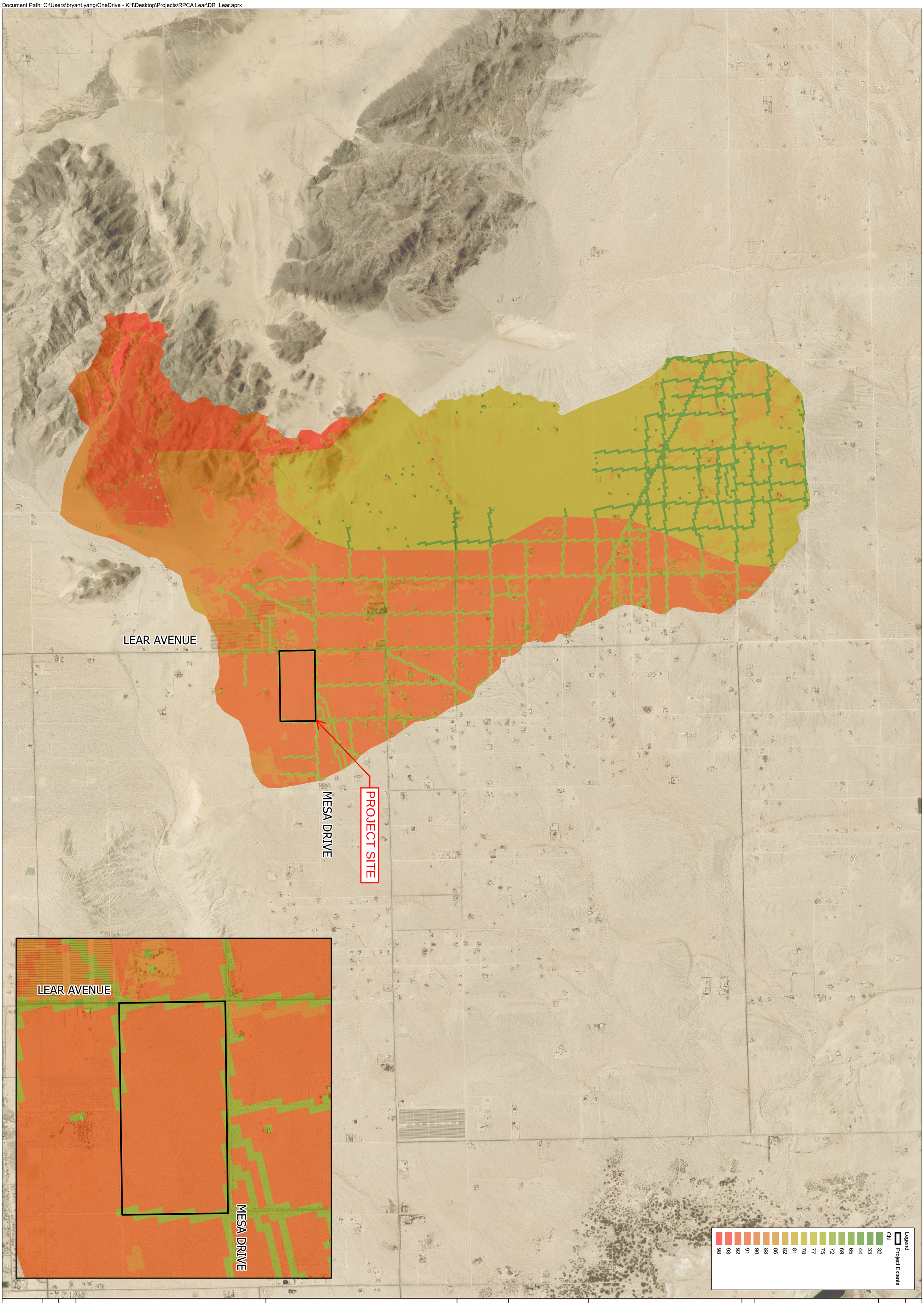

6	CURVE NUMBER MAP	LEAR SOLAR SAN BERNARDINO COUNTY, CA	1 inch = 1,500 feet

DATE
MAY 2024
PROJECT NO.
099997003
FIGURE NUMBER

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LOS ANGELES, CA 90017
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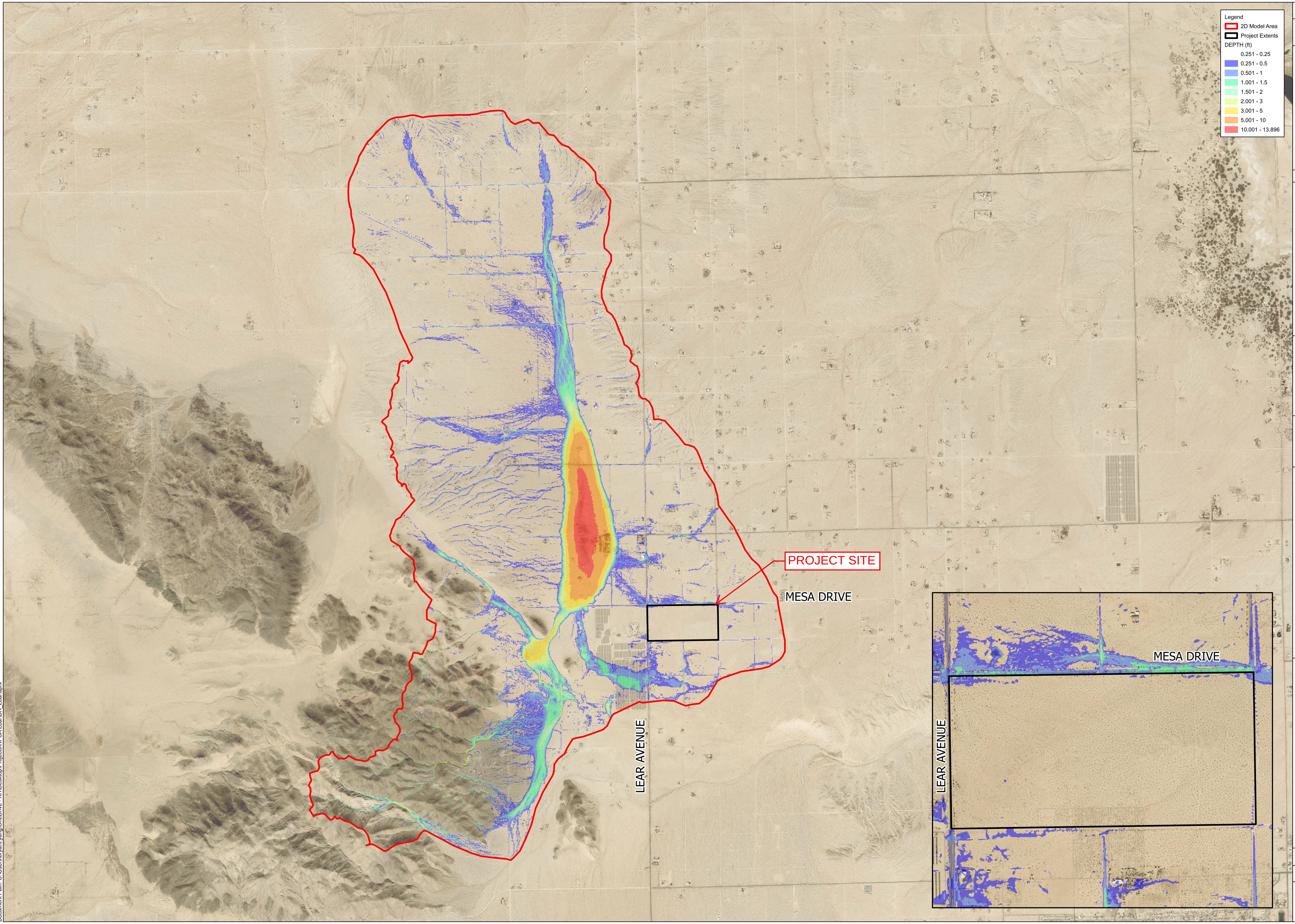
REVIEW:	RR



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REVIEW:	RR

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LOS ANGELES, CA 90017
PHONE: 213-344-2522

N

1 inch = 1,500 feet

LEAR SOLAR
SAN BERNARDINO COUNTY, CA

100-YEAR INUNDATION DEPTH MAP

DATE
MAY 2024
PROJECT NO.
099997003
FIGURE NUMBER
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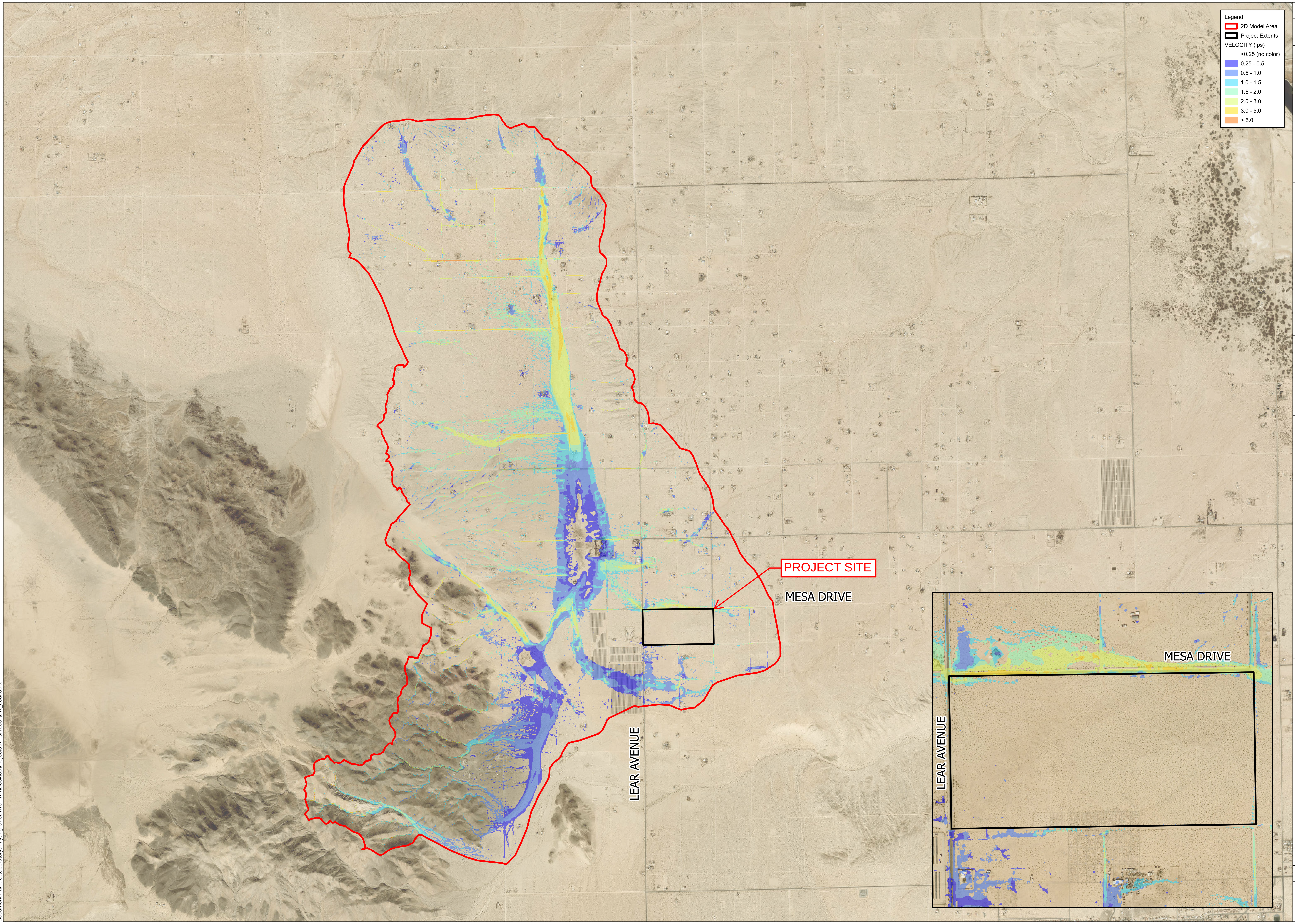

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LOS ANGELES, CA 90017
PHONE: 213-344-2522

N

1 inch = 1,500 feet

LEAR SOLAR
SAN BERNARDINO COUNTY, CA

100-YEAR VELOCITY DEPTH MAP

DATE
MAY 2024

PROJECT NO.
099997003

FIGURE NUMBER
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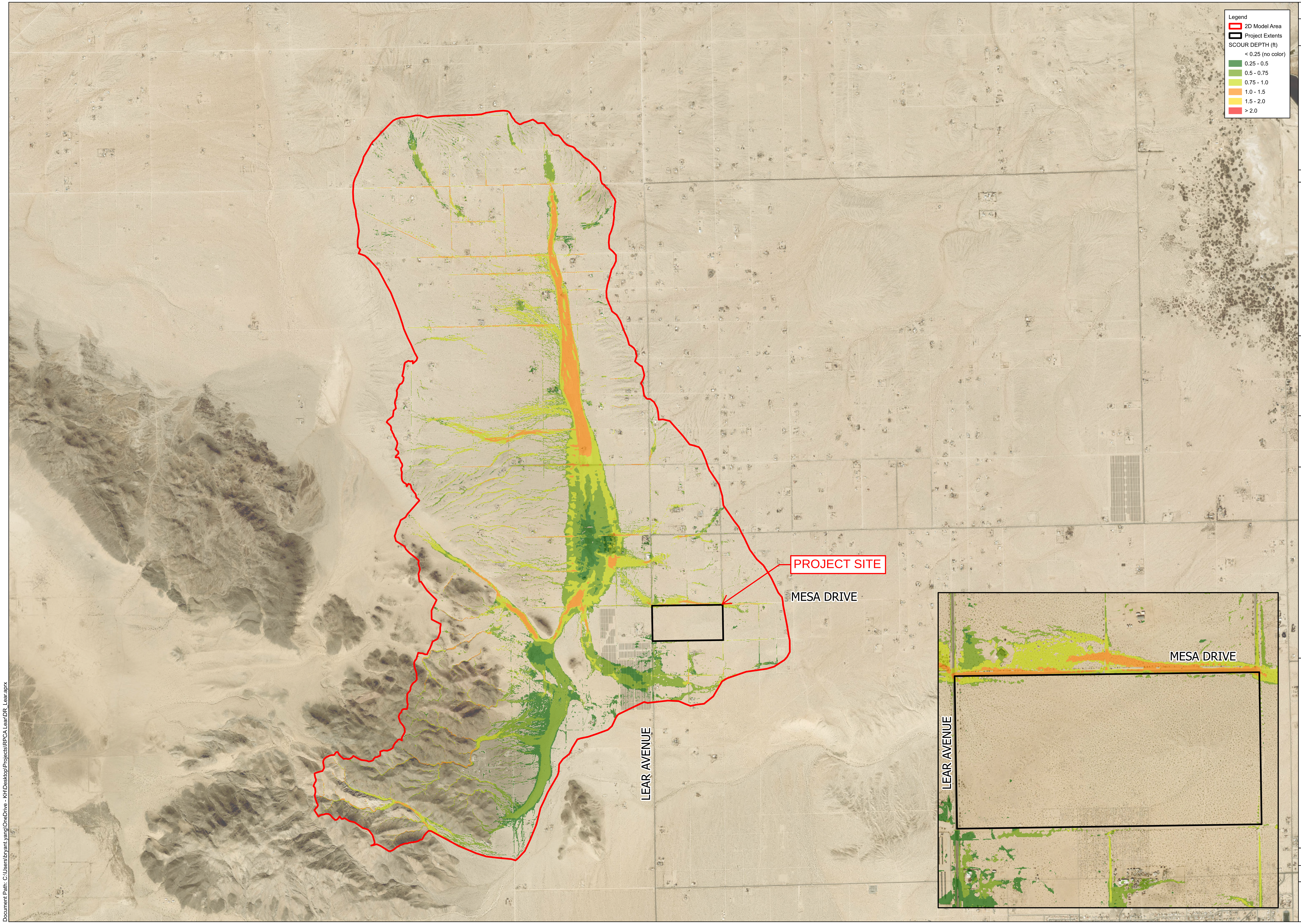

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N
1 inch = 1,500 feet

LEAR SOLAR
SAN BERNARDINO COUNTY, CA

100-YEAR SCOUR DEPTH MAP

DATE
MAY 2024

PROJECT NO.
099997003

FIGURE NUMBER
9

Attachment A– Hydrologic Parameters and Results

- **NOAA Data**
- **Hydrology Manual Excerpts**
- **FEMA FIRMette**
- **Total Study Limits Offsite Existing AES Outputs**

NOAA Atlas 14, Volume 6, Version 2
Location name: Twentynine Palms, California, USA*
Latitude: 34.1771°, Longitude: -116.1461°
Elevation: 2236 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point 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	**0.121** (0.100-0.148)	**0.173** (0.143-0.212)	**0.247** (0.204-0.303)	**0.313** (0.255-0.387)	**0.409** (0.324-0.523)	**0.490** (0.380-0.639)	**0.579** (0.438-0.774)	**0.678** (0.499-0.931)	**0.827** (0.584-1.18)	**0.956** (0.652-1.41)
10-min	**0.174** (0.143-0.212)	**0.248** (0.205-0.304)	**0.355** (0.292-0.435)	**0.448** (0.366-0.554)	**0.587** (0.464-0.749)	**0.703** (0.544-0.916)	**0.830** (0.628-1.11)	**0.972** (0.715-1.34)	**1.18** (0.837-1.70)	**1.37** (0.935-2.03)
15-min	**0.210** (0.174-0.256)	**0.300** (0.248-0.367)	**0.429** (0.353-0.526)	**0.542** (0.443-0.670)	**0.709** (0.561-0.906)	**0.850** (0.658-1.11)	**1.00** (0.759-1.34)	**1.18** (0.865-1.62)	**1.43** (1.01-2.05)	**1.66** (1.13-2.45)
30-min	**0.308** (0.255-0.377)	**0.441** (0.364-0.540)	**0.630** (0.519-0.773)	**0.796** (0.650-0.984)	**1.04** (0.824-1.33)	**1.25** (0.967-1.63)	**1.47** (1.12-1.97)	**1.73** (1.27-2.37)	**2.10** (1.49-3.01)	**2.43** (1.66-3.60)
60-min	**0.398** (0.329-0.486)	**0.569** (0.470-0.696)	**0.813** (0.670-0.997)	**1.03** (0.839-1.27)	**1.34** (1.06-1.72)	**1.61** (1.25-2.10)	**1.90** (1.44-2.54)	**2.23** (1.64-3.06)	**2.72** (1.92-3.88)	**3.14** (2.14-4.65)
2-hr	**0.484** (0.400-0.591)	**0.674** (0.556-0.824)	**0.943** (0.777-1.16)	**1.18** (0.964-1.46)	**1.53** (1.21-1.95)	**1.82** (1.41-2.37)	**2.14** (1.62-2.86)	**2.49** (1.83-3.42)	**3.01** (2.12-4.30)	**3.45** (2.35-5.10)
3-hr	**0.534** (0.442-0.653)	**0.739** (0.610-0.903)	**1.03** (0.847-1.26)	**1.28** (1.05-1.59)	**1.66** (1.31-2.12)	**1.97** (1.52-2.57)	**2.31** (1.74-3.08)	**2.68** (1.97-3.68)	**3.23** (2.28-4.62)	**3.69** (2.52-5.46)
6-hr	**0.627** (0.518-0.765)	**0.869** (0.718-1.06)	**1.21** (0.996-1.48)	**1.50** (1.23-1.86)	**1.94** (1.53-2.47)	**2.29** (1.78-2.99)	**2.68** (2.02-3.57)	**3.09** (2.28-4.25)	**3.70** (2.61-5.29)	**4.20** (2.87-6.22)
12-hr	**0.709** (0.586-0.866)	**1.01** (0.833-1.23)	**1.42** (1.17-1.74)	**1.78** (1.45-2.20)	**2.28** (1.80-2.91)	**2.69** (2.08-3.51)	**3.12** (2.36-4.17)	**3.59** (2.64-4.93)	**4.26** (3.01-6.09)	**4.80** (3.28-7.11)
24-hr	**0.823** (0.729-0.948)	**1.21** (1.07-1.39)	**1.73** (1.53-2.00)	**2.18** (1.91-2.54)	**2.80** (2.38-3.37)	**3.30** (2.74-4.06)	**3.83** (3.11-4.82)	**4.40** (3.47-5.68)	**5.20** (3.94-7.00)	**5.85** (4.28-8.14)
2-day	**0.986** (0.874-1.14)	**1.47** (1.30-1.70)	**2.14** (1.89-2.48)	**2.71** (2.38-3.16)	**3.53** (2.99-4.24)	**4.18** (3.48-5.14)	**4.88** (3.96-6.14)	**5.64** (4.45-7.29)	**6.72** (5.09-9.04)	**7.60** (5.57-10.6)
3-day	**1.04** (0.918-1.19)	**1.56** (1.38-1.80)	**2.29** (2.02-2.65)	**2.92** (2.55-3.40)	**3.82** (3.24-4.60)	**4.56** (3.79-5.60)	**5.35** (4.34-6.73)	**6.21** (4.90-8.03)	**7.45** (5.65-10.0)	**8.48** (6.21-11.8)
4-day	**1.08** (0.959-1.25)	**1.64** (1.45-1.89)	**2.41** (2.13-2.79)	**3.08** (2.70-3.59)	**4.06** (3.44-4.88)	**4.86** (4.03-5.96)	**5.71** (4.64-7.19)	**6.65** (5.25-8.60)	**8.01** (6.07-10.8)	**9.13** (6.70-12.7)
7-day	**1.15** (1.02-1.32)	**1.75** (1.55-2.02)	**2.59** (2.29-3.00)	**3.33** (2.91-3.88)	**4.39** (3.72-5.29)	**5.27** (4.38-6.48)	**6.22** (5.04-7.82)	**7.25** (5.72-9.37)	**8.74** (6.63-11.8)	**9.98** (7.32-13.9)
10-day	**1.18** (1.04-1.36)	**1.80** (1.59-2.07)	**2.68** (2.36-3.10)	**3.44** (3.02-4.01)	**4.56** (3.86-5.49)	**5.48** (4.55-6.73)	**6.46** (5.24-8.13)	**7.54** (5.95-9.75)	**9.10** (6.90-12.3)	**10.4** (7.62-14.5)
20-day	**1.28** (1.14-1.48)	**1.99** (1.76-2.30)	**3.00** (2.65-3.47)	**3.87** (3.39-4.52)	**5.16** (4.37-6.20)	**6.21** (5.16-7.63)	**7.35** (5.96-9.24)	**8.59** (6.78-11.1)	**10.4** (7.86-14.0)	**11.9** (8.69-16.5)
30-day	**1.40** (1.24-1.62)	**2.20** (1.95-2.54)	**3.33** (2.94-3.85)	**4.32** (3.78-5.03)	**5.76** (4.89-6.94)	**6.95** (5.78-8.54)	**8.23** (6.68-10.4)	**9.62** (7.60-12.4)	**11.6** (8.81-15.7)	**13.3** (9.73-18.5)
45-day	**1.57** (1.39-1.81)	**2.48** (2.19-2.85)	**3.76** (3.32-4.35)	**4.89** (4.28-5.70)	**6.54** (5.54-7.87)	**7.90** (6.56-9.70)	**9.35** (7.58-11.8)	**10.9** (8.63-14.1)	**13.2** (10.0-17.8)	**15.1** (11.0-21.0)
60-day	**1.74** (1.54-2.01)	**2.76** (2.44-3.18)	**4.20** (3.71-4.86)	**5.47** (4.79-6.37)	**7.31** (6.20-8.80)	**8.84** (7.34-10.9)	**10.5** (8.49-13.2)	**12.2** (9.66-15.8)	**14.8** (11.2-19.9)	**16.8** (12.3-23.4)

[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.

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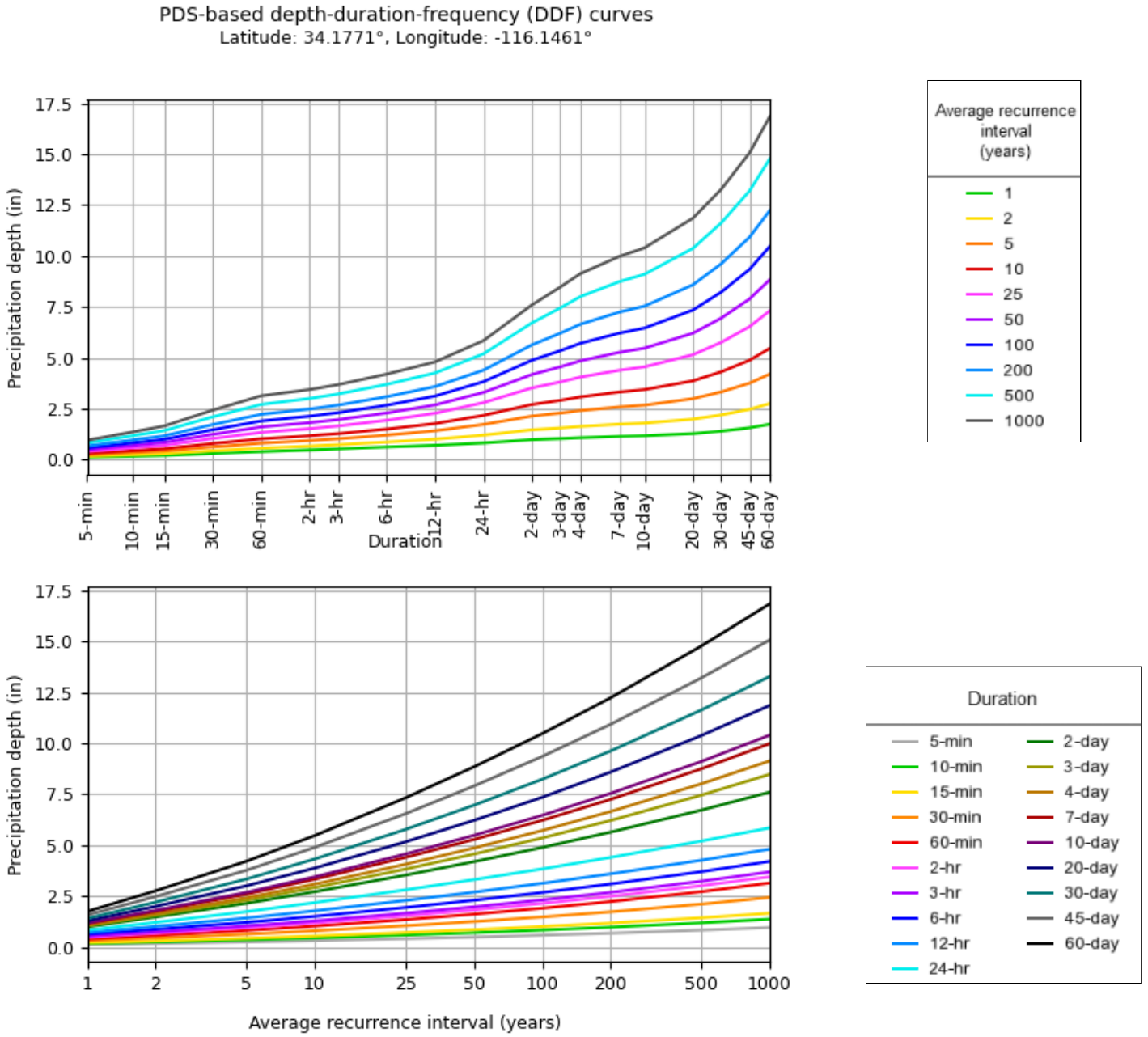
PF graphical



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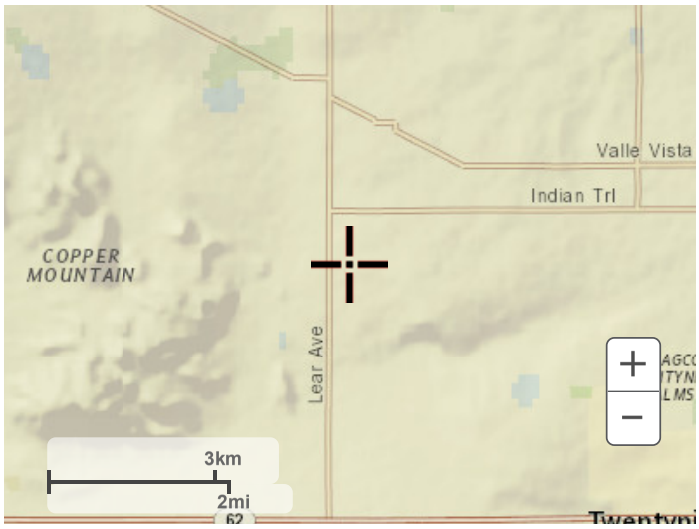
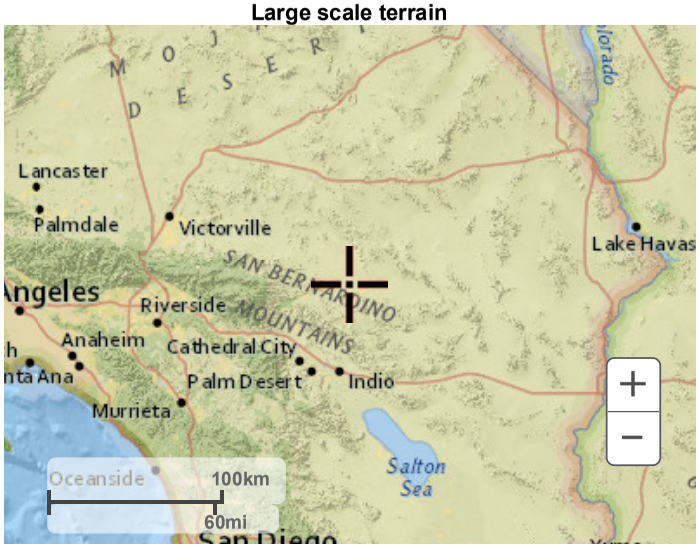
Maps & aerials

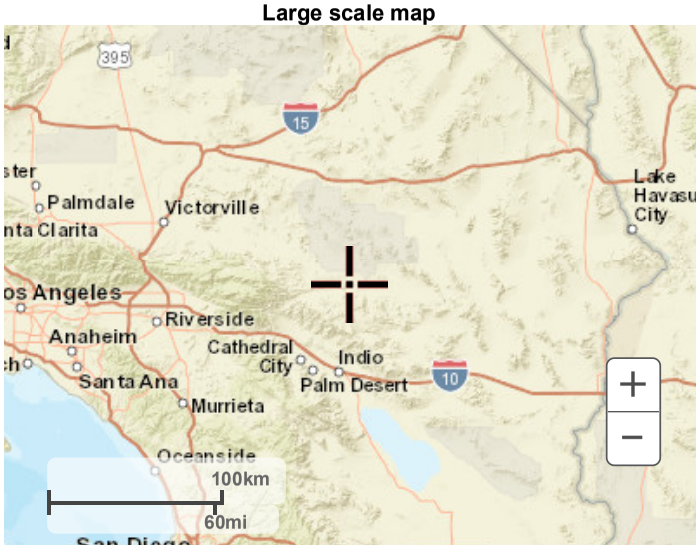
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

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NOAA Atlas 14, Volume 6, Version 2
Location name: Twentynine Palms, California, USA*
Latitude: 34.1771°, Longitude: -116.1461°
Elevation: 2236 ft**
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NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**1.45** (1.20-1.78)	**2.08** (1.72-2.54)	**2.96** (2.45-3.64)	**3.76** (3.06-4.64)	**4.91** (3.89-6.28)	**5.88** (4.56-7.67)	**6.95** (5.26-9.29)	**8.14** (5.99-11.2)	**9.92** (7.01-14.2)	**11.5** (7.82-17.0)
10-min	**1.04** (0.858-1.27)	**1.49** (1.23-1.82)	**2.13** (1.75-2.61)	**2.69** (2.20-3.32)	**3.52** (2.78-4.49)	**4.22** (3.26-5.50)	**4.98** (3.77-6.65)	**5.83** (4.29-8.01)	**7.11** (5.02-10.2)	**8.22** (5.61-12.2)
15-min	**0.840** (0.696-1.02)	**1.20** (0.992-1.47)	**1.72** (1.41-2.10)	**2.17** (1.77-2.68)	**2.84** (2.24-3.62)	**3.40** (2.63-4.43)	**4.02** (3.04-5.36)	**4.70** (3.46-6.46)	**5.73** (4.05-8.20)	**6.63** (4.52-9.81)
30-min	**0.616** (0.510-0.754)	**0.882** (0.728-1.08)	**1.26** (1.04-1.55)	**1.59** (1.30-1.97)	**2.08** (1.65-2.66)	**2.50** (1.93-3.25)	**2.95** (2.23-3.94)	**3.45** (2.54-4.74)	**4.21** (2.97-6.02)	**4.87** (3.32-7.20)
60-min	**0.398** (0.329-0.486)	**0.569** (0.470-0.696)	**0.813** (0.670-0.997)	**1.03** (0.839-1.27)	**1.34** (1.06-1.72)	**1.61** (1.25-2.10)	**1.90** (1.44-2.54)	**2.23** (1.64-3.06)	**2.72** (1.92-3.88)	**3.14** (2.14-4.65)
2-hr	**0.242** (0.200-0.295)	**0.337** (0.278-0.412)	**0.471** (0.388-0.578)	**0.589** (0.482-0.729)	**0.764** (0.604-0.976)	**0.910** (0.705-1.19)	**1.07** (0.808-1.43)	**1.24** (0.915-1.71)	**1.50** (1.06-2.15)	**1.72** (1.18-2.55)
3-hr	**0.177** (0.147-0.217)	**0.246** (0.203-0.300)	**0.342** (0.282-0.419)	**0.427** (0.348-0.528)	**0.551** (0.436-0.704)	**0.655** (0.507-0.854)	**0.768** (0.581-1.03)	**0.892** (0.656-1.22)	**1.07** (0.758-1.54)	**1.23** (0.838-1.82)
6-hr	**0.104** (0.086-0.127)	**0.145** (0.119-0.177)	**0.201** (0.166-0.247)	**0.251** (0.205-0.310)	**0.323** (0.255-0.413)	**0.382** (0.296-0.499)	**0.446** (0.337-0.596)	**0.516** (0.379-0.709)	**0.617** (0.436-0.883)	**0.701** (0.478-1.04)
12-hr	**0.058** (0.048-0.071)	**0.083** (0.069-0.102)	**0.118** (0.097-0.144)	**0.147** (0.120-0.182)	**0.189** (0.149-0.241)	**0.223** (0.172-0.291)	**0.259** (0.196-0.346)	**0.298** (0.219-0.409)	**0.353** (0.249-0.505)	**0.398** (0.271-0.589)
24-hr	**0.034** (0.030-0.039)	**0.050** (0.044-0.058)	**0.072** (0.063-0.083)	**0.090** (0.079-0.105)	**0.116** (0.099-0.140)	**0.137** (0.114-0.169)	**0.159** (0.129-0.200)	**0.183** (0.144-0.236)	**0.216** (0.164-0.291)	**0.243** (0.178-0.339)
2-day	**0.020** (0.018-0.023)	**0.030** (0.027-0.035)	**0.044** (0.039-0.051)	**0.056** (0.049-0.065)	**0.073** (0.062-0.088)	**0.087** (0.072-0.107)	**0.101** (0.082-0.128)	**0.117** (0.092-0.151)	**0.139** (0.106-0.188)	**0.158** (0.116-0.220)
3-day	**0.014** (0.012-0.016)	**0.021** (0.019-0.024)	**0.031** (0.028-0.036)	**0.040** (0.035-0.047)	**0.053** (0.044-0.063)	**0.063** (0.052-0.077)	**0.074** (0.060-0.093)	**0.086** (0.068-0.111)	**0.103** (0.078-0.139)	**0.117** (0.086-0.163)
4-day	**0.011** (0.009-0.012)	**0.017** (0.015-0.019)	**0.025** (0.022-0.029)	**0.032** (0.028-0.037)	**0.042** (0.035-0.050)	**0.050** (0.042-0.062)	**0.059** (0.048-0.074)	**0.069** (0.054-0.089)	**0.083** (0.063-0.112)	**0.095** (0.069-0.132)
7-day	**0.006** (0.006-0.007)	**0.010** (0.009-0.011)	**0.015** (0.013-0.017)	**0.019** (0.017-0.023)	**0.026** (0.022-0.031)	**0.031** (0.026-0.038)	**0.036** (0.030-0.046)	**0.043** (0.034-0.055)	**0.052** (0.039-0.070)	**0.059** (0.043-0.082)
10-day	**0.004** (0.004-0.005)	**0.007** (0.006-0.008)	**0.011** (0.009-0.012)	**0.014** (0.012-0.016)	**0.018** (0.016-0.022)	**0.022** (0.018-0.028)	**0.026** (0.021-0.033)	**0.031** (0.024-0.040)	**0.037** (0.028-0.051)	**0.043** (0.031-0.060)
20-day	**0.002** (0.002-0.003)	**0.004** (0.003-0.004)	**0.006** (0.005-0.007)	**0.008** (0.007-0.009)	**0.010** (0.009-0.012)	**0.012** (0.010-0.015)	**0.015** (0.012-0.019)	**0.017** (0.014-0.023)	**0.021** (0.016-0.029)	**0.024** (0.018-0.034)
30-day	**0.001** (0.001-0.002)	**0.003** (0.002-0.003)	**0.004** (0.004-0.005)	**0.005** (0.005-0.006)	**0.008** (0.006-0.009)	**0.009** (0.008-0.011)	**0.011** (0.009-0.014)	**0.013** (0.010-0.017)	**0.016** (0.012-0.021)	**0.018** (0.013-0.025)
45-day	**0.001** (0.001-0.001)	**0.002** (0.002-0.002)	**0.003** (0.003-0.004)	**0.004** (0.003-0.005)	**0.006** (0.005-0.007)	**0.007** (0.006-0.008)	**0.008** (0.007-0.010)	**0.010** (0.007-0.013)	**0.012** (0.009-0.016)	**0.013** (0.010-0.019)
60-day	**0.001** (0.001-0.001)	**0.001** (0.001-0.002)	**0.002** (0.002-0.003)	**0.003** (0.003-0.004)	**0.005** (0.004-0.006)	**0.006** (0.005-0.007)	**0.007** (0.005-0.009)	**0.008** (0.006-0.010)	**0.010** (0.007-0.013)	**0.011** (0.008-0.016)

[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.

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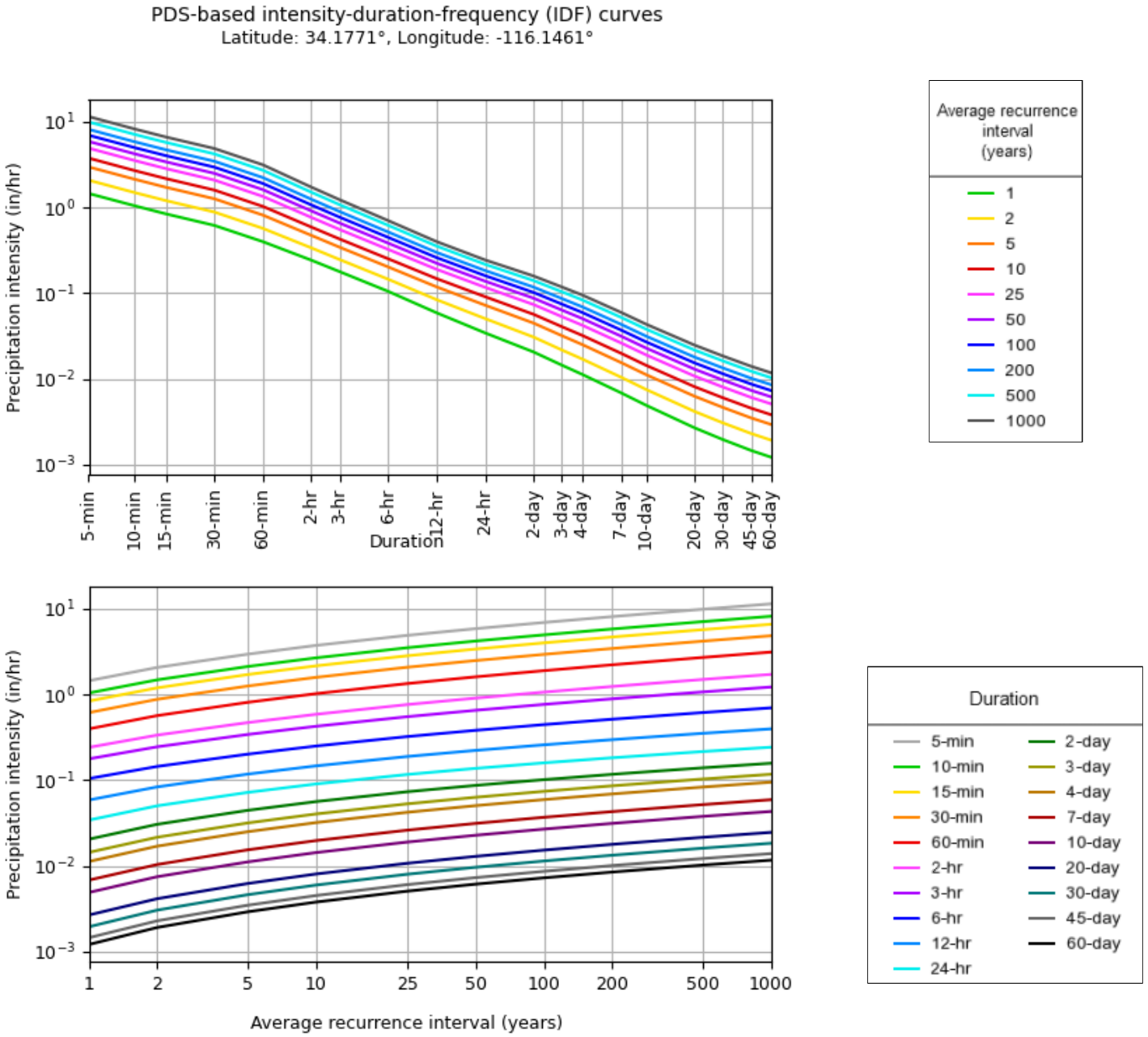
PF graphical



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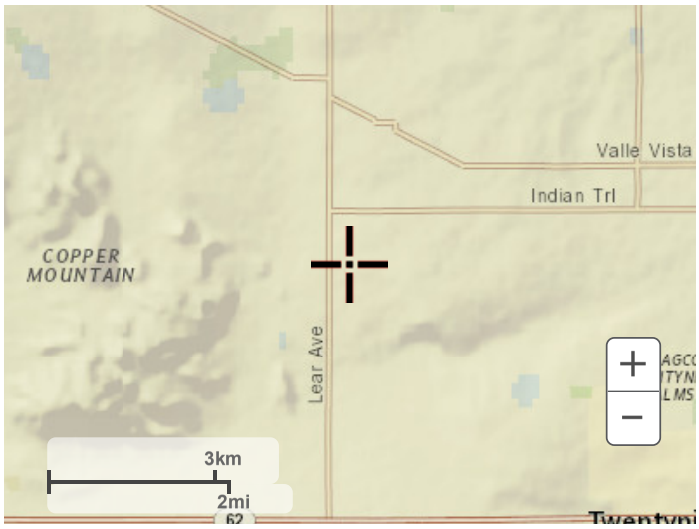
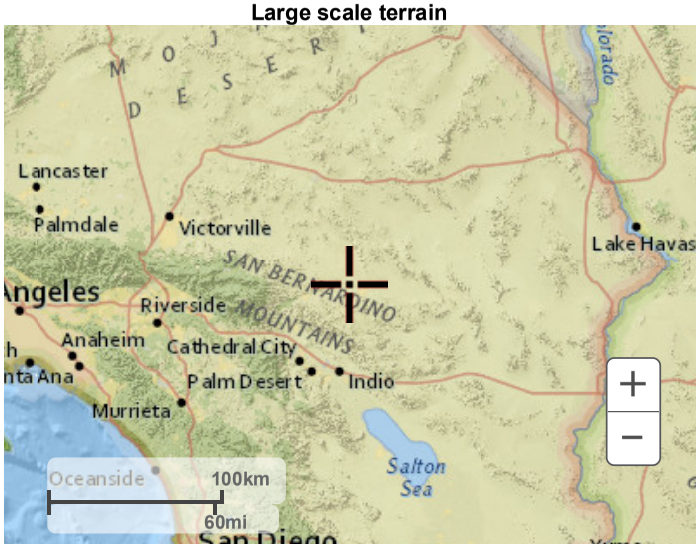
Maps & aerials

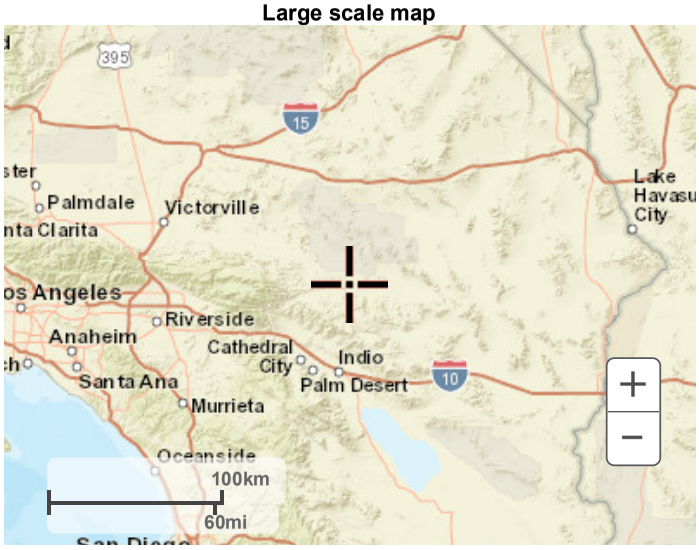
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

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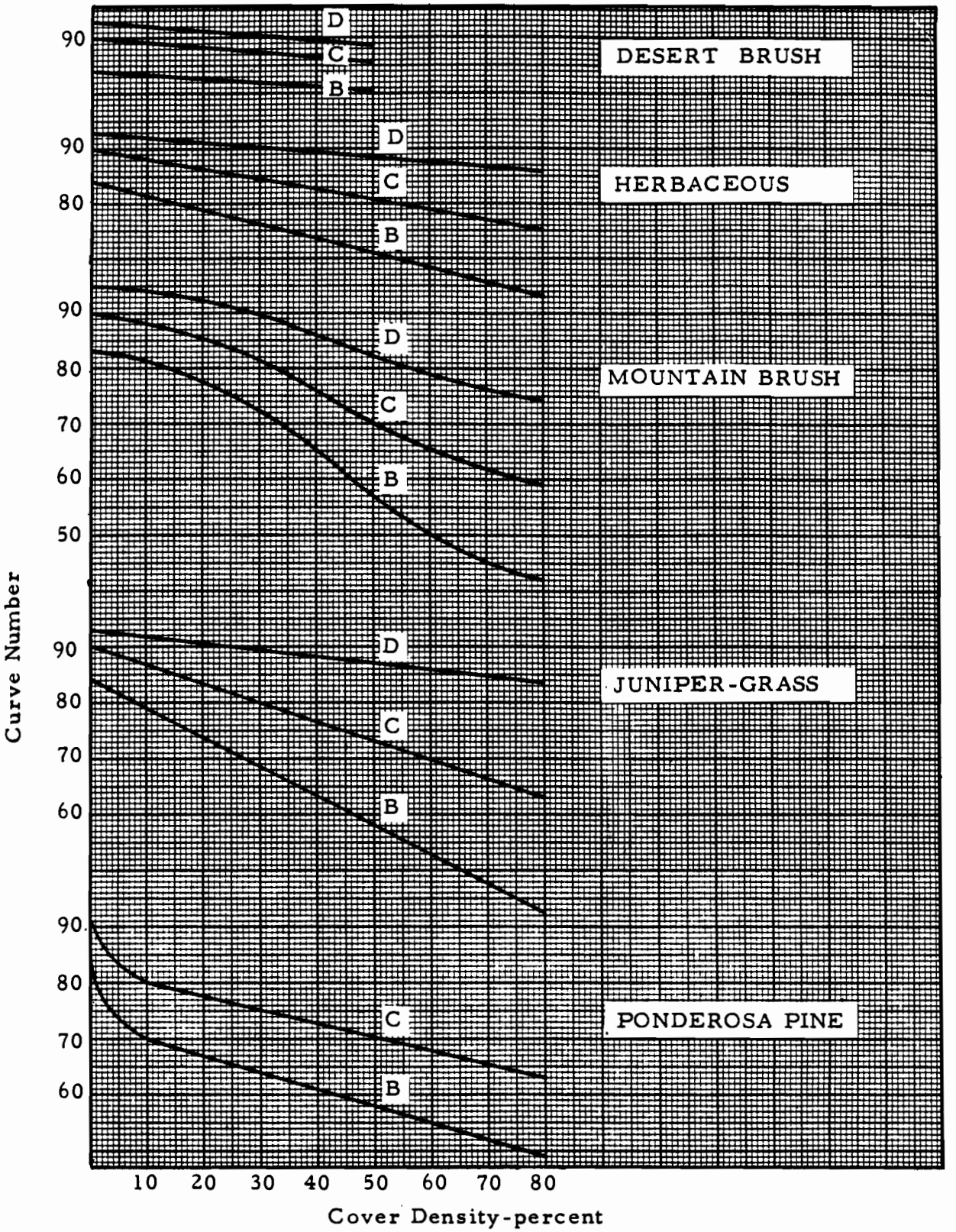
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

AES CURVE NUMBER TABLE

Curve Number of Frequently Used Soil-Cover Types -- AMC II

Cover Type	Quality of Cover	Soil Group A	B	C	D
Urban Covers					
Impervious Surface		98	98	98	98
Residential or Commercial Landscaping		32	56	69	75
Turf	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Natural Covers					
Barren		78	86	91	93
Chaparral, Broadleaf	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparral, Narrowleaf	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	71	78
Open Brush	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	25	55	70	77
Woodland, Grass	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Agricultural Covers					
Fallow		77	86	91	94
Legumes, Close Seeded	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Evergreen	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Pasture, Irrigated	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops	Poor	72	81	88	91
	Good	67	78	85	89
Small Grain	Poor	65	76	84	88
	Good	63	75	83	87
Desert Covers					
Desert Brush					
0 - 20% Cover Density	Poor	84	84	90	93
20 - 40% Cover Density	Fair	82	82	88	90
Over 40% Cover Density	Good	80	80	86	88
Herbaceous					
0 - 20% Cover Density	Poor	81	81	88	92
20 - 40% Cover Density	Fair	76	76	85	90
Over 40% Cover Density	Good	68	68	79	88
Mountain Brush					
0 - 20% Cover Density	Poor	81	81	88	94
20 - 40% Cover Density	Fair	73	73	82	90
Over 40% Cover Density	Good	50	50	65	79



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

HYDROLOGIC SOIL COVER COMPLEXES AND ASSOCIATED CURVE NUMBERS

Figure C-8

It it noted that the rational method time of concentration, used for the estimation of basin lag time, is a critical parameter in the unit hydrograph method. Extreme care must be taken in the evaluation of the catchment Tc in order to reduce uncertainty, and enable "reproducibility" of this parameter. Section D provides the procedure for estimating Tc using the rational method.

(E.1) is used in all unit hydrograph studies where sufficient topographic information is available to compute the time of concentration, Tc. It is noted that due to Tc being the sum of the rational method's initial subarea Tc and the subsequent downstream reach hydraulic traveltimes, Tc values will vary depending on the return frequency of rainfall used in the analysis. That is, a 2-year storm estimated Tc value typically is longer in duration than a 100-year storm estimated Tc value. Consequently, when computing the lag corresponding to a T-year design storm event, the Tc is estimated using the T-year intensity-duration rainfalls in the rational method. For certain large scale natural condition catchment studies, the Agency may consider the use of the lag relationship given by the empirical formula:

$$\text{lag (hours)} = C_t \ ((L \cdot L_{ca})/S^{0.5})^m \qquad \text{(E.2)}$$

where

C_t = a constant (determined by regional flood reconstitution studies)

L = length of longest watercourse (miles)

L_{ca} = length along longest watercourse, measured upstream to a point opposite center of area (miles)

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

m = a constant determined by regional flood reconstitution studies

It is then assumed that there exists a relationship between watershed lag and the quotient $((L \cdot L_{ca})/(S^{0.5}))^m$. This relationship is given by the above empirical formula for lag when

C_t = 24 $\bar{n}$; ($\bar{n}$ is the visually estimated basin factor of all collection streams and watershed channels, see Figure E-2)

m = 0.38

3. S-graph - After lag factors are determined for several gauged watersheds the next step in determining synthetic distribution graphs is the development of S-graphs, which are summation hydrographs modified so that the percent of ultimate discharge is related to time expressed in percent of lag. The derivation of an S-graph is identical to the derivation of a summation hydrograph, except that the factor of lag has been introduced. Time in percent of lag has been used to determine S-graphs for five major groupings of watersheds.

Five S-graphs are used for unit hydrograph development in San Bernardino County. These S-graphs are entitled Valley:Developed, Valley:Undeveloped, Foothill, Mountain, and Desert (Figures E-3a, b, c, d and e). In conformity with the definition of lag, each S-graph reaches 50 percent of ultimate discharge at 100 percent of lag. The average of the several S-graphs determined for mountain watersheds is assumed to be applicable to the mountain drainage basins with unknown runoff characteristics. Similarly the average of the S-graphs determined for valley watersheds is assumed to be applicable to the valley drainage basins, and so forth. Use of the Foothill S-graph is only for watersheds characterized by natural channels that are sharply incised in canyon bottoms; i.e., overbank flows are confined near the defined channel. Use of the Mountain S-graph is only for watersheds characterized by natural channels with numerous plunging flow reaches and lodged boulders/debris. Use of the Valley:Undeveloped S-graph is for natural watersheds whose channels are not sharply incised, i.e., where overbank flows may spread widely from the defined channel. Use of the Valley:Developed S-

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

BASIN FACTOR DESCRIPTIONS

Figure E-2

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11 North. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography collected by the U.S. Department of Agriculture Farm Service Agency. This imagery was flown in 2005 and was produced with a 1-meter ground sample distance.

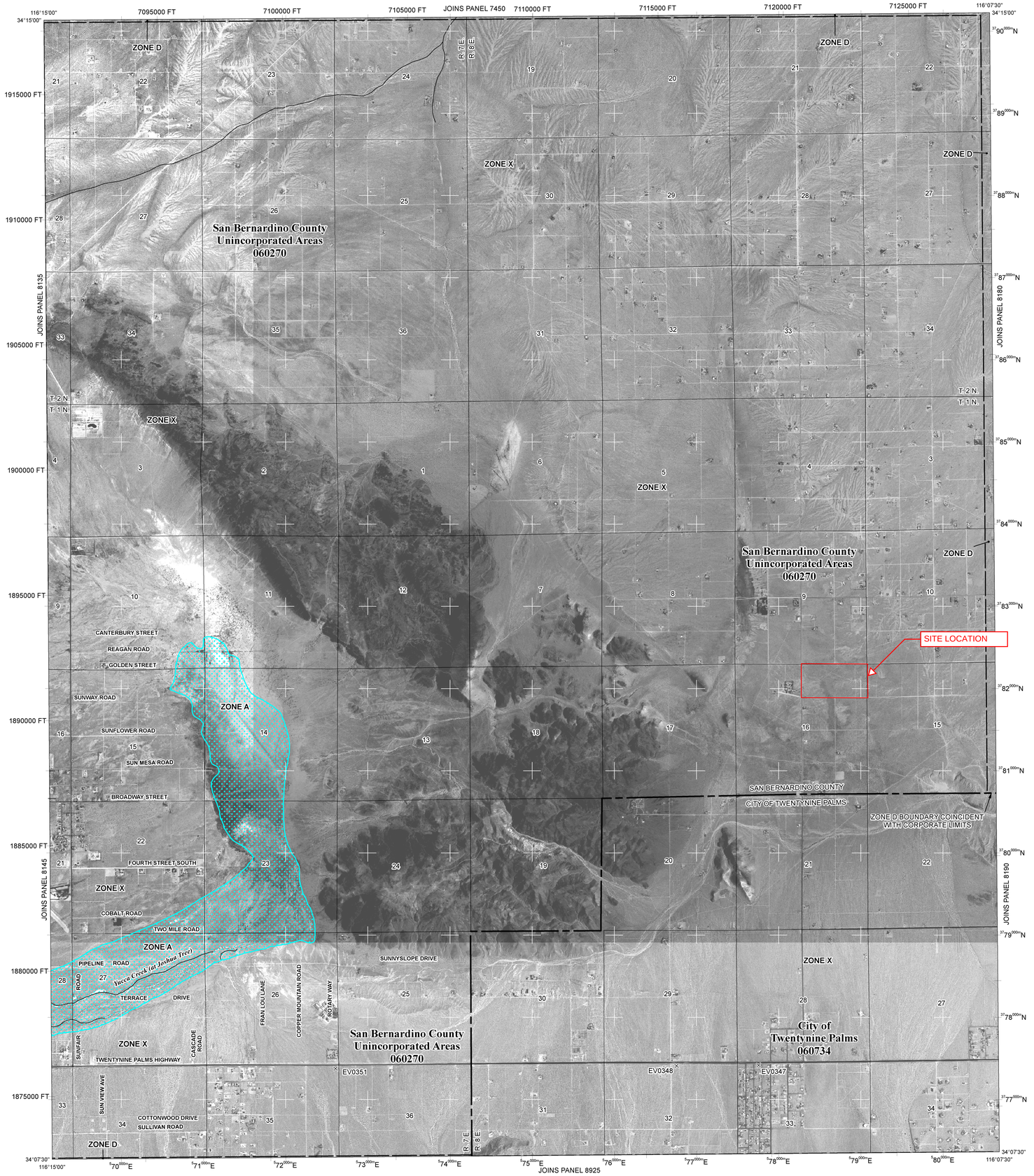
This map may reflect more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to confirm to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A — Cross section line

23 — 23 — Transect line

87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

$^{37}76^{000m}$N — 1000-meter Universal Transverse Mercator grid values, zone 11N

600000 FT — 5000-foot grid ticks: California State Plane coordinate system, zone V (FIPSZONE 0405), Lambert Conformal Conic projection

DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)

●M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
March 18, 1996

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
August 28, 2008 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'

1000 0 2000 4000 FEET

600 0 600 1200 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 8175H

FIRM
FLOOD INSURANCE RATE MAP

SAN BERNARDINO COUNTY, CALIFORNIA
AND INCORPORATED AREAS
PANEL 8175 OF 9400
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SAN BERNARDINO COUNTY	060270	8175	H
TWENTYNINE PALMS, CITY OF	060734	8175	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06071C8175H

MAP REVISED
AUGUST 28, 2008

Federal Emergency Management Agency

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**************************************************************************

            F L O O D    R O U T I N G    A N A L Y S I S
          USING COUNTY HYDROLOGY MANUAL OF SAN BERNARDINO(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1499

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* lear  (offsite existing)                                               *
* 100 yr 24 hr                                                          *
* kimley-horn                                                            *
 ************************************************************************

  FILE NAME: LEA100RT.DAT
  TIME/DATE OF STUDY: 11:49 11/09/2023
```



```
**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
==========================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =    6245.540 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    1.540 HOURS
         VALLEY(UNDEVELOPED)/DESERT S-GRAPH SELECTED
         MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.138
         LOW LOSS FRACTION = 0.117
         *HYDROGRAPH MODEL #1 SPECIFIED*

         SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=  0.57
         SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=  1.45
         SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =  1.89
         SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =  2.31
         SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  2.69
         SPECIFIED PEAK 24-HOUR RAINFALL(INCH) =  3.91

         PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
           5-MINUTE FACTOR = 0.754
          30-MINUTE FACTOR = 0.754
           1-HOUR FACTOR = 0.754
```

3-HOUR FACTOR = 0.961
6-HOUR FACTOR = 0.979
24-HOUR FACTOR = 0.987

UNIT HYDROGRAPH TIME UNIT = 5.000 MINUTES
UNIT INTERVAL PERCENTAGE OF LAG-TIME = 5.411

UNIT HYDROGRAPH DETERMINATION

INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	0.451	340.603
2	1.353	681.205
3	2.315	726.446
4	3.520	910.347
5	4.870	1019.974
6	6.587	1296.949
7	8.570	1497.812
8	10.640	1562.947
9	13.014	1793.344
10	16.165	2379.745
11	19.224	2311.087
12	22.847	2736.014
13	26.493	2753.917
14	30.251	2838.913
15	34.310	3065.478
16	38.480	3149.695
17	42.190	2802.839
18	46.340	3134.504
19	50.072	2818.672
20	53.259	2407.263
21	55.965	2043.992
22	58.520	1929.290
23	60.634	1597.402
24	62.507	1414.096
25	64.203	1281.057
26	66.031	1381.246
27	67.480	1094.002
28	69.001	1148.700
29	70.087	820.530
30	71.126	785.084
31	72.418	975.447
32	73.449	778.543
33	74.398	716.935
34	75.270	658.859
35	76.094	622.261
36	76.871	587.299
37	77.644	583.824

38	78.390	562.969
39	79.111	544.840
40	79.826	540.201
41	80.416	445.192
42	80.969	417.658
43	81.622	493.719
44	82.211	444.380
45	82.688	360.816
46	83.166	360.683
47	83.706	408.386
48	84.246	407.436
49	84.684	330.695
50	85.122	330.827
51	85.559	330.556
52	85.974	313.378
53	86.364	294.165
54	86.750	291.843
55	87.137	291.975
56	87.510	281.758
57	87.819	233.364
58	88.127	232.551
59	88.444	240.181
60	88.763	240.723
61	89.081	240.181
62	89.400	240.457
63	89.718	240.452
64	90.024	230.915
65	90.280	193.832
66	90.532	190.023
67	90.784	190.288
68	91.035	190.017
69	91.287	190.294
70	91.538	189.746
71	91.790	190.288
72	92.031	181.569
73	92.234	153.488
74	92.434	151.304
75	92.635	151.309
76	92.835	151.575
77	93.036	151.309
78	93.236	151.304
79	93.437	151.580
80	93.637	151.033
81	93.837	151.580
82	94.028	144.216
83	94.189	121.315
84	94.348	120.502
85	94.507	119.955
86	94.666	119.955
87	94.826	120.768
88	94.985	119.955
89	95.144	120.226
90	95.303	120.502

91	95.462	119.955
92	95.622	120.497
93	95.781	119.955
94	95.939	119.955
95	96.066	95.418
96	96.170	79.063
97	96.276	79.605
98	96.380	79.058
99	96.486	79.611
100	96.590	79.058
101	96.696	79.605
102	96.801	79.063
103	96.906	79.605
104	97.011	79.063
105	97.116	79.605
106	97.221	79.605
107	97.326	79.058
108	97.431	79.611
109	97.536	79.058
110	97.642	79.605
111	97.746	79.063
112	97.852	79.605
113	97.956	79.063
114	98.023	50.705
115	98.062	29.441
116	98.101	28.900
117	98.140	29.441
118	98.178	28.900
119	98.217	29.447
120	98.256	29.441
121	98.295	29.441
122	98.334	29.447
123	98.372	28.894
124	98.411	29.447
125	98.450	29.441
126	98.489	29.441
127	98.527	28.900
128	98.567	29.989
129	98.605	28.900
130	98.644	29.441
131	98.682	28.900
132	98.722	29.989
133	98.761	29.441
134	98.799	28.352
135	98.839	30.536
136	98.877	28.352
137	98.916	29.989
138	98.955	28.900
139	98.994	29.441
140	99.033	29.441
141	99.072	29.441
142	99.111	29.441
143	99.150	29.441

144	99.188	29.441
145	99.227	29.441
146	99.266	29.441
147	99.305	29.441
148	99.344	29.441
149	99.383	29.441
150	99.422	29.441
151	99.461	29.441
152	99.500	29.441
153	99.539	29.441
154	99.578	29.441
155	99.617	29.441
156	99.656	29.441
157	99.695	29.441
158	99.734	29.441
159	99.773	29.441
160	99.812	29.441
161	99.851	29.441
162	99.890	29.441
163	99.929	29.441
164	99.968	29.441
165	100.000	24.117

****

UNIT PERIOD (NUMBER)	UNIT RAINFALL (INCHES)	UNIT SOIL-LOSS (INCHES)	EFFECTIVE RAINFALL (INCHES)
1	0.0037	0.0004	0.0033
2	0.0037	0.0004	0.0033
3	0.0037	0.0004	0.0033
4	0.0037	0.0004	0.0033
5	0.0038	0.0004	0.0033
6	0.0038	0.0004	0.0033
7	0.0038	0.0004	0.0033
8	0.0038	0.0004	0.0034
9	0.0038	0.0004	0.0034
10	0.0038	0.0004	0.0034
11	0.0038	0.0004	0.0034
12	0.0039	0.0005	0.0034
13	0.0039	0.0005	0.0034
14	0.0039	0.0005	0.0034
15	0.0039	0.0005	0.0034
16	0.0039	0.0005	0.0035
17	0.0039	0.0005	0.0035
18	0.0039	0.0005	0.0035
19	0.0040	0.0005	0.0035
20	0.0040	0.0005	0.0035
21	0.0040	0.0005	0.0035
22	0.0040	0.0005	0.0035
23	0.0040	0.0005	0.0036

24	0.0041	0.0005	0.0036
25	0.0041	0.0005	0.0036
26	0.0041	0.0005	0.0036
27	0.0041	0.0005	0.0036
28	0.0041	0.0005	0.0036
29	0.0041	0.0005	0.0037
30	0.0042	0.0005	0.0037
31	0.0042	0.0005	0.0037
32	0.0042	0.0005	0.0037
33	0.0042	0.0005	0.0037
34	0.0042	0.0005	0.0037
35	0.0043	0.0005	0.0038
36	0.0043	0.0005	0.0038
37	0.0043	0.0005	0.0038
38	0.0043	0.0005	0.0038
39	0.0043	0.0005	0.0038
40	0.0044	0.0005	0.0038
41	0.0044	0.0005	0.0039
42	0.0044	0.0005	0.0039
43	0.0044	0.0005	0.0039
44	0.0044	0.0005	0.0039
45	0.0045	0.0005	0.0039
46	0.0045	0.0005	0.0040
47	0.0045	0.0005	0.0040
48	0.0045	0.0005	0.0040
49	0.0046	0.0005	0.0040
50	0.0046	0.0005	0.0040
51	0.0046	0.0005	0.0041
52	0.0046	0.0005	0.0041
53	0.0047	0.0005	0.0041
54	0.0047	0.0005	0.0041
55	0.0047	0.0005	0.0041
56	0.0047	0.0006	0.0042
57	0.0047	0.0006	0.0042
58	0.0048	0.0006	0.0042
59	0.0048	0.0006	0.0042
60	0.0048	0.0006	0.0043
61	0.0049	0.0006	0.0043
62	0.0049	0.0006	0.0043
63	0.0049	0.0006	0.0043
64	0.0049	0.0006	0.0044
65	0.0050	0.0006	0.0044
66	0.0050	0.0006	0.0044
67	0.0050	0.0006	0.0044
68	0.0050	0.0006	0.0045
69	0.0051	0.0006	0.0045
70	0.0051	0.0006	0.0045
71	0.0051	0.0006	0.0045
72	0.0052	0.0006	0.0046
73	0.0052	0.0006	0.0046
74	0.0052	0.0006	0.0046
75	0.0053	0.0006	0.0046
76	0.0053	0.0006	0.0047

77	0.0053	0.0006	0.0047
78	0.0054	0.0006	0.0047
79	0.0054	0.0006	0.0048
80	0.0054	0.0006	0.0048
81	0.0055	0.0006	0.0048
82	0.0055	0.0006	0.0049
83	0.0055	0.0006	0.0049
84	0.0056	0.0007	0.0049
85	0.0056	0.0007	0.0050
86	0.0056	0.0007	0.0050
87	0.0057	0.0007	0.0050
88	0.0057	0.0007	0.0050
89	0.0058	0.0007	0.0051
90	0.0058	0.0007	0.0051
91	0.0059	0.0007	0.0052
92	0.0059	0.0007	0.0052
93	0.0059	0.0007	0.0052
94	0.0060	0.0007	0.0053
95	0.0060	0.0007	0.0053
96	0.0061	0.0007	0.0053
97	0.0061	0.0007	0.0054
98	0.0061	0.0007	0.0054
99	0.0062	0.0007	0.0055
100	0.0062	0.0007	0.0055
101	0.0063	0.0007	0.0056
102	0.0063	0.0007	0.0056
103	0.0064	0.0008	0.0057
104	0.0064	0.0008	0.0057
105	0.0065	0.0008	0.0058
106	0.0066	0.0008	0.0058
107	0.0066	0.0008	0.0059
108	0.0067	0.0008	0.0059
109	0.0067	0.0008	0.0060
110	0.0068	0.0008	0.0060
111	0.0069	0.0008	0.0061
112	0.0069	0.0008	0.0061
113	0.0070	0.0008	0.0062
114	0.0070	0.0008	0.0062
115	0.0071	0.0008	0.0063
116	0.0072	0.0008	0.0063
117	0.0073	0.0008	0.0064
118	0.0073	0.0009	0.0064
119	0.0074	0.0009	0.0065
120	0.0074	0.0009	0.0066
121	0.0075	0.0009	0.0067
122	0.0076	0.0009	0.0067
123	0.0077	0.0009	0.0068
124	0.0078	0.0009	0.0068
125	0.0079	0.0009	0.0069
126	0.0079	0.0009	0.0070
127	0.0080	0.0009	0.0071
128	0.0081	0.0009	0.0071
129	0.0082	0.0010	0.0073

130	0.0083	0.0010	0.0073
131	0.0084	0.0010	0.0074
132	0.0085	0.0010	0.0075
133	0.0086	0.0010	0.0076
134	0.0087	0.0010	0.0077
135	0.0088	0.0010	0.0078
136	0.0089	0.0010	0.0079
137	0.0091	0.0011	0.0080
138	0.0091	0.0011	0.0081
139	0.0093	0.0011	0.0082
140	0.0094	0.0011	0.0083
141	0.0096	0.0011	0.0084
142	0.0096	0.0011	0.0085
143	0.0098	0.0012	0.0087
144	0.0099	0.0012	0.0088
145	0.0091	0.0011	0.0080
146	0.0092	0.0011	0.0081
147	0.0094	0.0011	0.0083
148	0.0095	0.0011	0.0084
149	0.0097	0.0011	0.0086
150	0.0098	0.0012	0.0087
151	0.0101	0.0012	0.0089
152	0.0102	0.0012	0.0090
153	0.0105	0.0012	0.0092
154	0.0106	0.0012	0.0093
155	0.0109	0.0013	0.0096
156	0.0110	0.0013	0.0097
157	0.0113	0.0013	0.0100
158	0.0115	0.0013	0.0101
159	0.0118	0.0014	0.0104
160	0.0120	0.0014	0.0106
161	0.0124	0.0014	0.0109
162	0.0126	0.0015	0.0111
163	0.0130	0.0015	0.0115
164	0.0132	0.0015	0.0117
165	0.0137	0.0016	0.0121
166	0.0140	0.0016	0.0123
167	0.0145	0.0017	0.0128
168	0.0148	0.0017	0.0131
169	0.0251	0.0029	0.0221
170	0.0255	0.0030	0.0225
171	0.0264	0.0031	0.0233
172	0.0269	0.0032	0.0238
173	0.0280	0.0033	0.0247
174	0.0286	0.0033	0.0252
175	0.0299	0.0035	0.0264
176	0.0305	0.0036	0.0270
177	0.0321	0.0038	0.0283
178	0.0329	0.0039	0.0291
179	0.0348	0.0041	0.0307
180	0.0358	0.0042	0.0317
181	0.0382	0.0045	0.0338
182	0.0396	0.0046	0.0350

183	0.0428	0.0050	0.0378
184	0.0446	0.0052	0.0394
185	0.0466	0.0055	0.0412
186	0.0494	0.0058	0.0436
187	0.0562	0.0066	0.0496
188	0.0608	0.0071	0.0537
189	0.0996	0.0115	0.0881
190	0.1097	0.0115	0.0982
191	0.1455	0.0115	0.1340
192	0.1874	0.0115	0.1759
193	0.4275	0.0115	0.4160
194	0.1237	0.0115	0.1122
195	0.0663	0.0078	0.0586
196	0.0525	0.0061	0.0463
197	0.0467	0.0055	0.0413
198	0.0411	0.0048	0.0363
199	0.0370	0.0043	0.0327
200	0.0338	0.0040	0.0299
201	0.0313	0.0037	0.0276
202	0.0292	0.0034	0.0258
203	0.0274	0.0032	0.0242
204	0.0260	0.0030	0.0229
205	0.0151	0.0018	0.0133
206	0.0142	0.0017	0.0126
207	0.0135	0.0016	0.0119
208	0.0128	0.0015	0.0113
209	0.0122	0.0014	0.0108
210	0.0117	0.0014	0.0103
211	0.0112	0.0013	0.0099
212	0.0107	0.0013	0.0095
213	0.0103	0.0012	0.0091
214	0.0100	0.0012	0.0088
215	0.0096	0.0011	0.0085
216	0.0093	0.0011	0.0082
217	0.0100	0.0012	0.0089
218	0.0097	0.0011	0.0086
219	0.0095	0.0011	0.0084
220	0.0092	0.0011	0.0081
221	0.0090	0.0011	0.0079
222	0.0088	0.0010	0.0077
223	0.0085	0.0010	0.0075
224	0.0083	0.0010	0.0074
225	0.0082	0.0010	0.0072
226	0.0080	0.0009	0.0070
227	0.0078	0.0009	0.0069
228	0.0076	0.0009	0.0068
229	0.0075	0.0009	0.0066
230	0.0073	0.0009	0.0065
231	0.0072	0.0008	0.0064
232	0.0071	0.0008	0.0062
233	0.0069	0.0008	0.0061
234	0.0068	0.0008	0.0060
235	0.0067	0.0008	0.0059

236	0.0066	0.0008	0.0058
237	0.0065	0.0008	0.0057
238	0.0064	0.0007	0.0056
239	0.0063	0.0007	0.0055
240	0.0062	0.0007	0.0055
241	0.0061	0.0007	0.0054
242	0.0060	0.0007	0.0053
243	0.0059	0.0007	0.0052
244	0.0058	0.0007	0.0051
245	0.0057	0.0007	0.0051
246	0.0057	0.0007	0.0050
247	0.0056	0.0007	0.0049
248	0.0055	0.0006	0.0049
249	0.0054	0.0006	0.0048
250	0.0054	0.0006	0.0047
251	0.0053	0.0006	0.0047
252	0.0052	0.0006	0.0046
253	0.0052	0.0006	0.0046
254	0.0051	0.0006	0.0045
255	0.0051	0.0006	0.0045
256	0.0050	0.0006	0.0044
257	0.0049	0.0006	0.0044
258	0.0049	0.0006	0.0043
259	0.0048	0.0006	0.0043
260	0.0048	0.0006	0.0042
261	0.0047	0.0006	0.0042
262	0.0047	0.0005	0.0041
263	0.0046	0.0005	0.0041
264	0.0046	0.0005	0.0041
265	0.0045	0.0005	0.0040
266	0.0045	0.0005	0.0040
267	0.0045	0.0005	0.0039
268	0.0044	0.0005	0.0039
269	0.0044	0.0005	0.0039
270	0.0043	0.0005	0.0038
271	0.0043	0.0005	0.0038
272	0.0042	0.0005	0.0038
273	0.0042	0.0005	0.0037
274	0.0042	0.0005	0.0037
275	0.0041	0.0005	0.0037
276	0.0041	0.0005	0.0036
277	0.0041	0.0005	0.0036
278	0.0040	0.0005	0.0036
279	0.0040	0.0005	0.0035
280	0.0040	0.0005	0.0035
281	0.0039	0.0005	0.0035
282	0.0039	0.0005	0.0034
283	0.0039	0.0005	0.0034
284	0.0038	0.0004	0.0034
285	0.0038	0.0004	0.0034
286	0.0038	0.0004	0.0033
287	0.0037	0.0004	0.0033
288	0.0037	0.0004	0.0033

TOTAL STORM RAINFALL(INCHES) = 3.86
TOTAL SOIL-LOSS(INCHES) = 0.39
TOTAL EFFECTIVE RAINFALL(INCHES) = 3.47

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 204.4114
TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 1803.8606

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2 4 - H O U R S T O R M
R U N O F F H Y D R O G R A P H

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HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
(Note: Time indicated is at END of Each Unit Intervals)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1200.0	2400.0	3600.0	4800.0
0.083	0.0077	1.11	Q	.	.	.	.
0.167	0.0307	3.34	Q	.	.	.	.
0.250	0.0701	5.72	Q	.	.	.	.
0.333	0.1301	8.72	Q	.	.	.	.
0.417	0.2133	12.08	Q	.	.	.	.
0.500	0.3259	16.36	Q	.	.	.	.
0.583	0.4726	21.31	Q	.	.	.	.
0.667	0.6551	26.49	Q	.	.	.	.
0.750	0.8785	32.44	Q	.	.	.	.
0.833	1.1563	40.33	Q	.	.	.	.
0.917	1.4871	48.03	Q	.	.	.	.
1.000	1.8806	57.15	Q	.	.	.	.
1.083	2.3376	66.35	Q	.	.	.	.
1.167	2.8602	75.88	Q	.	.	.	.
1.250	3.4536	86.17	Q	.	.	.	.
1.333	4.1202	96.79	Q	.	.	.	.
1.417	4.8524	106.31	Q	.	.	.	.
1.500	5.6579	116.96	Q	.	.	.	.
1.583	6.5298	126.61	VQ	.	.	.	.
1.667	7.4594	134.97	VQ	.	.	.	.
1.750	8.4385	142.16	VQ	.	.	.	.
1.833	9.4648	149.03	VQ	.	.	.	.
1.917	10.5311	154.83	VQ	.	.	.	.
2.000	11.6335	160.06	VQ	.	.	.	.
2.083	12.7690	164.88	VQ	.	.	.	.
2.167	13.9402	170.05	VQ	.	.	.	.
2.250	15.1406	174.31	VQ	.	.	.	.
2.333	16.3718	178.77	VQ	.	.	.	.
2.417	17.6264	182.16	VQ	.	.	.	.
2.500	18.9038	185.48	VQ	.	.	.	.
2.583	20.2083	189.42	VQ	.	.	.	.
2.667	21.5357	192.74	VQ	.	.	.	.

2.750	22.8848	195.88	VQ	.	.	.	.
2.833	24.2542	198.85	VQ	.	.	.	.
2.917	25.6434	201.71	VQ	.	.	.	.
3.000	27.0516	204.48	VQ	.	.	.	.
3.083	28.4789	207.24	VQ	.	.	.	.
3.167	29.9249	209.96	VQ	.	.	.	.
3.250	31.3893	212.63	VQ	.	.	.	.
3.333	32.8722	215.31	VQ	.	.	.	.
3.417	34.3714	217.68	VQ	.	.	.	.
3.500	35.8865	220.00	VQ	.	.	.	.
3.583	37.4193	222.56	VQ	.	.	.	.
3.667	38.9688	224.99	VQ	.	.	.	.
3.750	40.5332	227.15	VQ	.	.	.	.
3.833	42.1126	229.34	VQ	.	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1200.0	2400.0	3600.0	4800.0
3.917	43.7083	231.68	VQ	.	.	.	.
4.000	45.3202	234.06	.Q	.	.	.	.
4.083	46.9468	236.18	.Q	.	.	.	.
4.167	48.5882	238.33	.Q	.	.	.	.
4.250	50.2445	240.49	.VQ	.	.	.	.
4.333	51.9154	242.62	.VQ	.	.	.	.
4.417	53.6005	244.68	.VQ	.	.	.	.
4.500	55.3001	246.77	.VQ	.	.	.	.
4.583	57.0140	248.87	.VQ	.	.	.	.
4.667	58.7424	250.96	.VQ	.	.	.	.
4.750	60.4840	252.89	.VQ	.	.	.	.
4.833	62.2392	254.85	.VQ	.	.	.	.
4.917	64.0081	256.84	.VQ	.	.	.	.
5.000	65.7909	258.87	.VQ	.	.	.	.
5.083	67.5877	260.89	.VQ	.	.	.	.
5.167	69.3986	262.94	.VQ	.	.	.	.
5.250	71.2237	265.00	.VQ	.	.	.	.
5.333	73.0630	267.06	.VQ	.	.	.	.
5.417	74.9156	269.01	.VQ	.	.	.	.
5.500	76.7818	270.97	.VQ	.	.	.	.
5.583	78.6616	272.94	.VQ	.	.	.	.
5.667	80.5551	274.94	.VQ	.	.	.	.
5.750	82.4624	276.94	.VQ	.	.	.	.
5.833	84.3838	278.98	.VQ	.	.	.	.
5.917	86.3192	281.03	.VQ	.	.	.	.
6.000	88.2688	283.08	.VQ	.	.	.	.
6.083	90.2319	285.04	. Q	.	.	.	.
6.167	92.2088	287.04	. Q	.	.	.	.
6.250	94.1994	289.04	. Q	.	.	.	.
6.333	96.2041	291.08	. Q	.	.	.	.
6.417	98.2228	293.12	. Q	.	.	.	.
6.500	100.2558	295.20	. Q	.	.	.	.
6.583	102.3032	297.28	. Q	.	.	.	.
6.667	104.3652	299.41	. Q	.	.	.	.
6.750	106.4419	301.54	. Q	.	.	.	.

6.833	108.5335	303.69	. Q	.	.	.	.
6.917	110.6393	305.77	. Q	.	.	.	.
7.000	112.7598	307.89	. Q	.	.	.	.
7.083	114.8949	310.02	. Q	.	.	.	.
7.167	117.0450	312.19	. Q	.	.	.	.
7.250	119.2101	314.37	. Q	.	.	.	.
7.333	121.3905	316.59	. Q	.	.	.	.
7.417	123.5862	318.82	. Q	.	.	.	.
7.500	125.7977	321.11	. Q	.	.	.	.
7.583	128.0249	323.39	. Q	.	.	.	.
7.667	130.2682	325.73	. Q	.	.	.	.
7.750	132.5277	328.07	. Q	.	.	.	.
7.833	134.8037	330.47	. Q	.	.	.	.
7.917	137.0956	332.80	. QV	.	.	.	.
8.000	139.4037	335.12	. QV	.	.	.	.

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TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1200.0	2400.0	3600.0	4800.0
8.083	141.7278	337.46	. QV	.	.	.	.
8.167	144.0683	339.85	. QV	.	.	.	.
8.250	146.4254	342.25	. QV	.	.	.	.
8.333	148.7995	344.71	. QV	.	.	.	.
8.417	151.1906	347.18	. QV	.	.	.	.
8.500	153.5991	349.72	. QV	.	.	.	.
8.583	156.0251	352.26	. QV	.	.	.	.
8.667	158.4691	354.87	. QV	.	.	.	.
8.750	160.9312	357.49	. QV	.	.	.	.
8.833	163.4117	360.18	. Q	.	.	.	.
8.917	165.9109	362.87	. Q	.	.	.	.
9.000	168.4291	365.65	. Q	.	.	.	.
9.083	170.9665	368.43	. Q	.	.	.	.
9.167	173.5236	371.29	. Q	.	.	.	.
9.250	176.1005	374.16	. Q	.	.	.	.
9.333	178.6977	377.12	. Q	.	.	.	.
9.417	181.3153	380.08	. QV	.	.	.	.
9.500	183.9533	383.04	. QV	.	.	.	.
9.583	186.6113	385.94	. QV	.	.	.	.
9.667	189.2899	388.93	. QV	.	.	.	.
9.750	191.9892	391.94	. QV	.	.	.	.
9.833	194.7098	395.03	. QV	.	.	.	.
9.917	197.4519	398.15	. QV	.	.	.	.
10.000	200.2161	401.37	. QV	.	.	.	.
10.083	203.0026	404.60	. QV	.	.	.	.
10.167	205.8121	407.94	. QV	.	.	.	.
10.250	208.6447	411.30	. QV	.	.	.	.
10.333	211.5012	414.76	. QV	.	.	.	.
10.417	214.3818	418.25	. QV	.	.	.	.
10.500	217.2872	421.86	. QV	.	.	.	.
10.583	220.2175	425.49	. QV	.	.	.	.
10.667	223.1738	429.25	. QV	.	.	.	.
10.750	226.1561	433.03	. Q V	.	.	.	.
10.833	229.1654	436.95	. Q V	.	.	.	.

10.917	232.2018	440.89	.	Q V	.	.	.	.
11.000	235.2664	444.98	.	Q V	.	.	.	.
11.083	238.3593	449.10	.	Q V	.	.	.	.
11.167	241.4816	453.36	.	Q V	.	.	.	.
11.250	244.6336	457.67	.	Q V	.	.	.	.
11.333	247.8163	462.13	.	Q V	.	.	.	.
11.417	251.0300	466.64	.	Q V	.	.	.	.
11.500	254.2760	471.31	.	Q V	.	.	.	.
11.583	257.5544	476.03	.	Q V	.	.	.	.
11.667	260.8666	480.93	.	QV	.	.	.	.
11.750	264.2130	485.89	.	QV	.	.	.	.
11.833	267.5948	491.04	.	QV	.	.	.	.
11.917	271.0125	496.25	.	Q V	.	.	.	.
12.000	274.4676	501.67	.	Q V	.	.	.	.
12.083	277.9583	506.85	.	Q V	.	.	.	.
12.167	281.4840	511.94	.	Q V	.	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1200.0	2400.0	3600.0	4800.0
12.250	285.0451	517.06	.	Q V	.	.	.	.
12.333	288.6419	522.25	.	Q V	.	.	.	.
12.417	292.2743	527.42	.	Q V	.	.	.	.
12.500	295.9422	532.59	.	Q V	.	.	.	.
12.583	299.6452	537.67	.	Q V	.	.	.	.
12.667	303.3845	542.95	.	Q V	.	.	.	.
12.750	307.1595	548.13	.	Q V	.	.	.	.
12.833	310.9685	553.06	.	Q V	.	.	.	.
12.917	314.8126	558.17	.	Q V	.	.	.	.
13.000	318.6914	563.20	.	Q V	.	.	.	.
13.083	322.6056	568.34	.	Q V	.	.	.	.
13.167	326.5570	573.74	.	Q V	.	.	.	.
13.250	330.5452	579.09	.	Q V	.	.	.	.
13.333	334.5722	584.73	.	Q V	.	.	.	.
13.417	338.6414	590.85	.	Q V	.	.	.	.
13.500	342.7536	597.09	.	Q V	.	.	.	.
13.583	346.9122	603.82	.	Q V	.	.	.	.
13.667	351.1229	611.39	.	Q V	.	.	.	.
13.750	355.3896	619.53	.	Q V	.	.	.	.
13.833	359.7162	628.22	.	Q V	.	.	.	.
13.917	364.1067	637.51	.	Q V	.	.	.	.
14.000	368.5667	647.58	.	Q V	.	.	.	.
14.083	373.1193	661.04	.	Q V	.	.	.	.
14.167	377.7890	678.05	.	Q V	.	.	.	.
14.250	382.5840	696.23	.	Q V	.	.	.	.
14.333	387.5210	716.85	.	Q V	.	.	.	.
14.417	392.6129	739.35	.	Q V	.	.	.	.
14.500	397.8841	765.37	.	Q V	.	.	.	.
14.583	403.3508	793.77	.	Q V	.	.	.	.
14.667	409.0277	824.28	.	Q V	.	.	.	.
14.750	414.9360	857.88	.	Q V	.	.	.	.
14.833	421.1221	898.22	.	Q V	.	.	.	.
14.917	427.5920	939.43	.	Q V	.	.	.	.

15.000	434.3857	986.44	.	QV.	.	.	.	.
15.083	441.5166	1035.42	.	QV.	.	.	.	.
15.167	449.0090	1087.90	.	Q.	.	.	.	.
15.250	456.8925	1144.68	.	QV	.	.	.	.
15.333	465.1966	1205.76	.	Q	.	.	.	.
15.417	473.9189	1266.47	.	Q	.	.	.	.
15.500	483.1064	1334.04	.	VQ	.	.	.	.
15.583	492.7720	1403.44	.	VQ	.	.	.	.
15.667	502.9365	1475.88	.	.VQ	.	.	.	.
15.750	513.6849	1560.67	.	.V Q	.	.	.	.
15.833	525.1436	1663.80	.	.V Q	.	.	.	.
15.917	537.4315	1784.20	.	.V Q	.	.	.	.
16.000	550.8004	1941.18	.	. V Q	.	.	.	.
16.083	565.9739	2203.19	.	. V Q	.	.	.	.
16.167	582.9611	2466.54	.	. V Q	.	.	.	.
16.250	601.1425	2639.94	.	. V .Q	.	.	.	.
16.333	620.7346	2844.78	.	. V . Q	.	.	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1200.0	2400.0	3600.0	4800.0
16.417	641.6534	3037.41	.	. V . Q	.	.	.
16.500	664.2674	3283.56	.	. V . Q	.	.	.
16.583	688.3556	3497.61	.	. V . Q.	.	.	.
16.667	713.7591	3688.59	.	. V . Q	.	.	.
16.750	740.7719	3922.25	.	. V . . Q	.	.	.
16.833	769.8988	4229.23	.	. V . . Q	.	.	.
16.917	799.8260	4345.44	.	. V . . Q	.	.	.
17.000	831.1735	4551.65	.	. V . . Q	.	.	.
17.083	862.9777	4617.96	.	. V. . Q .	.	.	.
17.167	895.2182	4681.33	.	. V. . Q.	.	.	.
17.250	927.8499	4738.12	.	. V . Q.	.	.	.
17.333	960.2833	4709.33	.	. .V . Q.	.	.	.
17.417	991.4991	4532.55	.	. .V . Q	.	.	.
17.500	1022.3988	4486.63	.	. . V . Q	.	.	.
17.583	1051.5294	4229.76	.	. . V . Q	.	.	.
17.667	1078.5267	3920.02	.	. . V . . Q	.	.	.
17.750	1103.5328	3630.89	.	. . V Q	.	.	.
17.833	1127.0973	3421.56	.	. . V Q .	.	.	.
17.917	1148.9132	3167.68	.	. . VQ .	.	.	.
18.000	1169.3933	2973.71	.	. . QV .	.	.	.
18.083	1188.7339	2808.26	.	. . Q V .	.	.	.
18.167	1207.3842	2708.02	.	. . Q V .	.	.	.
18.250	1224.7029	2514.69	.	. Q V .	.	.	.
18.333	1241.2355	2400.53	.	. Q V .	.	.	.
18.417	1256.4708	2212.18	.	. Q . V .	.	.	.
18.500	1271.0244	2113.18	.	. Q . V .	.	.	.
18.583	1285.3551	2080.82	.	. Q . V .	.	.	.
18.667	1298.7747	1948.51	.	. Q . V .	.	.	.
18.750	1311.5372	1853.12	.	. Q . V.	.	.	.
18.833	1323.7366	1771.34	.	. Q . V.	.	.	.
18.917	1335.4796	1705.10	.	. Q . V.	.	.	.
19.000	1346.8254	1647.41	.	. Q . V.	.	.	.

19.083	1357.8483	1600.51	.		. Q	.	V	.
19.167	1368.5236	1550.04	.		. Q	.	V	.
19.250	1378.8846	1504.43	.		. Q	.	V	.
19.333	1388.9340	1459.16	.		. Q	.	V	.
19.417	1398.5442	1395.40	.		.Q	.	.V	.
19.500	1407.8867	1356.53	.		.Q	.	.V	.
19.583	1417.1465	1344.51	.		.Q	.	.V	.
19.667	1426.0920	1298.89	.		Q	.	.V	.
19.750	1434.6646	1244.73	.		Q	.	.V	.
19.833	1443.0681	1220.19	.		Q	.	.V	.
19.917	1451.3995	1209.73	.		Q	.	. V	.
20.000	1459.5421	1182.31	.		Q.	.	. V	.
20.083	1467.3517	1133.94	.		Q.	.	. V	.
20.167	1474.9858	1108.48	.		Q.	.	. V	.
20.250	1482.4626	1085.63	.		Q.	.	. V	.
20.333	1489.7538	1058.67	.		Q .	.	. V	.
20.417	1496.8589	1031.66	.		Q .	.	. V	.
20.500	1503.8204	1010.81	.		Q .	.	. V	.

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TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1200.0	2400.0	3600.0	4800.0
20.583	1510.6384	989.98	.	Q .	.	. V	.
20.667	1517.2896	965.74	.	Q .	.	. V	.
20.750	1523.7244	934.34	.	Q .	.	. V	.
20.833	1530.0504	918.55	.	Q .	.	. V	.
20.917	1536.2971	907.02	.	Q .	.	. V	.
21.000	1542.4525	893.77	.	Q .	.	. V	.
21.083	1548.5105	879.63	.	Q .	.	. V	.
21.167	1554.4692	865.21	.	Q .	.	. V	.
21.250	1560.3182	849.27	.	Q .	.	. V	.
21.333	1566.0326	829.72	.	Q .	.	. V	.
21.417	1571.5718	804.29	.	Q .	.	. V	.
21.500	1577.0115	789.85	.	Q .	.	. V	.
21.583	1582.3751	778.81	.	Q .	.	. V	.
21.667	1587.6652	768.12	.	Q .	.	. V	.
21.750	1592.8804	757.24	.	Q .	.	. V	.
21.833	1598.0172	745.88	.	Q .	.	. V	.
21.917	1603.0684	733.43	.	Q .	.	. V	.
22.000	1608.0104	717.58	.	Q .	.	. V	.
22.083	1612.8147	697.59	.	Q .	.	. V	.
22.167	1617.5406	686.20	.	Q .	.	. V	.
22.250	1622.2046	677.21	.	Q .	.	. V	.
22.333	1626.8110	668.86	.	Q .	.	. V	.
22.417	1631.3623	660.85	.	Q .	.	. V	.
22.500	1635.8585	652.85	.	Q .	.	. V	.
22.583	1640.2957	644.27	.	Q .	.	. V	.
22.667	1644.6699	635.14	.	Q .	.	. V	.
22.750	1648.9760	625.23	.	Q .	.	. V	.
22.833	1653.1945	612.53	.	Q .	.	. V	.
22.917	1657.3032	596.60	.	Q .	.	. V	.
23.000	1661.3523	587.92	.	Q .	.	. V	.
23.083	1665.3534	580.96	.	Q .	.	. V	.

23.167	1669.3104	574.57	.	Q	.	.	.	V .
23.250	1673.2260	568.54	.	Q	.	.	.	V .
23.333	1677.0980	562.23	.	Q	.	.	.	V .
23.417	1680.9281	556.13	.	Q	.	.	.	V .
23.500	1684.7142	549.75	.	Q	.	.	.	V .
23.583	1688.4482	542.17	.	Q	.	.	.	V .
23.667	1692.1270	534.14	.	Q	.	.	.	V .
23.750	1695.7421	524.91	.	Q	.	.	.	V .
23.833	1699.2842	514.31	.	Q	.	.	.	V .
23.917	1702.7102	497.46	.	Q	.	.	.	V .
24.000	1706.0447	484.17	.	Q	.	.	.	V .
24.083	1709.3243	476.20	.	Q	.	.	.	V .
24.167	1712.5477	468.03	.	Q	.	.	.	V .
24.250	1715.7181	460.34	.	Q	.	.	.	V .
24.333	1718.8311	452.00	.	Q	.	.	.	V .
24.417	1721.8873	443.77	.	Q	.	.	.	V .
24.500	1724.8798	434.50	.	Q	.	.	.	V .
24.583	1727.8063	424.93	.	Q	.	.	.	V .
24.667	1730.6642	414.98	.	Q	.	.	.	V .

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TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1200.0	2400.0	3600.0	4800.0
24.750	1733.4503	404.55	.	Q	.	.	.	V .
24.833	1736.1510	392.14	.	Q	.	.	.	V .
24.917	1738.7682	380.01	.	Q	.	.	.	V .
25.000	1741.2947	366.85	.	Q	.	.	.	V .
25.083	1743.7274	353.23	.	Q	.	.	.	V .
25.167	1746.0597	338.65	.	Q	.	.	.	V .
25.250	1748.2786	322.18	.	Q	.	.	.	V .
25.333	1750.3760	304.55	.	Q	.	.	.	V .
25.417	1752.3455	285.96	.	Q	.	.	.	V .
25.500	1754.1279	258.81	.	Q	.	.	.	V .
25.583	1755.7556	236.34	.	Q	.	.	.	V .
25.667	1757.2926	223.17	.	Q	.	.	.	V .
25.750	1758.7599	213.05	.	Q	.	.	.	V .
25.833	1760.1619	203.57	.	Q	.	.	.	V.
25.917	1761.5098	195.72	.	Q	.	.	.	V.
26.000	1762.8086	188.58	.	Q	.	.	.	V.
26.083	1764.0625	182.06	.	Q	.	.	.	V.
26.167	1765.2704	175.38	.	Q	.	.	.	V.
26.250	1766.4387	169.65	.	Q	.	.	.	V.
26.333	1767.5695	164.19	.	Q	.	.	.	V.
26.417	1768.6694	159.72	.	Q	.	.	.	V.
26.500	1769.7418	155.71	.	Q	.	.	.	V.
26.583	1770.7831	151.19	.	Q	.	.	.	V.
26.667	1771.8010	147.80	.	Q	.	.	.	V.
26.750	1772.7935	144.11	.	Q	.	.	.	V.
26.833	1773.7648	141.04	.	Q	.	.	.	V.
26.917	1774.7150	137.97	.	Q	.	.	.	V.
27.000	1775.6471	135.34	.	Q	.	.	.	V.
27.083	1776.5588	132.39	.	Q	.	.	.	V.
27.167	1777.4500	129.39	.	Q	.	.	.	V.

27.250	1778.3269	127.33	.Q	.	.	.	V.
27.333	1779.1824	124.22	.Q	.	.	.	V.
27.417	1780.0250	122.36	.Q	.	.	.	V.
27.500	1780.8511	119.95	Q	.	.	.	V.
27.583	1781.6616	117.69	Q	.	.	.	V.
27.667	1782.4569	115.47	Q	.	.	.	V.
27.750	1783.2385	113.49	Q	.	.	.	V.
27.833	1784.0050	111.30	Q	.	.	.	V.
27.917	1784.7555	108.97	Q	.	.	.	V.
28.000	1785.4899	106.63	Q	.	.	.	V.
28.083	1786.2100	104.56	Q	.	.	.	V.
28.167	1786.9158	102.48	Q	.	.	.	V.
28.250	1787.6072	100.39	Q	.	.	.	V.
28.333	1788.2845	98.36	Q	.	.	.	V.
28.417	1788.9482	96.37	Q	.	.	.	V.
28.500	1789.5981	94.37	Q	.	.	.	V.
28.583	1790.2343	92.36	Q	.	.	.	V.
28.667	1790.8566	90.35	Q	.	.	.	V.
28.750	1791.4659	88.48	Q	.	.	.	V.
28.833	1792.0621	86.57	Q	.	.	.	V.

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TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1200.0	2400.0	3600.0	4800.0
28.917	1792.6448	84.60	Q	.	.	.	V.
29.000	1793.2134	82.56	Q	.	.	.	V.
29.083	1793.7677	80.49	Q	.	.	.	V.
29.167	1794.3074	78.37	Q	.	.	.	V.
29.250	1794.8319	76.17	Q	.	.	.	V.
29.333	1795.3405	73.84	Q	.	.	.	V.
29.417	1795.8319	71.36	Q	.	.	.	V.
29.500	1796.3004	68.02	Q	.	.	.	V.
29.583	1796.7429	64.26	Q	.	.	.	V.
29.667	1797.1521	59.41	Q	.	.	.	V.
29.750	1797.5122	52.29	Q	.	.	.	V.
29.833	1797.7946	40.99	Q	.	.	.	V.
29.917	1798.0516	37.32	Q	.	.	.	V.
30.000	1798.2930	35.04	Q	.	.	.	V.
30.083	1798.5215	33.18	Q	.	.	.	V.
30.167	1798.7383	31.49	Q	.	.	.	V.
30.250	1798.9445	29.93	Q	.	.	.	V.
30.333	1799.1406	28.49	Q	.	.	.	V.
30.417	1799.3274	27.13	Q	.	.	.	V.
30.500	1799.5054	25.83	Q	.	.	.	V.
30.583	1799.6748	24.60	Q	.	.	.	V.
30.667	1799.8361	23.42	Q	.	.	.	V.
30.750	1799.9897	22.32	Q	.	.	.	V.
30.833	1800.1377	21.48	Q	.	.	.	V.
30.917	1800.2806	20.75	Q	.	.	.	V.
31.000	1800.4187	20.04	Q	.	.	.	V.
31.083	1800.5520	19.36	Q	.	.	.	V.
31.167	1800.6808	18.69	Q	.	.	.	V.
31.250	1800.8051	18.04	Q	.	.	.	V.

31.333	1800.9249	17.41	Q	.	.	.	V.
31.417	1801.0405	16.79	Q	.	.	.	V.
31.500	1801.1520	16.18	Q	.	.	.	V.
31.583	1801.2593	15.59	Q	.	.	.	V.
31.667	1801.3625	15.00	Q	.	.	.	V.
31.750	1801.4619	14.43	Q	.	.	.	V.
31.833	1801.5573	13.84	Q	.	.	.	V.
31.917	1801.6492	13.35	Q	.	.	.	V.
32.000	1801.7380	12.91	Q	.	.	.	V.
32.083	1801.8240	12.49	Q	.	.	.	V.
32.167	1801.9071	12.07	Q	.	.	.	V.
32.250	1801.9874	11.66	Q	.	.	.	V.
32.333	1802.0649	11.25	Q	.	.	.	V.
32.417	1802.1396	10.86	Q	.	.	.	V.
32.500	1802.2117	10.47	Q	.	.	.	V.
32.583	1802.2811	10.08	Q	.	.	.	V.
32.667	1802.3479	9.70	Q	.	.	.	V.
32.750	1802.4121	9.33	Q	.	.	.	V.
32.833	1802.4738	8.96	Q	.	.	.	V.
32.917	1802.5330	8.60	Q	.	.	.	V.
33.000	1802.5897	8.24	Q	.	.	.	V.

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TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	1200.0	2400.0	3600.0	4800.0
33.083	1802.6440	7.89	Q	.	.	.	V.
33.167	1802.6959	7.54	Q	.	.	.	V.
33.250	1802.7455	7.20	Q	.	.	.	V.
33.333	1802.7927	6.86	Q	.	.	.	V.
33.417	1802.8376	6.52	Q	.	.	.	V.
33.500	1802.8810	6.28	Q	.	.	.	V.
33.583	1802.9231	6.12	Q	.	.	.	V.
33.667	1802.9641	5.96	Q	.	.	.	V.
33.750	1803.0040	5.80	Q	.	.	.	V.
33.833	1803.0428	5.64	Q	.	.	.	V.
33.917	1803.0807	5.49	Q	.	.	.	V.
34.000	1803.1174	5.33	Q	.	.	.	V.
34.083	1803.1531	5.18	Q	.	.	.	V.
34.167	1803.1877	5.03	Q	.	.	.	V.
34.250	1803.2214	4.89	Q	.	.	.	V.
34.333	1803.2542	4.74	Q	.	.	.	V.
34.417	1803.2859	4.60	Q	.	.	.	V.
34.500	1803.3167	4.46	Q	.	.	.	V.
34.583	1803.3464	4.32	Q	.	.	.	V.
34.667	1803.3752	4.18	Q	.	.	.	V.
34.750	1803.4031	4.05	Q	.	.	.	V.
34.833	1803.4301	3.91	Q	.	.	.	V.
34.917	1803.4561	3.78	Q	.	.	.	V.
35.000	1803.4812	3.65	Q	.	.	.	V.
35.083	1803.5055	3.52	Q	.	.	.	V.
35.167	1803.5289	3.40	Q	.	.	.	V.
35.250	1803.5514	3.27	Q	.	.	.	V.
35.333	1803.5730	3.14	Q	.	.	.	V.

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   35.417   1803.5938      3.02  Q         .         .         .        V.
   35.500   1803.6136      2.90  Q         .         .         .        V.
   35.583   1803.6328      2.77  Q         .         .         .        V.
   35.667   1803.6511      2.65  Q         .         .         .        V.
   35.750   1803.6686      2.54  Q         .         .         .        V.
   35.833   1803.6852      2.42  Q         .         .         .        V.
   35.917   1803.7010      2.30  Q         .         .         .        V.
   36.000   1803.7161      2.19  Q         .         .         .        V.
-------------------------------------------------------------------------------
--
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                Duration
        Peak Flow Rate                     (minutes)
    ======================                 =========
               0%                           2165.0
              10%                            755.0
              20%                            345.0
              30%                            225.0
              40%                            165.0
              50%                            135.0
              60%                            105.0
              70%                             80.0
              80%                             60.0
              90%                             40.0
 ===============================================================================

   END OF FLOODSCx ROUTING ANALYSIS
```

Attachment B – Hydraulic Parameters and Result

- **Onsite Existing and Proposed AES Outputs**
- **Pondpack Output**

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2011 Advanced Engineering Software (aes)
             Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* ONSITE RPCA Lear                                                      *
* 100 YR EXISTING                                                       *
* Kimley-Horn                                                           *
 ************************************************************************

  FILE NAME: LEAREX.DAT
  TIME/DATE OF STUDY: 15:48 05/13/2024
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.99
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  5
   1)    5.00;  6.950
   2)   15.00;  4.020
   3)   30.00;  2.950
   4)  180.00;  0.769
   5)  360.00;  0.449
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
```

```
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
ELEVATION DATA: UPSTREAM(FEET) =   2265.00  DOWNSTREAM(FEET) =   2263.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.979
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.084
SUBAREA Tc AND LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL DESERT COVER
"HERBACEOUS"     (40.0%)   C        0.78      0.13     1.000    96   10.98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.13
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =      3.48
TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      3.48

****************************************************************************
FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   2263.00  DOWNSTREAM(FEET) =   2198.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  2001.00   CHANNEL SLOPE =  0.0325
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.990
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.481
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL DESERT COVER
"HERBACEOUS"     (40.0%)   C       33.73      0.13     1.000    96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.13
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      55.15
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.18
AVERAGE FLOW DEPTH(FEET) =   0.42   TRAVEL TIME(MIN.) =  10.50
Tc(MIN.) =   21.48
SUBAREA AREA(ACRES) =    33.73       SUBAREA RUNOFF(CFS) =  101.62
EFFECTIVE AREA(ACRES) =     34.51     AREA-AVERAGED Fm(INCH/HR) =   0.13
AREA-AVERAGED Fp(INCH/HR) =   0.13  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =       34.5         PEAK FLOW RATE(CFS) =     103.97
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.53   FLOW VELOCITY(FEET/SEC.) =   3.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =    2201.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.48
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.481
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "HERBACEOUS"     (40.0%)   C       33.74      0.13     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.13
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   33.74      SUBAREA RUNOFF(CFS) =  101.65
  EFFECTIVE AREA(ACRES) =     68.25   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.13  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       68.2       PEAK FLOW RATE(CFS) =     205.63
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       68.2  TC(MIN.) =     21.48
  EFFECTIVE AREA(ACRES) =     68.25  AREA-AVERAGED Fm(INCH/HR)=  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.13  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =     205.63
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Analysis prepared by:

```
**************************************************************************
--------------------------------------------------------------------------

 Problem Descriptions:
  ONSITE RPCA LEAR
  100 YEAR EXISTING CONDITIONS
  KIMLEY-HORN
==========================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

    TOTAL 24-HOUR DURATION RAINFALL DEPTH =     3.83 (inches)

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1         68.25       100.00       79.(AMC II)     0.170       0.798

    TOTAL AREA (Acres) =     68.25

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.170

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.202
==========================================================================


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.92
    TOTAL CATCHMENT AREA(ACRES) =   68.25
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.170
    LOW LOSS FRACTION = 0.202
    TIME OF CONCENTRATION(MIN.) = 21.48
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.58
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.47
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.90
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.31
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.68
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  3.83

--------------------------------------------------------------------------
```

```
   TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    17.01
   TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     4.78

************************************************************************
  TIME     VOLUME       Q    0.       52.5     105.0     157.5     210.0
 (HOURS)    (AF)      (CFS)
------------------------------------------------------------------------
  0.25      0.0304      2.06  Q         .         .         .         .
  0.61      0.0917      2.09  Q         .         .         .         .
  0.96      0.1539      2.11  Q         .         .         .         .
  1.32      0.2172      2.16  Q         .         .         .         .
  1.68      0.2817      2.19  Q         .         .         .         .
  2.04      0.3473      2.24  Q         .         .         .         .
  2.40      0.4141      2.27  Q         .         .         .         .
  2.75      0.4823      2.33  Q         .         .         .         .
  3.11      0.5517      2.36  Q         .         .         .         .
  3.47      0.6227      2.43  Q         .         .         .         .
  3.83      0.6950      2.46  Q         .         .         .         .
  4.19      0.7690      2.54  Q         .         .         .         .
  4.54      0.8446      2.57  Q         .         .         .         .
  4.90      0.9219      2.65  Q         .         .         .         .
  5.26      1.0010      2.70  Q         .         .         .         .
  5.62      1.0821      2.79  Q         .         .         .         .
  5.98      1.1652      2.83  Q         .         .         .         .
  6.33      1.2505      2.93  Q         .         .         .         .
  6.69      1.3381      2.99  Q         .         .         .         .
  7.05      1.4282      3.10  Q         .         .         .         .
  7.41      1.5209      3.16  Q         .         .         .         .
  7.77      1.6164      3.29  Q         .         .         .         .
  8.12      1.7149      3.36  Q         .         .         .         .
  8.48      1.8167      3.52  Q         .         .         .         .
  8.84      1.9220      3.60  Q         .         .         .         .
  9.20      2.0312      3.78  Q         .         .         .         .
  9.56      2.1445      3.88  Q         .         .         .         .
  9.91      2.2624      4.09  Q         .         .         .         .
 10.27      2.3852      4.21  Q         .         .         .         .
 10.63      2.5137      4.47  Q         .         .         .         .
 10.99      2.6483      4.62  Q         .         .         .         .
 11.35      2.7899      4.95  Q         .         .         .         .
 11.70      2.9392      5.14  Q         .         .         .         .
 12.06      3.0977      5.57  .Q        .         .         .         .
 12.42      3.2552      5.08  Q         .         .         .         .
 12.78      3.4097      5.36  .Q        .         .         .         .
 13.14      3.5730      5.67  .Q        .         .         .         .
 13.49      3.7521      6.44  .Q        .         .         .         .
 13.85      3.9496      6.91  .Q        .         .         .         .
 14.21      4.1647      7.62  .Q        .         .         .         .
 14.57      4.3886      7.51  .Q        .         .         .         .
 14.93      4.6431      9.70  .Q        .         .         .         .
 15.28      4.9559     11.45  . Q       .         .         .         .
```

15.64	5.6320	34.25	.	Q	.	.	.	.
16.00	7.1280	66.87	.		. Q	.	.	.
16.36	11.1591	205.63	.		.	.	.	Q.
16.72	14.4096	14.11	. Q		.	.	.	.
17.07	14.7433	8.45	.Q		.	.	.	.
17.43	14.9790	7.48	.Q		.	.	.	.
17.79	15.1788	6.03	.Q		.	.	.	.
18.15	15.3433	5.09	Q		.	.	.	.
18.51	15.4976	5.35	.Q		.	.	.	.
18.86	15.6474	4.78	Q		.	.	.	.
19.22	15.7823	4.34	Q		.	.	.	.
19.58	15.9054	3.98	Q		.	.	.	.
19.94	16.0189	3.69	Q		.	.	.	.
20.30	16.1243	3.44	Q		.	.	.	.
20.65	16.2229	3.23	Q		.	.	.	.
21.01	16.3157	3.04	Q		.	.	.	.
21.37	16.4033	2.88	Q		.	.	.	.
21.73	16.4865	2.74	Q		.	.	.	.
22.09	16.5657	2.61	Q		.	.	.	.
22.44	16.6413	2.50	Q		.	.	.	.
22.80	16.7137	2.40	Q		.	.	.	.
23.16	16.7832	2.30	Q		.	.	.	.
23.52	16.8501	2.22	Q		.	.	.	.
23.88	16.9146	2.14	Q		.	.	.	.
24.23	16.9768	2.07	Q		.	.	.	.
24.59	17.0074	0.00	Q		.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1460.6
10%	64.4
20%	43.0
30%	43.0
40%	21.5
50%	21.5
60%	21.5
70%	21.5
80%	21.5
90%	21.5

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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             Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* ONSITE RPCA Lear                                                      *
* 100 YR PROPOSED                                                       *
* Kimley-Horn                                                           *
 ************************************************************************

  FILE NAME: LEARP.DAT
  TIME/DATE OF STUDY: 15:45 05/13/2024
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.99
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  5
   1)    5.00;  6.950
   2)   15.00;  4.020
   3)   30.00;  2.950
   4)  180.00;  0.769
   5)  360.00;  0.449
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
```

```
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
ELEVATION DATA: UPSTREAM(FEET) =   2265.00  DOWNSTREAM(FEET) =   2263.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.979
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.084
SUBAREA Tc AND LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL DESERT COVER
"HERBACEOUS"     (40.0%)   C        0.78      0.13     1.000    96   10.98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.13
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =      3.48
TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      3.48

****************************************************************************
FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   2263.00  DOWNSTREAM(FEET) =   2198.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  2001.00   CHANNEL SLOPE =  0.0325
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.990
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.481
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL DESERT COVER
"HERBACEOUS"     (40.0%)   C       33.73      0.13     1.000    96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.13
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      55.15
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.18
AVERAGE FLOW DEPTH(FEET) =   0.42   TRAVEL TIME(MIN.) =  10.50
Tc(MIN.) =   21.48
SUBAREA AREA(ACRES) =    33.73       SUBAREA RUNOFF(CFS) =  101.62
EFFECTIVE AREA(ACRES) =     34.51     AREA-AVERAGED Fm(INCH/HR) =   0.13
AREA-AVERAGED Fp(INCH/HR) =   0.13  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =       34.5         PEAK FLOW RATE(CFS) =     103.97
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.53   FLOW VELOCITY(FEET/SEC.) =   3.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =    2201.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.48
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.481
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "HERBACEOUS"     (40.0%)   C       33.74      0.13     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.13
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   33.74      SUBAREA RUNOFF(CFS) =  101.65
  EFFECTIVE AREA(ACRES) =     68.25   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.13  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       68.2       PEAK FLOW RATE(CFS) =     205.63
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       68.2  TC(MIN.) =     21.48
  EFFECTIVE AREA(ACRES) =     68.25  AREA-AVERAGED Fm(INCH/HR)=  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.13  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =     205.63
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
==========================================================================
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             Ver. 18.0  Release Date: 05/01/2011  License ID 1499

                          Analysis prepared by:




**************************************************************************
--------------------------------------------------------------------------

 Problem Descriptions:
  ONSITE RPCA LEAR
  100 YR PROPOSED CONDITIONS
  KIMLEY-HORN
==========================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

    TOTAL 24-HOUR DURATION RAINFALL DEPTH =     3.83 (inches)

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1         68.25       99.50       79.(AMC II)     0.170       0.798

    TOTAL AREA (Acres) =     68.25

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.169

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.202
==========================================================================

 Problem Descriptions:
  RPCA LEAR
  100 YR PROPOSED
  KIMLEY-HORN
--------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.92
    TOTAL CATCHMENT AREA(ACRES) =   68.25
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.169
    LOW LOSS FRACTION = 0.202
    TIME OF CONCENTRATION(MIN.) = 21.48
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
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    USER SPECIFIED RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.58
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.47
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.90
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.31
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.68
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  3.83

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    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    17.01
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     4.77

********************************************************************************
  TIME     VOLUME       Q    0.       52.5     105.0     157.5     210.0
 (HOURS)    (AF)      (CFS)
--------------------------------------------------------------------------------
  0.25      0.0304      2.06  Q         .         .         .         .
  0.61      0.0917      2.09  Q         .         .         .         .
  0.96      0.1539      2.11  Q         .         .         .         .
  1.32      0.2172      2.16  Q         .         .         .         .
  1.68      0.2817      2.19  Q         .         .         .         .
  2.04      0.3473      2.24  Q         .         .         .         .
  2.40      0.4141      2.27  Q         .         .         .         .
  2.75      0.4823      2.33  Q         .         .         .         .
  3.11      0.5517      2.36  Q         .         .         .         .
  3.47      0.6227      2.43  Q         .         .         .         .
  3.83      0.6950      2.46  Q         .         .         .         .
  4.19      0.7690      2.54  Q         .         .         .         .
  4.54      0.8446      2.57  Q         .         .         .         .
  4.90      0.9219      2.65  Q         .         .         .         .
  5.26      1.0010      2.70  Q         .         .         .         .
  5.62      1.0821      2.79  Q         .         .         .         .
  5.98      1.1652      2.83  Q         .         .         .         .
  6.33      1.2505      2.93  Q         .         .         .         .
  6.69      1.3381      2.99  Q         .         .         .         .
  7.05      1.4282      3.10  Q         .         .         .         .
  7.41      1.5209      3.16  Q         .         .         .         .
  7.77      1.6164      3.29  Q         .         .         .         .
  8.12      1.7149      3.36  Q         .         .         .         .
  8.48      1.8167      3.52  Q         .         .         .         .
  8.84      1.9220      3.60  Q         .         .         .         .
  9.20      2.0312      3.78  Q         .         .         .         .
  9.56      2.1445      3.88  Q         .         .         .         .
  9.91      2.2624      4.09  Q         .         .         .         .
 10.27      2.3852      4.21  Q         .         .         .         .
 10.63      2.5137      4.47  Q         .         .         .         .
 10.99      2.6483      4.62  Q         .         .         .         .
 11.35      2.7899      4.95  Q         .         .         .         .
 11.70      2.9392      5.14  Q         .         .         .         .
```

12.06	3.0977	5.57	.Q	.	.	.	.
12.42	3.2552	5.08	Q	.	.	.	.
12.78	3.4097	5.36	.Q	.	.	.	.
13.14	3.5730	5.67	.Q	.	.	.	.
13.49	3.7521	6.44	.Q	.	.	.	.
13.85	3.9496	6.91	.Q	.	.	.	.
14.21	4.1647	7.62	.Q	.	.	.	.
14.57	4.3886	7.51	.Q	.	.	.	.
14.93	4.6431	9.70	.Q	.	.	.	.
15.28	4.9559	11.45	. Q	.	.	.	.
15.64	5.6320	34.25	.	Q	.	.	.
16.00	7.1289	66.93	.	. Q	.	.	.
16.36	11.1618	205.69	.	.	.	.	Q.
16.72	14.4133	14.11	. Q	.	.	.	.
17.07	14.7470	8.45	.Q	.	.	.	.
17.43	14.9827	7.48	.Q	.	.	.	.
17.79	15.1825	6.03	.Q	.	.	.	.
18.15	15.3470	5.09	Q	.	.	.	.
18.51	15.5014	5.35	.Q	.	.	.	.
18.86	15.6511	4.78	Q	.	.	.	.
19.22	15.7861	4.34	Q	.	.	.	.
19.58	15.9091	3.98	Q	.	.	.	.
19.94	16.0226	3.69	Q	.	.	.	.
20.30	16.1280	3.44	Q	.	.	.	.
20.65	16.2266	3.23	Q	.	.	.	.
21.01	16.3194	3.04	Q	.	.	.	.
21.37	16.4070	2.88	Q	.	.	.	.
21.73	16.4902	2.74	Q	.	.	.	.
22.09	16.5694	2.61	Q	.	.	.	.
22.44	16.6450	2.50	Q	.	.	.	.
22.80	16.7174	2.40	Q	.	.	.	.
23.16	16.7869	2.30	Q	.	.	.	.
23.52	16.8538	2.22	Q	.	.	.	.
23.88	16.9183	2.14	Q	.	.	.	.
24.23	16.9805	2.07	Q	.	.	.	.
24.59	17.0111	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1460.6
10%	64.4
20%	43.0
30%	43.0
40%	21.5
50%	21.5

60%	21.5
70%	21.5
80%	21.5
90%	21.5

100-yr 24-hr Analysis

Project Summary	
Title	RPCA Lear 100yr 24hr
Engineer	
Company	Kimley-Horn
Date	5/13/2024

Notes	1. The hydrographs were inputted and created using the AES v.2011 software.

Table of Contents

100-yr 24-hr Analysis

Subsection: User Notifications

User Notifications?	No user notifications generated.

100-yr 24-hr Analysis

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)
DA 1	Base	0	728,424.00	16.189	205.690

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)
O-1	Base	0	727,012.00	16.200	195.041

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
Detention (IN)	Base	0	728,410.00	16.200	199.944	(N/A)	(N/A)
Detention (OUT)	Base	0	727,012.00	16.200	195.041	0.66	1,846.00

100-yr 24-hr Analysis

Subsection: Read Hydrograph
Scenario: Base
Label: DA 1

Peak Discharge	205.690 ft³/s
Time to Peak	16.189 hours
Hydrograph Volume	728,423.64 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.352 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.000	2.060	2.090	2.110	2.160
1.760	2.190	2.240	2.270	2.330	2.360
3.519	2.430	2.460	2.540	2.570	2.650
5.279	2.700	2.790	2.830	2.930	2.990
7.039	3.100	3.160	3.290	3.360	3.520
8.799	3.600	3.780	3.880	4.090	4.210
10.558	4.470	4.620	4.950	5.140	5.570
12.318	5.080	5.360	5.670	6.440	6.910
14.078	7.620	7.510	9.700	11.450	34.250
15.838	66.930	205.690	14.110	8.450	7.480
17.597	6.030	5.090	5.350	4.780	4.340
19.357	3.980	3.690	3.440	3.230	3.040
21.117	2.880	2.740	2.610	2.500	2.400
22.876	2.300	2.220	2.140	2.070	0.000

Subsection: Time vs. Elevation
Scenario: Base
Label: Detention (OUT)

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	0.00	0.01	0.04	0.08	0.15
0.250	0.24	0.34	0.46	0.50	0.50
0.500	0.50	0.50	0.50	0.50	0.50
0.750	0.50	0.50	0.50	0.50	0.50
1.000	0.50	0.50	0.50	0.50	0.50
1.250	0.50	0.50	0.50	0.50	0.50
1.500	0.50	0.50	0.50	0.50	0.50
1.750	0.50	0.50	0.50	0.50	0.50
2.000	0.50	0.50	0.50	0.50	0.50
2.250	0.50	0.50	0.50	0.50	0.50
2.500	0.50	0.50	0.50	0.50	0.50
2.750	0.50	0.50	0.50	0.50	0.50
3.000	0.50	0.50	0.50	0.50	0.50
3.250	0.50	0.50	0.50	0.50	0.50
3.500	0.50	0.50	0.50	0.50	0.50
3.750	0.50	0.50	0.50	0.50	0.50
4.000	0.50	0.50	0.50	0.50	0.50
4.250	0.50	0.50	0.50	0.50	0.50
4.500	0.50	0.50	0.50	0.50	0.50
4.750	0.50	0.50	0.50	0.50	0.50
5.000	0.50	0.50	0.50	0.50	0.50
5.250	0.50	0.50	0.50	0.50	0.50
5.500	0.50	0.50	0.50	0.50	0.50
5.750	0.50	0.50	0.50	0.50	0.50
6.000	0.50	0.50	0.50	0.50	0.50
6.250	0.50	0.50	0.50	0.50	0.50
6.500	0.50	0.50	0.50	0.50	0.50
6.750	0.50	0.50	0.50	0.50	0.50
7.000	0.50	0.50	0.50	0.50	0.50
7.250	0.50	0.50	0.50	0.50	0.50
7.500	0.50	0.50	0.50	0.50	0.50
7.750	0.50	0.50	0.50	0.50	0.50
8.000	0.50	0.50	0.50	0.50	0.51
8.250	0.51	0.51	0.51	0.51	0.51
8.500	0.51	0.51	0.51	0.51	0.51
8.750	0.51	0.51	0.51	0.51	0.51
9.000	0.51	0.51	0.51	0.51	0.51
9.250	0.51	0.51	0.51	0.51	0.51
9.500	0.51	0.51	0.51	0.51	0.51
9.750	0.51	0.51	0.51	0.51	0.51
10.000	0.51	0.51	0.51	0.51	0.51

Subsection: Time vs. Elevation
Scenario: Base
Label: Detention (OUT)

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
10.250	0.51	0.51	0.51	0.51	0.51
10.500	0.51	0.51	0.51	0.51	0.51
10.750	0.51	0.51	0.51	0.51	0.51
11.000	0.51	0.51	0.51	0.51	0.51
11.250	0.51	0.51	0.51	0.51	0.51
11.500	0.51	0.51	0.51	0.51	0.51
11.750	0.51	0.51	0.51	0.51	0.51
12.000	0.51	0.51	0.51	0.51	0.51
12.250	0.51	0.51	0.51	0.51	0.51
12.500	0.51	0.51	0.51	0.51	0.51
12.750	0.51	0.51	0.51	0.51	0.51
13.000	0.51	0.51	0.51	0.51	0.51
13.250	0.51	0.51	0.51	0.51	0.51
13.500	0.51	0.51	0.51	0.51	0.51
13.750	0.51	0.51	0.51	0.51	0.51
14.000	0.51	0.51	0.51	0.51	0.51
14.250	0.51	0.51	0.51	0.51	0.51
14.500	0.51	0.51	0.51	0.51	0.51
14.750	0.51	0.51	0.51	0.52	0.52
15.000	0.52	0.52	0.52	0.52	0.52
15.250	0.53	0.53	0.54	0.54	0.54
15.500	0.55	0.55	0.56	0.56	0.56
15.750	0.57	0.57	0.58	0.59	0.60
16.000	0.62	0.63	0.64	0.65	0.66
16.250	0.66	0.64	0.62	0.61	0.58
16.500	0.56	0.54	0.52	0.52	0.51
16.750	0.52	0.51	0.52	0.51	0.51
17.000	0.51	0.51	0.51	0.51	0.51
17.250	0.51	0.51	0.51	0.51	0.51
17.500	0.51	0.51	0.51	0.51	0.51
17.750	0.51	0.51	0.51	0.51	0.51
18.000	0.51	0.51	0.51	0.51	0.51
18.250	0.51	0.51	0.51	0.51	0.51
18.500	0.51	0.51	0.51	0.51	0.51
18.750	0.51	0.51	0.51	0.51	0.51
19.000	0.51	0.51	0.51	0.51	0.51
19.250	0.51	0.51	0.51	0.51	0.51
19.500	0.51	0.51	0.51	0.51	0.51
19.750	0.51	0.51	0.51	0.51	0.51
20.000	0.51	0.51	0.51	0.50	0.50
20.250	0.50	0.50	0.50	0.50	0.50

Subsection: Time vs. Elevation
Scenario: Base
Label: Detention (OUT)

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
20.500	0.50	0.50	0.50	0.50	0.50
20.750	0.50	0.50	0.50	0.50	0.50
21.000	0.50	0.50	0.50	0.50	0.50
21.250	0.50	0.50	0.50	0.50	0.50
21.500	0.50	0.50	0.50	0.50	0.50
21.750	0.50	0.50	0.50	0.50	0.50
22.000	0.50	0.50	0.50	0.50	0.50
22.250	0.50	0.50	0.50	0.50	0.50
22.500	0.50	0.50	0.50	0.50	0.50
22.750	0.50	0.50	0.50	0.50	0.50
23.000	0.50	0.50	0.50	0.50	0.50
23.250	0.50	0.50	0.50	0.50	0.50
23.500	0.50	0.50	0.50	0.50	0.50
23.750	0.50	0.50	0.50	0.50	0.50
24.000	0.50	0.50	0.50	0.50	0.50
24.250	0.50	0.50	0.50	0.50	0.50
24.500	0.50	0.50	0.50	0.50	0.50
24.750	0.50	0.50	0.50	0.50	0.50
25.000	0.50	(N/A)	(N/A)	(N/A)	(N/A)

100-yr 24-hr Analysis

Subsection: Time vs. Volume
Scenario: Base
Label: Detention

Time vs. Volume (ft³)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
0.000	0.00	26.00	105.00	237.00	421.00
0.250	658.00	948.00	1,291.00	1,410.00	1,405.00
0.500	1,410.00	1,405.00	1,410.00	1,406.00	1,409.00
0.750	1,406.00	1,409.00	1,406.00	1,409.00	1,407.00
1.000	1,409.00	1,407.00	1,409.00	1,407.00	1,408.00
1.250	1,407.00	1,408.00	1,407.00	1,408.00	1,407.00
1.500	1,408.00	1,408.00	1,408.00	1,408.00	1,408.00
1.750	1,408.00	1,408.00	1,408.00	1,408.00	1,408.00
2.000	1,408.00	1,408.00	1,408.00	1,408.00	1,408.00
2.250	1,408.00	1,408.00	1,408.00	1,408.00	1,408.00
2.500	1,408.00	1,408.00	1,408.00	1,408.00	1,409.00
2.750	1,409.00	1,409.00	1,409.00	1,409.00	1,409.00
3.000	1,409.00	1,409.00	1,409.00	1,409.00	1,409.00
3.250	1,409.00	1,409.00	1,409.00	1,409.00	1,409.00
3.500	1,409.00	1,409.00	1,409.00	1,409.00	1,409.00
3.750	1,409.00	1,409.00	1,409.00	1,409.00	1,409.00
4.000	1,409.00	1,409.00	1,409.00	1,409.00	1,409.00
4.250	1,409.00	1,409.00	1,409.00	1,410.00	1,410.00
4.500	1,410.00	1,410.00	1,410.00	1,410.00	1,410.00
4.750	1,410.00	1,410.00	1,410.00	1,410.00	1,410.00
5.000	1,410.00	1,410.00	1,410.00	1,410.00	1,410.00
5.250	1,410.00	1,410.00	1,410.00	1,410.00	1,410.00
5.500	1,410.00	1,410.00	1,410.00	1,410.00	1,411.00
5.750	1,411.00	1,411.00	1,411.00	1,411.00	1,411.00
6.000	1,411.00	1,411.00	1,411.00	1,411.00	1,411.00
6.250	1,411.00	1,411.00	1,411.00	1,411.00	1,411.00
6.500	1,411.00	1,411.00	1,411.00	1,411.00	1,411.00
6.750	1,411.00	1,411.00	1,412.00	1,412.00	1,412.00
7.000	1,412.00	1,412.00	1,412.00	1,412.00	1,412.00
7.250	1,412.00	1,412.00	1,412.00	1,412.00	1,412.00
7.500	1,412.00	1,412.00	1,412.00	1,412.00	1,412.00
7.750	1,413.00	1,413.00	1,413.00	1,413.00	1,413.00
8.000	1,413.00	1,413.00	1,413.00	1,413.00	1,413.00
8.250	1,413.00	1,413.00	1,413.00	1,413.00	1,413.00
8.500	1,414.00	1,414.00	1,414.00	1,414.00	1,414.00
8.750	1,414.00	1,414.00	1,414.00	1,414.00	1,414.00
9.000	1,414.00	1,414.00	1,414.00	1,415.00	1,415.00
9.250	1,415.00	1,415.00	1,415.00	1,415.00	1,415.00
9.500	1,415.00	1,415.00	1,415.00	1,415.00	1,415.00
9.750	1,416.00	1,416.00	1,416.00	1,416.00	1,416.00
10.000	1,416.00	1,416.00	1,416.00	1,416.00	1,416.00

Subsection: Time vs. Volume
Scenario: Base
Label: Detention

Time vs. Volume (ft³)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
10.250	1,416.00	1,417.00	1,417.00	1,417.00	1,417.00
10.500	1,417.00	1,417.00	1,417.00	1,418.00	1,418.00
10.750	1,418.00	1,418.00	1,418.00	1,418.00	1,418.00
11.000	1,418.00	1,419.00	1,419.00	1,419.00	1,419.00
11.250	1,419.00	1,419.00	1,420.00	1,420.00	1,420.00
11.500	1,420.00	1,420.00	1,420.00	1,420.00	1,421.00
11.750	1,421.00	1,421.00	1,421.00	1,422.00	1,422.00
12.000	1,422.00	1,421.00	1,421.00	1,421.00	1,421.00
12.250	1,420.00	1,420.00	1,420.00	1,420.00	1,420.00
12.500	1,421.00	1,421.00	1,421.00	1,421.00	1,421.00
12.750	1,421.00	1,422.00	1,422.00	1,422.00	1,422.00
13.000	1,422.00	1,423.00	1,423.00	1,423.00	1,424.00
13.250	1,424.00	1,425.00	1,425.00	1,426.00	1,426.00
13.500	1,426.00	1,426.00	1,427.00	1,427.00	1,427.00
13.750	1,428.00	1,428.00	1,428.00	1,429.00	1,429.00
14.000	1,430.00	1,430.00	1,430.00	1,430.00	1,430.00
14.250	1,430.00	1,430.00	1,430.00	1,430.00	1,430.00
14.500	1,432.00	1,433.00	1,434.00	1,436.00	1,437.00
14.750	1,438.00	1,439.00	1,440.00	1,441.00	1,442.00
15.000	1,443.00	1,444.00	1,445.00	1,450.00	1,463.00
15.250	1,472.00	1,484.00	1,497.00	1,510.00	1,524.00
15.500	1,538.00	1,548.00	1,558.00	1,569.00	1,579.00
15.750	1,590.00	1,600.00	1,615.00	1,646.00	1,688.00
16.000	1,722.00	1,757.00	1,791.00	1,824.00	1,846.00
16.250	1,833.00	1,788.00	1,741.00	1,694.00	1,637.00
16.500	1,576.00	1,503.00	1,445.00	1,458.00	1,439.00
16.750	1,450.00	1,434.00	1,442.00	1,429.00	1,438.00
17.000	1,428.00	1,436.00	1,428.00	1,434.00	1,427.00
17.250	1,432.00	1,427.00	1,430.00	1,425.00	1,428.00
17.500	1,424.00	1,426.00	1,422.00	1,424.00	1,422.00
17.750	1,423.00	1,421.00	1,422.00	1,420.00	1,421.00
18.000	1,419.00	1,421.00	1,420.00	1,421.00	1,420.00
18.250	1,421.00	1,421.00	1,421.00	1,420.00	1,420.00
18.500	1,419.00	1,420.00	1,419.00	1,419.00	1,418.00
18.750	1,418.00	1,418.00	1,418.00	1,417.00	1,417.00
19.000	1,417.00	1,417.00	1,416.00	1,416.00	1,416.00
19.250	1,416.00	1,416.00	1,415.00	1,415.00	1,415.00
19.500	1,415.00	1,415.00	1,415.00	1,414.00	1,414.00
19.750	1,414.00	1,414.00	1,414.00	1,414.00	1,414.00
20.000	1,413.00	1,413.00	1,413.00	1,413.00	1,413.00
20.250	1,413.00	1,413.00	1,412.00	1,412.00	1,412.00

100-yr 24-hr Analysis

Subsection: Time vs. Volume
Scenario: Base
Label: Detention

Time vs. Volume (ft³)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
20.500	1,412.00	1,412.00	1,412.00	1,412.00	1,412.00
20.750	1,412.00	1,411.00	1,411.00	1,411.00	1,411.00
21.000	1,411.00	1,411.00	1,411.00	1,411.00	1,411.00
21.250	1,411.00	1,411.00	1,410.00	1,410.00	1,410.00
21.500	1,410.00	1,410.00	1,410.00	1,410.00	1,410.00
21.750	1,410.00	1,410.00	1,410.00	1,410.00	1,410.00
22.000	1,410.00	1,409.00	1,409.00	1,409.00	1,409.00
22.250	1,409.00	1,409.00	1,409.00	1,409.00	1,409.00
22.500	1,409.00	1,409.00	1,409.00	1,409.00	1,409.00
22.750	1,409.00	1,409.00	1,408.00	1,408.00	1,408.00
23.000	1,408.00	1,408.00	1,408.00	1,408.00	1,408.00
23.250	1,408.00	1,408.00	1,408.00	1,408.00	1,408.00
23.500	1,408.00	1,408.00	1,408.00	1,408.00	1,408.00
23.750	1,408.00	1,408.00	1,408.00	1,408.00	1,407.00
24.000	1,406.00	1,405.00	1,403.00	1,402.00	1,401.00
24.250	1,400.00	1,399.00	1,399.00	1,399.00	1,399.00
24.500	1,399.00	1,399.00	1,399.00	1,399.00	1,399.00
24.750	1,399.00	1,399.00	1,399.00	1,399.00	1,399.00
25.000	1,399.00	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Outlet Input Data Scenario: Base

Label: Weir

Requested Pond Water Surface Elevations	
Minimum (Headwater)	0.00 ft
Increment (Headwater)	0.05 ft
Maximum (Headwater)	1.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	Weir - 1	Forward	TW	0.50	1.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Subsection: Outlet Input Data Scenario: Base
Label: Weir

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	0.50 ft
Weir Length	800.00 ft
Weir Coefficient	3.80 (ft^0.5)/s

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

100-yr 24-hr Analysis

Subsection: Elevation-Volume-Flow Table (Pond) Scenario: Base

Label: Detention

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	0.00 ft
Volume (Initial)	0.00 ft³
Flow (Initial Outlet)	0.000 ft³/s
Flow (Initial Infiltration)	0.000 ft³/s
Flow (Initial, Total)	0.000 ft³/s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
0.00	0.000	0.00	2,798.000	0.000	0.000	0.000
0.05	0.000	139.90	2,798.000	0.000	0.000	1.554
0.10	0.000	279.80	2,798.000	0.000	0.000	3.109
0.15	0.000	419.70	2,798.000	0.000	0.000	4.663
0.20	0.000	559.60	2,798.000	0.000	0.000	6.218
0.25	0.000	699.50	2,798.000	0.000	0.000	7.772
0.30	0.000	839.40	2,798.000	0.000	0.000	9.327
0.35	0.000	979.30	2,798.000	0.000	0.000	10.881
0.40	0.000	1,119.20	2,798.000	0.000	0.000	12.436
0.45	0.000	1,259.10	2,798.000	0.000	0.000	13.990
0.50	0.000	1,399.00	2,798.000	0.000	0.000	15.544
0.55	33.988	1,538.90	2,798.000	0.000	33.988	51.087
0.60	96.131	1,678.80	2,798.000	0.000	96.131	114.784
0.65	176.601	1,818.70	2,798.000	0.000	176.601	196.809
0.70	271.892	1,958.60	2,798.000	0.000	271.892	293.654
0.75	379.976	2,098.50	2,798.000	0.000	379.976	403.293
0.80	499.486	2,238.40	2,798.000	0.000	499.486	524.357
0.85	629.416	2,378.30	2,798.000	0.000	629.416	655.841
0.90	768.989	2,518.20	2,798.000	0.000	768.989	796.969
0.95	917.579	2,658.10	2,798.000	0.000	917.579	947.114
1.00	1,074.668	2,798.00	2,798.000	0.000	1,074.668	1,105.757

Subsection: Level Pool Pond Routing Summary
Scenario: Base
Label: Detention (IN)

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	0.00 ft
Volume (Initial)	0.00 ft³
Flow (Initial Outlet)	0.000 ft³/s
Flow (Initial Infiltration)	0.000 ft³/s
Flow (Initial, Total)	0.000 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	199.944 ft³/s	Time to Peak (Flow, In)	16.200 hours
Flow (Peak Outlet)	195.041 ft³/s	Time to Peak (Flow, Outlet)	16.200 hours

Elevation (Water Surface, Peak)	0.66 ft
Volume (Peak)	1,845.77 ft³

Mass Balance (ft³)	
Volume (Initial)	0.00 ft³
Volume (Total Inflow)	728,410.00 ft³
Volume (Total Infiltration)	0.00 ft³
Volume (Total Outlet Outflow)	727,012.00 ft³
Volume (Retained)	1,399.00 ft³
Volume (Unrouted)	0.00 ft³
Error (Mass Balance)	0.0 %

Subsection: Pond Inflow Summary
Scenario: Base
Label: Detention (IN)

Summary for Hydrograph Addition at 'Detention'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	DA 1

Node Inflows

Inflow Type	Element	Volume (ft³)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	DA 1	728,423.64	16.189	205.690
Flow (In)	Detention	728,410.29	16.200	199.944

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Attachment C – Water Quality Calculations

- **Proposed Impervious Calculations**
- **Pre-Development 85th Percentile Volume**
- **Post-Development 85th Percentile Volume**
- **Infiltration Basin Sizing Worksheet**

Water Quality Calculations

Project Name: RPCA Lear
Completed by: Bryant Yang
Reviewed by: Lupita Astorga
Date: 13-May-24
County: San Bernardino

Existing Conditions (Figure 2A)

Drainage Area	Area (sf)	Area (ac)	Land Cover	Impervious Area (%)	impervious area (sf)	imp	2-yr 1-hr Isohyet* (in)	climatic region	a1 (desert)	draw down time (hr)	a2 (48 hours)	C	85th% Depth (in)	Water Quality Volume (cf)
DMA 1	2,973,098	68.25	Desert - Herbaceous 40% Density	0.0	0.0	0.000	0.569	desert	1.2371	48	1.963	0.040	0.704	13,694

Proposed Conditions (Figure 2B)

Drainage Area	Area (sf)	Area (ac)	Land Cover	Impervious Area (%)	impervious area (sf)	imp	2-yr 1-hr Isohyet* (in)	climatic region	a1 (desert)	draw down time (hr)	a2 (48 hours)	C	85th% Depth (in)	Water Quality Volume (cf)
DMA 1	2,973,098	68.25	Desert - Herbaceous 40% Density	0.5	14972.0	0.005	0.569	desert	1.2371	48	1.963	0.044	0.704	15,021

*Obtained from NOAA 14

85th Percentile Volume Mitigation

Drainage Area	Area (sf)	Area (ac)	Water Quality Volume		Delta (cf)
			Existing (cf)	Proposed (cf)	
DMA 1	2,973,098	68.25	13,694	15,021	1,328

San Bernardino County Infiltration Basin Formula Table 5-4

Drainage Area	Volume (cf)	Infiltration Rate (in/hr)	Infiltration Safety Factor	Design percolation rate (in/hr)	Drawdown Time (hr)	Duration of Storm (hr)	Inch to Feet Conversion	Minimum Surface Area (sf)
DMA 1	1,328	1.5	2	0.75	48	3	12	416.5

Basin	Tributary DA	85th Percentile, 24-hr Mitigation Volume (cf)	Required Retention Volume (cf)	Design Length (ft)	Design Width (ft)	Design Area (sf)	Design Depth (ft)	Design Volume (cf)	Vdesign > Vrequired?
1	DMA 1	1,328	1,328	1,865	1.5	2,798	0.5	1,399	*YES*
Total Required Retention Volume			1,328	Total Designed Volume					1,399

Basin	Ponding Depth (ft)	Infiltration Rate (in/hr)*	Factor of Safety	Design Infiltration Rate (in/hr)	Drawdown Time (hr)	Required Drawdown Time (hr)	Compliance?
1	0.5	1.5	2	0.75	8.00	48.00	*YES*

*Note- Infiltration testing was conducted by Salem Engineering Group, Inc. dated November 2023

Proposed Impervious Calculations

Project Name: RPCA Lear
Completed by: Bryant Yang
Reviewed by: Lupita Astorga
Date: 13-May-24
County: San Bernardino

Number of Piles	Area of Each Pile (sf)*	Total Pile Area (sf)	Number of Transformer Pads	Area of Each Pad (sf)	Total Pad Area (sf)	Number of BESS Pads	Area of Each Pad (sf)	Total Pad Area (sf)	Total Impervious Area (sf)	Total Area (sf)	Impervious (%)
5,002	0.6667	3,335	4	315	1,260	3	3,459	10,377	14,972	2,973,098	0.50

* Pile areas are conservative as the 8"x12" I-beams are calculated as 8"x12" rectangles.