Merrell Johnson
COMPANIES

ON-SITE HYDROLOGY STUDY

For

AP Investors Group LLC
APN 0463-241-02 & 03
Apple Valley, CA

February 22, 2023

Prepared by:

Merrell-Johnson Companies

22221 US Highway 18
Apple Valley, CA 92307
(760) 240-8000

Job No. 3675.007

E. Cary Packer, PE   **Mark D. Rowan**
Associate Engineer   Project Manager
R.C.E. 51752 Exp. 06/30/24

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SECTION 1

DISCUSSION

INTRODUCTION

The purpose of this study was to determine the impact, if any, of the 100-year on-site storm runoff flow on the project site as delineated on the map contained in this study. The project site encompasses approximately 72 acres of property located on the east side of Central Road, between Johnson Road to the north and Lafayette Street on the south in the northeastern area of the Town of Apple Valley, San Bernardino County, California. Development of the site will be a proposed distribution warehouse facility.

METHODOLOGY

The method in determining these peak on-site runoff flows was the unit hydrograph method as specified in the 1986 San Bernardino County Hydrology Manual and the 2010 San Bernardino County Hydrology Manual Addendum for Arid Regions. The existing on-site flow was examined and delineated from U.S.G.S. Map: Apple Valley North and an examination of the project site.

Point rainfalls for the 100-year storm were obtained from the NOAA Atlas 14 per the 2010 Addendum to the County Hydrology Manual. The 100-year 1-hour point rainfall for the site is 1.07". Per the aforementioned addendum, AMC II was used for the project site and the soil types were determined to be Soil Type A in the eastern tributary area and Soil Type C southeastern tributary area per the Natural Resources Conservation Service's "Web Soil Survey". Rainfall and maps are included as exhibits in Section 3 of this report.

The on-site flow areas examined in this study is shown in Table A.

<p style="text-align:center">Table A</p>

Sub-area	Elevation Difference (ft.)	Length (ft)	Area (Ac)	Avg. Slope (ft/ft)
On-site Undeveloped	38	2,668	72.5	0.0142
On-site Developed	39	3,482	72.5	0.0112

EXISTING CONDITIONS

The site is located along the east side of Central Road between Johnson Road to the north and Lafayette Street to the south in the Town of Apple Valley, California. The property is currently vacant, undeveloped land. Central Road is a paved road with dirt shoulders. Johnson Road and Lafayette Street area both graded, unimproved roads.

The results of the offsite flow analysis are summarized in Table B.

Table B

Sub-Area	Q_{100} (cfs)
On-site Undeveloped	207.7
On-site Developed	249.4

CONCLUSIONS AND RECOMMENDATIONS

During our field investigation of the site, we observed the existing conditions as stated previously. Future development of the project is being performed in conjunction with engineered improvement plans. Off-site flows were examined and delineated in the off-site hydrology study for this project. Off-site flows from the east and southeast will be intercepted along the easterly property boundary, conveyed through the project, around the proposed building and outlet along the westerly and southerly boundaries following their historical flow locations. The Apple Valley MPD flow will be intercepted as it enters the property along the northern boundary, conveyed around the proposed development and released within its historical flow location along Central Road.

On-site runoff flows will be routed through the site and intercepted in an on-site storm drain system and routed to two underground retention systems at the southeastern parking area and along the western project boundary as indicated on the map in this study and allowed to infiltrate. The proposed retention volume of these two systems is approximately 195,797 cubic feet. Overflow runoff from these systems will be routed to the storm runoff basin at the southwest corner of the project site. Excess runoff from larger storm events will outlet from this basin as weir flow across Central Road following the historical drainage patterns.

SECTION 2

EXHIBITS

VICINITY MAP

Uncommon Development
Building 1

Quarry Rd

Central Rd

Central Rd

Central Rd

PROJECT SITE

Google Earth

N

5000 ft

PROPOSED DEVELOPMENT PLAN

SITE MAP 1
DESCRIPTIONS AS SHOWN IN WQMP FORM 1-1

	TOTAL PROPERTY:	3,159,417 SQ.FT.	72.53 ACRES
	ROAD IMPROVEMENTS:	209,426 SQ.FT.	4.81 ACRES
	DIVERSION AREAS:	458,902 SQ.FT.	10.53 ACRES
	WQMP AREA:	2,491,089 SQ.FT.	57.19 ACRES

CL CENTRAL ROAD
CL LAFAYETTE STREET
NEW BUILDING ROOF
EAST CHANNEL
CL JOHNSON ROAD
CL SYCAMORE LANE
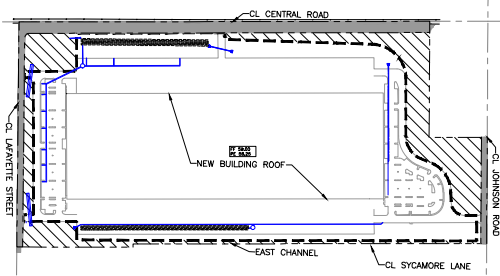
SITE MAP 2
DESCRIPTIONS AS SHOWN IN WQMP COMPARATIVE BREAKDOWN FORM 4.2-1(A)
AND IN FORMS LISTED:

DA 1 WEST: INCLUDES NORTH AND SOUTH PARKING AND WEST LOADING
WEST DA AREA:	1,380,173 SQ.FT.	31.68 ACRES
ROOF AREA:	540,000 SQ. FT.	12.40 ACRES
IMPERVIOUS SURFACE:	601,509 SQ. FT.	13.81 ACRES
CURB LANDSCAPE:	37,721 SQ. FT.	0.87 ACRES
BIORETENTION SURFACE:	61,221 SQ. FT.	1.41 ACRES
NW PRETREATMENT SWALE:	94,447 SQ. FT.	2.17 ACRES
SW PRETREATMENT VORTEX SEPARATOR		
PERVIOUS GRAVEL:	45,275 SQ.FT.	1.04 ACRES
U/G HORIZONTAL PERFORATED INFILTRATION PIPES

DESCRIPTIONS AS SHOWN IN WQMP FORM 4.3-2, ITEM #5
NORTHWEST DMA AREA:	670,290 SQ.FT.	15.39 ACRES
ROOF AREA:	269,045 SQ. FT.	6.18 ACRES	4.3-2 ITEM#2
IMPERVIOUS SURFACE:	286,101 SQ. FT.	6.57 ACRES	4.3-2 ITEM#2
NW PRETREATMENT SWALE:	94,447 SQ. FT.	2.17 ACRES

DA2 EAST: INCLUDES EAST LOADING
EAST DA AREA:	1,110,918 SQ.FT.	25.50 ACRES	4.2-1(A) EAST
ROOF AREA:	540,000 SQ. FT.	12.40 ACRES
IMPERVIOUS SURFACE:	440,950 SQ. FT.	10.12 ACRES
CURB LANDSCAPE:	15,453 SQ. FT.	0.35 ACRES
PERVIOUS GRAVEL:	114,513 SQ. FT.	2.63 ACRES
E PRETREATMENT VORTEX SEPARATOR		
U/G HORIZONTAL PERFORATED INFILTRATION PIPES

CL CENTRAL ROAD
CL LAFAYETTE STREET
DA1 WEST
DMA NORTHWEST
NEW BUILDING ROOF
DA2 EAST
EAST CHANNEL
CL SYCAMORE LANE
CL JOHNSON ROAD
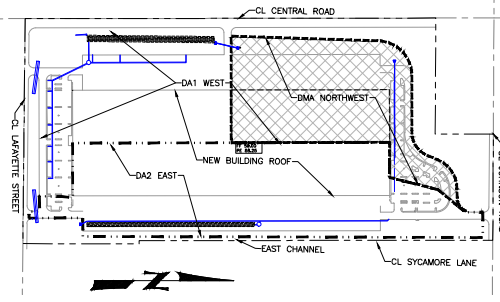
ONSITE RUNOFF FLOW PATHS

LEGEND:
- DS — DOWNSPOUT LOCATION
- INLET — STORM DRAIN INLET
- PRE- — PRETREATMENT SYSTEM
- BMP — DETENTION/INFILTRATION BMP
- TC-# — BMP REFERENCE
- ROOF AREA: 1,080,000 SQ. FT.
- CONCRETE AREA HATCH — TOTAL IMPERVIOUS SURFACE AREA: 1,042,459 SQ. FT.
- LANDSCAPED CURBED: 53,174 SQ. FT.
- SURFACE BASIN LANDSCAPED AREA: 56,612 SQ. FT. U/G PIPE INFILTRATION BOTTOM SURFACE: 27,916 SQ. FT.
- NATIVE SOILS GRADED TO SLOPE: 254,234 SQ.FT. GRAVEL OVER NATIVE (USES THE SAME ON AS, PRE DEVELOPED AS SHOWN IN FORM 4.2-3).

FF 59.00
PE 58.25

OVERFLOW DISCHARGE FOR LARGE STORMS. SEE HYDROLOGY STUDY FOR 100YR STORM CALCULATIONS

DIVERSION METHOD, NOT A PART OF WQMP, DOES NOT COMMINGLE WITH ONSITE ACTIVITIES.

DIVERSION METHOD, PIPE UNDER DRIVEWAY.

DIVERTED HISTORICAL RUN-ON, NOT A PART OF WQMP, DOES NOT COMMINGLE WITH ONSITE ACTIVITIES.

CL DRAINAGE CHANNEL

CENTRAL ROAD

NOTE:
IF THIS PLAN IS NOT SIGNED AND DATED BY THE ENGINEER OF RECORD AND ALSO BY THE CITY ENGINEER OR UTILITY COMPANY OFFICIAL IN THE APPROVAL BLOCKS OF THIS PLAN THEN THIS PLAN IS PRELIMINARY AND NOT FOR CONSTRUCTION.

BENCHMARK:
BENCHMARK ="

BASIS OF BEARINGS
CALIFORNIA STATE PLANE COORDINATE SYSTEM ZONE V NAD 83

E. CARY PACKER R.C.E. 51752
No. C-51752

MERRELL JOHNSON
MERRELL JOHNSON ENGINEERING, INC.
MERRELLJOHNSON.COM

DRAWN BY: JMC	DATE: 02/03/23
DESIGNED BY:	DATE: 12/08/22
APPROVED BY:	DATE: 12/08/22

TOWN OF APPLE VALLEY
ENGINEERING DEPARTMENT
REVIEWED BY:
NORMAN B. MILLER, TOWN ENGINEER   DATE
RCE 59809, EXP. DATE:

THESE PLANS ARE SIGNED BY THE TOWN OF APPLE VALLEY FOR CONCEPT ADHERENCE TO TOWN STANDARDS AND REQUIREMENTS ONLY. THE TOWN OF APPLE VALLEY IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS AND ACCURACY.

Town of Apple Valley

AP INVESTORS GROUP LLC
WQMP EXHIBIT
CENTRAL RD & LAFAYETTE ST.
68.2 ACRES

| SCALE: AS SHOWN |
| JOB NO. 3675.007 |
| SHEET 1 OF 2 |

SCALE: 1" = 80'
80' 40' 0' 80' 160'

SECTION 3

HYDROLOGY CALCULATIONS

Merrell-Johnson Engineering, Inc.
CIVIL ENGINEERING ♦ SURVEYING

UNIT HYDROGRAPH CALCULATIONS

```
              U n i t   H y d r o g r a p h   A n a l y s i s

          Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

                       Study date  02/23/23


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     --------------------------------------------------------------------------

     San Bernardino County Synthetic Unit Hydrology Method
                     Manual date - August 1986


     Program License Serial Number 5006

     ------------------------------------------------------------------------
     APPLE MGA - JOB 3675.007
     ON-SITE UNDEVELOPED STORM RUNOFF
     100-YEAR STORM EVENT - AMC II

     ------------------------------------------------------------------------

             Storm Event Year = 100

             Antecedent Moisture Condition = 2

       English (in-lb) Input Units Used

       English Rainfall Data (Inches) Input Values Used

       English Units used in output format




     Area averaged rainfall intensity isohyetal data:
             Sub-Area         Duration          Isohyetal
             (Ac.)            (hours)           (In)
     Rainfall data for year 10
                 72.50             1             0.60
     ------------------------------------------------------------------------
     Rainfall data for year 2
                 72.50             6             0.72
     ------------------------------------------------------------------------
     Rainfall data for year 2
                 72.50            24             1.29
     ------------------------------------------------------------------------
     Rainfall data for year 100
```

```
            72.50                 1           1.07
------------------------------------------------------------------------
Rainfall data for year 100
            72.50                 6           1.98
------------------------------------------------------------------------
Rainfall data for year 100
            72.50                24           3.38
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

******** Area-averaged max loss rate, Fm ********


SCS curve  SCS curve    Area      Area     Fp(Fig C6)    Ap       Fm
No.(AMCII) NO.(AMC 2)   (Ac.)    Fraction   (In/Hr)   (dec.)   (In/Hr)
 67.0      67.0         72.50     1.000     0.578     1.000     0.578

Area-averaged adjusted loss rate Fm (In/Hr) =  0.578

********* Area-Averaged low loss rate fraction, Yb **********

Area         Area        SCS CN     SCS CN      S      Pervious
 (Ac.)       Fract       (AMC2)     (AMC2)             Yield Fr
    72.50    1.000        67.0       67.0      4.93     0.232

Area-averaged catchment yield fraction, Y =  0.232
Area-averaged low loss fraction, Yb =  0.768
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watercourse length =    2668.00(Ft.)
Length from concentration point to centroid =    1477.00(Ft.)
Elevation difference along watercourse =      38.00(Ft.)
Mannings friction factor along watercourse =  0.020
Watershed area =       72.50(Ac.)
Catchment Lag time =   0.100 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 82.9752
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.578(In/Hr)
Average low loss rate fraction (Yb) = 0.768 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.508(In)
Computed peak 30-minute rainfall =  0.869(In)
Specified peak 1-hour rainfall =  1.070(In)
Computed peak 3-hour rainfall =  1.561(In)
Specified peak 6-hour rainfall =  1.980(In)
Specified peak 24-hour rainfall =  3.380(In)


Rainfall depth area reduction factors:
Using a total area of      72.50(Ac.) (Ref: fig. E-4)
```

```
        5-minute factor = 0.997      Adjusted rainfall =  0.506(In)
        30-minute factor = 0.997     Adjusted rainfall =  0.866(In)
        1-hour factor = 0.997        Adjusted rainfall =  1.066(In)
        3-hour factor = 1.000        Adjusted rainfall =  1.560(In)
        6-hour factor = 1.000        Adjusted rainfall =  1.980(In)
        24-hour factor = 1.000       Adjusted rainfall =  3.380(In)
        -----------------------------------------------------------------

                        U n i t   H y d r o g r a p h
        +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        Interval            'S' Graph          Unit Hydrograph
        Number              Mean values            ((CFS))
        -----------------------------------------------------------------
                        (K =        876.80 (CFS))

          1                  11.660                 102.232
          2                  59.142                 416.320
          3                  78.913                 173.356
          4                  87.744                  77.424
          5                  92.655                  43.064
          6                  95.706                  26.749
          7                  97.562                  16.274
          8                  98.572                   8.857
          9                  99.488                   8.027
         10                 100.000                   4.492
        -----------------------------------------------------------------
        -----------------------------------------------------------------
        -----------------------------------------------------------------
        Total soil rain loss =      2.20(In)
        Total effective rainfall =      1.18(In)
```
Peak flow rate in flood hydrograph =   207.69(CFS)
```
        -----------------------------------------------------------------
        +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        24 - 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
        -----------------------------------------------------------------
                    Hydrograph in   5   Minute intervals ((CFS))


        -----------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS) 0        75.0      150.0     225.0     300.0
        -----------------------------------------------------------------
    0+ 5       0.0007       0.11  Q        |         |         |         |
    0+10       0.0045       0.55  Q        |         |         |         |
    0+15       0.0095       0.73  Q        |         |         |         |
    0+20       0.0151       0.81  Q        |         |         |         |
    0+25       0.0210       0.86  Q        |         |         |         |
    0+30       0.0272       0.89  Q        |         |         |         |
    0+35       0.0334       0.91  Q        |         |         |         |
    0+40       0.0398       0.92  Q        |         |         |         |
```

```
0+45        0.0462        0.93    Q       |       |       |       |
0+50        0.0527        0.94    Q       |       |       |       |
0+55        0.0593        0.95    Q       |       |       |       |
1+ 0        0.0658        0.95    Q       |       |       |       |
1+ 5        0.0723        0.95    Q       |       |       |       |
1+10        0.0789        0.96    Q       |       |       |       |
1+15        0.0855        0.96    Q       |       |       |       |
1+20        0.0922        0.96    Q       |       |       |       |
1+25        0.0988        0.97    Q       |       |       |       |
1+30        0.1055        0.97    Q       |       |       |       |
1+35        0.1122        0.97    Q       |       |       |       |
1+40        0.1189        0.98    Q       |       |       |       |
1+45        0.1256        0.98    Q       |       |       |       |
1+50        0.1324        0.98    Q       |       |       |       |
1+55        0.1392        0.99    Q       |       |       |       |
2+ 0        0.1460        0.99    Q       |       |       |       |
2+ 5        0.1529        0.99    Q       |       |       |       |
2+10        0.1597        1.00    Q       |       |       |       |
2+15        0.1666        1.00    Q       |       |       |       |
2+20        0.1735        1.00    Q       |       |       |       |
2+25        0.1805        1.01    QV      |       |       |       |
2+30        0.1874        1.01    QV      |       |       |       |
2+35        0.1944        1.02    QV      |       |       |       |
2+40        0.2014        1.02    QV      |       |       |       |
2+45        0.2085        1.02    QV      |       |       |       |
2+50        0.2156        1.03    QV      |       |       |       |
2+55        0.2227        1.03    QV      |       |       |       |
3+ 0        0.2298        1.04    QV      |       |       |       |
3+ 5        0.2369        1.04    QV      |       |       |       |
3+10        0.2441        1.04    QV      |       |       |       |
3+15        0.2513        1.05    QV      |       |       |       |
3+20        0.2586        1.05    QV      |       |       |       |
3+25        0.2659        1.06    QV      |       |       |       |
3+30        0.2732        1.06    QV      |       |       |       |
3+35        0.2805        1.06    QV      |       |       |       |
3+40        0.2878        1.07    QV      |       |       |       |
3+45        0.2952        1.07    QV      |       |       |       |
3+50        0.3026        1.08    QV      |       |       |       |
3+55        0.3101        1.08    QV      |       |       |       |
4+ 0        0.3176        1.09    QV      |       |       |       |
4+ 5        0.3251        1.09    QV      |       |       |       |
4+10        0.3326        1.10    QV      |       |       |       |
4+15        0.3402        1.10    QV      |       |       |       |
4+20        0.3478        1.10    QV      |       |       |       |
4+25        0.3555        1.11    QV      |       |       |       |
4+30        0.3631        1.11    Q V     |       |       |       |
4+35        0.3708        1.12    Q V     |       |       |       |
4+40        0.3786        1.12    Q V     |       |       |       |
4+45        0.3864        1.13    Q V     |       |       |       |
4+50        0.3942        1.13    Q V     |       |       |       |
```

```
4+55      0.4020      1.14   Q V         |          |          |          |
5+ 0      0.4099      1.14   Q V         |          |          |          |
5+ 5      0.4178      1.15   Q V         |          |          |          |
5+10      0.4258      1.16   Q V         |          |          |          |
5+15      0.4338      1.16   Q V         |          |          |          |
5+20      0.4418      1.17   Q V         |          |          |          |
5+25      0.4499      1.17   Q V         |          |          |          |
5+30      0.4580      1.18   Q V         |          |          |          |
5+35      0.4661      1.18   Q V         |          |          |          |
5+40      0.4743      1.19   Q V         |          |          |          |
5+45      0.4825      1.19   Q V         |          |          |          |
5+50      0.4908      1.20   Q V         |          |          |          |
5+55      0.4991      1.21   Q V         |          |          |          |
6+ 0      0.5075      1.21   Q V         |          |          |          |
6+ 5      0.5158      1.22   Q V         |          |          |          |
6+10      0.5243      1.22   Q V         |          |          |          |
6+15      0.5328      1.23   Q V         |          |          |          |
6+20      0.5413      1.24   Q   V       |          |          |          |
6+25      0.5498      1.24   Q   V       |          |          |          |
6+30      0.5585      1.25   Q   V       |          |          |          |
6+35      0.5671      1.26   Q   V       |          |          |          |
6+40      0.5758      1.26   Q   V       |          |          |          |
6+45      0.5846      1.27   Q   V       |          |          |          |
6+50      0.5934      1.28   Q   V       |          |          |          |
6+55      0.6022      1.28   Q   V       |          |          |          |
7+ 0      0.6111      1.29   Q   V       |          |          |          |
7+ 5      0.6200      1.30   Q   V       |          |          |          |
7+10      0.6290      1.31   Q   V       |          |          |          |
7+15      0.6381      1.31   Q   V       |          |          |          |
7+20      0.6472      1.32   Q   V       |          |          |          |
7+25      0.6563      1.33   Q   V       |          |          |          |
7+30      0.6655      1.34   Q   V       |          |          |          |
7+35      0.6748      1.34   Q   V       |          |          |          |
7+40      0.6841      1.35   Q   V       |          |          |          |
7+45      0.6935      1.36   Q   V       |          |          |          |
7+50      0.7029      1.37   Q   V       |          |          |          |
7+55      0.7124      1.38   Q   V       |          |          |          |
8+ 0      0.7219      1.39   Q     V     |          |          |          |
8+ 5      0.7315      1.39   Q     V     |          |          |          |
8+10      0.7412      1.40   Q     V     |          |          |          |
8+15      0.7509      1.41   Q     V     |          |          |          |
8+20      0.7607      1.42   Q     V     |          |          |          |
8+25      0.7706      1.43   Q     V     |          |          |          |
8+30      0.7805      1.44   Q     V     |          |          |          |
8+35      0.7905      1.45   Q     V     |          |          |          |
8+40      0.8005      1.46   Q     V     |          |          |          |
8+45      0.8107      1.47   Q     V     |          |          |          |
8+50      0.8208      1.48   Q     V     |          |          |          |
8+55      0.8311      1.49   Q     V     |          |          |          |
9+ 0      0.8414      1.50   Q     V     |          |          |          |
```

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 9+ 5      0.8519      1.51   Q     V      |           |           |           |
 9+10      0.8623      1.52   Q     V      |           |           |           |
 9+15      0.8729      1.53   Q     V      |           |           |           |
 9+20      0.8835      1.55   Q     V      |           |           |           |
 9+25      0.8943      1.56   Q      V     |           |           |           |
 9+30      0.9051      1.57   Q      V     |           |           |           |
 9+35      0.9160      1.58   Q      V     |           |           |           |
 9+40      0.9269      1.59   Q      V     |           |           |           |
 9+45      0.9380      1.61   Q      V     |           |           |           |
 9+50      0.9491      1.62   Q      V     |           |           |           |
 9+55      0.9604      1.63   Q      V     |           |           |           |
10+ 0      0.9717      1.65   Q      V     |           |           |           |
10+ 5      0.9831      1.66   Q      V     |           |           |           |
10+10      0.9946      1.67   Q      V     |           |           |           |
10+15      1.0062      1.69   Q      V     |           |           |           |
10+20      1.0180      1.70   Q      V     |           |           |           |
10+25      1.0298      1.72   Q      V     |           |           |           |
10+30      1.0417      1.73   Q      V     |           |           |           |
10+35      1.0537      1.75   Q      V     |           |           |           |
10+40      1.0659      1.76   Q      V     |           |           |           |
10+45      1.0782      1.78   Q       V    |           |           |           |
10+50      1.0905      1.80   Q       V    |           |           |           |
10+55      1.1030      1.81   Q       V    |           |           |           |
11+ 0      1.1156      1.83   Q       V    |           |           |           |
11+ 5      1.1284      1.85   Q       V    |           |           |           |
11+10      1.1413      1.87   Q       V    |           |           |           |
11+15      1.1543      1.89   Q       V    |           |           |           |
11+20      1.1674      1.91   Q       V    |           |           |           |
11+25      1.1807      1.93   Q       V    |           |           |           |
11+30      1.1941      1.95   Q       V    |           |           |           |
11+35      1.2077      1.97   Q       V    |           |           |           |
11+40      1.2214      1.99   Q       V    |           |           |           |
11+45      1.2353      2.01   Q       V    |           |           |           |
11+50      1.2493      2.04   Q        V   |           |           |           |
11+55      1.2635      2.06   Q        V   |           |           |           |
12+ 0      1.2779      2.09   Q        V   |           |           |           |
12+ 5      1.2923      2.09   Q        V   |           |           |           |
12+10      1.3061      2.00   Q        V   |           |           |           |
12+15      1.3197      1.98   Q        V   |           |           |           |
12+20      1.3334      1.99   Q        V   |           |           |           |
12+25      1.3472      2.00   Q        V   |           |           |           |
12+30      1.3612      2.03   Q        V   |           |           |           |
12+35      1.3753      2.05   Q        V   |           |           |           |
12+40      1.3896      2.08   Q        V   |           |           |           |
12+45      1.4042      2.11   Q        V   |           |           |           |
12+50      1.4190      2.15   Q        V   |           |           |           |
12+55      1.4340      2.18   Q         V  |           |           |           |
13+ 0      1.4493      2.22   Q         V  |           |           |           |
13+ 5      1.4648      2.25   Q         V  |           |           |           |
13+10      1.4806      2.30   Q         V  |           |           |           |
```

```
13+15     1.4967      2.34    Q           V |              |              |              |
13+20     1.5131      2.38    Q           V |              |              |              |
13+25     1.5299      2.43    Q           V |              |              |              |
13+30     1.5469      2.48    Q           V |              |              |              |
13+35     1.5644      2.53    Q           V |              |              |              |
13+40     1.5822      2.59    Q           V |              |              |              |
13+45     1.6003      2.64    Q           V |              |              |              |
13+50     1.6190      2.70    Q            V|              |              |              |
13+55     1.6380      2.76    Q            V|              |              |              |
14+ 0     1.6575      2.84    Q            V|              |              |              |
14+ 5     1.6775      2.91    Q            V|              |              |              |
14+10     1.6982      3.00    Q            V|              |              |              |
14+15     1.7194      3.08    Q            V|              |              |              |
14+20     1.7413      3.18    Q            V|              |              |              |
14+25     1.7638      3.27    Q            V|              |              |              |
14+30     1.7871      3.38    Q             V              |              |              |
14+35     1.8111      3.48    Q             V              |              |              |
14+40     1.8360      3.62    Q             V              |              |              |
14+45     1.8618      3.74    Q             V              |              |              |
14+50     1.8886      3.90    Q             V              |              |              |
14+55     1.9165      4.05    Q             V              |              |              |
15+ 0     1.9458      4.25    Q             V              |              |              |
15+ 5     1.9764      4.44    Q           |V              |              |              |
15+10     2.0086      4.69    Q           |V              |              |              |
15+15     2.0426      4.93    Q           |V              |              |              |
15+20     2.0789      5.26    Q           |V              |              |              |
15+25     2.1167      5.50    Q           |V              |              |              |
15+30     2.1551      5.56    Q           |  V            |              |              |
15+35     2.1955      5.87    Q           |  V            |              |              |
15+40     2.2402      6.49    Q           |  V            |              |              |
15+45     2.2900      7.23    Q           |  V            |              |              |
15+50     2.3486      8.50   |Q           |    V          |              |              |
15+55     2.4292     11.71   |Q           |    V          |              |              |
16+ 0     2.5966     24.30   |   Q        |      V        |              |              |
16+ 5     3.1680     82.96   |            |Q        V     |              |              |
16+10     4.5983    207.69   |            |              |        V Q   |              |
16+15     5.2461     94.06   |            |  Q          |           V|              |
16+20     5.5699     47.01   |         Q  |              |            |V             |
16+25     5.7688     28.88   |     Q      |              |            | V            |
16+30     5.9063     19.96   |  Q         |              |            |  V           |
16+35     6.0029     14.02   |Q           |              |            |  V           |
16+40     6.0709      9.89   |Q           |              |            |   V          |
16+45     6.1305      8.65   |Q           |              |            |   V          |
16+50     6.1744      6.37    Q           |              |            |    V         |
16+55     6.2019      3.99    Q           |              |            |    V         |
17+ 0     6.2271      3.67    Q           |              |            |    V         |
17+ 5     6.2506      3.41    Q           |              |            |     V        |
17+10     6.2726      3.19    Q           |              |            |     V        |
17+15     6.2934      3.01    Q           |              |            |     V       |
17+20     6.3130      2.85    Q           |              |            |     V       |
```

```
17+25      6.3317      2.71   Q          |          |          |          V     |
17+30      6.3495      2.59   Q          |          |          |          V     |
17+35      6.3667      2.48   Q          |          |          |          V     |
17+40      6.3831      2.39   Q          |          |          |          V     |
17+45      6.3989      2.30   Q          |          |          |          V     |
17+50      6.4142      2.22   Q          |          |          |           V    |
17+55      6.4290      2.15   Q          |          |          |           V    |
18+ 0      6.4433      2.08   Q          |          |          |           V    |
18+ 5      6.4574      2.05   Q          |          |          |           V    |
18+10      6.4719      2.10   Q          |          |          |           V    |
18+15      6.4863      2.09   Q          |          |          |           V    |
18+20      6.5005      2.06   Q          |          |          |           V    |
18+25      6.5144      2.02   Q          |          |          |           V    |
18+30      6.5280      1.98   Q          |          |          |           V    |
18+35      6.5414      1.94   Q          |          |          |           V    |
18+40      6.5545      1.90   Q          |          |          |           V    |
18+45      6.5674      1.87   Q          |          |          |           V    |
18+50      6.5800      1.83   Q          |          |          |           V    |
18+55      6.5924      1.80   Q          |          |          |            V   |
19+ 0      6.6045      1.76   Q          |          |          |            V   |
19+ 5      6.6164      1.73   Q          |          |          |            V   |
19+10      6.6281      1.70   Q          |          |          |            V   |
19+15      6.6397      1.67   Q          |          |          |            V   |
19+20      6.6510      1.64   Q          |          |          |            V   |
19+25      6.6621      1.62   Q          |          |          |            V   |
19+30      6.6731      1.59   Q          |          |          |            V   |
19+35      6.6839      1.57   Q          |          |          |            V   |
19+40      6.6945      1.54   Q          |          |          |            V   |
19+45      6.7050      1.52   Q          |          |          |            V   |
19+50      6.7153      1.50   Q          |          |          |            V   |
19+55      6.7255      1.48   Q          |          |          |            V   |
20+ 0      6.7356      1.46   Q          |          |          |            V   |
20+ 5      6.7455      1.44   Q          |          |          |            V   |
20+10      6.7553      1.42   Q          |          |          |            V   |
20+15      6.7649      1.40   Q          |          |          |            V   |
20+20      6.7745      1.39   Q          |          |          |             V  |
20+25      6.7839      1.37   Q          |          |          |             V  |
20+30      6.7932      1.35   Q          |          |          |             V  |
20+35      6.8024      1.34   Q          |          |          |             V  |
20+40      6.8115      1.32   Q          |          |          |             V  |
20+45      6.8205      1.31   Q          |          |          |             V  |
20+50      6.8294      1.29   Q          |          |          |             V  |
20+55      6.8382      1.28   Q          |          |          |             V  |
21+ 0      6.8469      1.26   Q          |          |          |             V  |
21+ 5      6.8555      1.25   Q          |          |          |             V  |
21+10      6.8640      1.24   Q          |          |          |             V  |
21+15      6.8724      1.22   Q          |          |          |             V  |
21+20      6.8808      1.21   Q          |          |          |             V  |
21+25      6.8890      1.20   Q          |          |          |             V  |
21+30      6.8972      1.19   Q          |          |          |             V  |
```

```
21+35      6.9053      1.18   Q        |           |           |           V |
21+40      6.9133      1.17   Q        |           |           |           V |
21+45      6.9213      1.15   Q        |           |           |           V |
21+50      6.9292      1.14   Q        |           |           |           V |
21+55      6.9370      1.13   Q        |           |           |           V |
22+ 0      6.9447      1.12   Q        |           |           |           V |
22+ 5      6.9524      1.11   Q        |           |           |           V|
22+10      6.9600      1.10   Q        |           |           |           V|
22+15      6.9675      1.09   Q        |           |           |           V|
22+20      6.9750      1.09   Q        |           |           |           V|
22+25      6.9824      1.08   Q        |           |           |           V|
22+30      6.9898      1.07   Q        |           |           |           V|
22+35      6.9971      1.06   Q        |           |           |           V|
22+40      7.0043      1.05   Q        |           |           |           V|
22+45      7.0115      1.04   Q        |           |           |           V|
22+50      7.0186      1.03   Q        |           |           |           V|
22+55      7.0257      1.03   Q        |           |           |           V|
23+ 0      7.0327      1.02   Q        |           |           |           V|
23+ 5      7.0397      1.01   Q        |           |           |           V|
23+10      7.0466      1.00   Q        |           |           |           V|
23+15      7.0535      1.00   Q        |           |           |           V|
23+20      7.0603      0.99   Q        |           |           |           V|
23+25      7.0670      0.98   Q        |           |           |           V|
23+30      7.0737      0.98   Q        |           |           |           V|
23+35      7.0804      0.97   Q        |           |           |           V|
23+40      7.0870      0.96   Q        |           |           |           V|
23+45      7.0936      0.96   Q        |           |           |           V|
23+50      7.1002      0.95   Q        |           |           |           V|
23+55      7.1066      0.94   Q        |           |           |           V|
24+ 0      7.1131      0.94   Q        |           |           |           V|
24+ 5      7.1188      0.82   Q        |           |           |           V|
24+10      7.1214      0.38   Q        |           |           |           V|
24+15      7.1227      0.20   Q        |           |           |           V|
24+20      7.1235      0.11   Q        |           |           |           V|
24+25      7.1240      0.07   Q        |           |           |           V|
24+30      7.1243      0.04   Q        |           |           |           V|
24+35      7.1244      0.02   Q        |           |           |           V|
24+40      7.1245      0.01   Q        |           |           |           V|
24+45      7.1246      0.00   Q        |           |           |            V
          --------------------------------------------------------------------
```

```
              U n i t   H y d r o g r a p h    A n a l y s i s

          Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

                      Study date  02/23/23


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      ----------------------------------------------------------------------

      San Bernardino County Synthetic Unit Hydrology Method
                      Manual date - August 1986


      Program License Serial Number 5006

      ---------------------------------------------------------------------
      APPLE MGA - JOB 3675.007
      ON-SITE DEVELOPED STORM RUNOFF
      100-YEAR STORM EVENT - AMC II

      ---------------------------------------------------------------------

              Storm Event Year = 100

              Antecedent Moisture Condition = 2

       English (in-lb) Input Units Used

       English Rainfall Data (Inches) Input Values Used

       English Units used in output format




      Area averaged rainfall intensity isohyetal data:
              Sub-Area         Duration        Isohyetal
               (Ac.)           (hours)          (In)
      Rainfall data for year 10
                72.50              1             0.60
      -----------------------------------------------------------------
      Rainfall data for year 2
                72.50              6             0.75
      -----------------------------------------------------------------
      Rainfall data for year 2
                72.50             24             1.29
      -----------------------------------------------------------------
      Rainfall data for year 100
```

```
          72.50              1            1.07
-------------------------------------------------------------------
Rainfall data for year 100
          72.50              6            1.98
-------------------------------------------------------------------
Rainfall data for year 100
          72.50             24            3.38
-------------------------------------------------------------------
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

******** Area-averaged max loss rate, Fm ********


SCS curve  SCS curve    Area      Area     Fp(Fig C6)    Ap       Fm
No.(AMCII) NO.(AMC 2)   (Ac.)    Fraction    (In/Hr)   (dec.)   (In/Hr)
 32.0       32.0        72.50     1.000      0.978     0.100     0.098

Area-averaged adjusted loss rate Fm (In/Hr) =   0.098

********* Area-Averaged low loss rate fraction, Yb **********

Area         Area        SCS CN     SCS CN      S      Pervious
 (Ac.)       Fract       (AMC2)     (AMC2)            Yield Fr
    7.25    0.100         32.0       32.0     16.90     0.000
   65.25    0.900         98.0       98.0      0.20     0.931

Area-averaged catchment yield fraction, Y =  0.838
Area-averaged low loss fraction, Yb =  0.162
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watercourse length =    3482.00(Ft.)
Length from concentration point to centroid =    1400.00(Ft.)
Elevation difference along watercourse =      39.00(Ft.)
Mannings friction factor along watercourse =  0.015
Watershed area =       72.50(Ac.)
Catchment Lag time =   0.085 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 97.4877
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.098(In/Hr)
Average low loss rate fraction (Yb) = 0.162 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.508(In)
Computed peak 30-minute rainfall =  0.869(In)
Specified peak 1-hour rainfall =  1.070(In)
Computed peak 3-hour rainfall =  1.561(In)
Specified peak 6-hour rainfall =  1.980(In)
Specified peak 24-hour rainfall =  3.380(In)


Rainfall depth area reduction factors:
```

```
         Using a total area of        72.50(Ac.) (Ref: fig. E-4)

         5-minute factor = 0.997     Adjusted rainfall =  0.506(In)
         30-minute factor = 0.997    Adjusted rainfall =  0.866(In)
         1-hour factor = 0.997       Adjusted rainfall =  1.066(In)
         3-hour factor = 1.000       Adjusted rainfall =  1.560(In)
         6-hour factor = 1.000       Adjusted rainfall =  1.980(In)
         24-hour factor = 1.000      Adjusted rainfall =  3.380(In)
         ----------------------------------------------------------------

                         U n i t   H y d r o g r a p h
         +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
         Interval            'S' Graph          Unit Hydrograph
         Number              Mean values            ((CFS))
         ----------------------------------------------------------------
                        (K =        876.80 (CFS))

            1                16.414                  143.917
            2                66.154                  436.116
            3                83.370                  150.953
            4                91.010                   66.987
            5                95.153                   36.325
            6                97.495                   20.533
            7                98.706                   10.623
            8                99.686                    8.586
            9               100.000                    2.757
         ----------------------------------------------------------------
         ----------------------------------------------------------------
         ----------------------------------------------------------------

         Total soil rain loss =      0.46(In)
         Total effective rainfall =      2.92(In)
         Peak flow rate in flood hydrograph =     249.42(CFS)
         ----------------------------------------------------------------
         +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - 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
         ----------------------------------------------------------------
                    Hydrograph in   5   Minute intervals ((CFS))


         ----------------------------------------------------------------
Time(h+m) Volume Ac.Ft  Q(CFS) 0        75.0      150.0     225.0     300.0
         ----------------------------------------------------------------
    0+ 5       0.0038     0.55  Q        |         |         |         |
    0+10       0.0189     2.20  Q        |         |         |         |
    0+15       0.0381     2.78  Q        |         |         |         |
    0+20       0.0591     3.05  Q        |         |         |         |
    0+25       0.0811     3.19  Q        |         |         |         |
    0+30       0.1037     3.28  Q        |         |         |         |
    0+35       0.1267     3.33  Q        |         |         |         |
    0+40       0.1499     3.38  Q        |         |         |         |
```

```
0+45      0.1734      3.40    Q       |        |        |        |
0+50      0.1969      3.41    Q       |        |        |        |
0+55      0.2204      3.42    Q       |        |        |        |
1+ 0      0.2441      3.43    Q       |        |        |        |
1+ 5      0.2678      3.45    Q       |        |        |        |
1+10      0.2916      3.46    Q       |        |        |        |
1+15      0.3155      3.47    Q       |        |        |        |
1+20      0.3395      3.48    Q       |        |        |        |
1+25      0.3635      3.49    Q       |        |        |        |
1+30      0.3877      3.51    Q       |        |        |        |
1+35      0.4119      3.52    Q       |        |        |        |
1+40      0.4362      3.53    Q       |        |        |        |
1+45      0.4606      3.54    QV      |        |        |        |
1+50      0.4851      3.56    QV      |        |        |        |
1+55      0.5096      3.57    QV      |        |        |        |
2+ 0      0.5343      3.58    QV      |        |        |        |
2+ 5      0.5591      3.59    QV      |        |        |        |
2+10      0.5839      3.61    QV      |        |        |        |
2+15      0.6088      3.62    QV      |        |        |        |
2+20      0.6338      3.63    QV      |        |        |        |
2+25      0.6590      3.65    QV      |        |        |        |
2+30      0.6842      3.66    QV      |        |        |        |
2+35      0.7095      3.67    QV      |        |        |        |
2+40      0.7349      3.69    QV      |        |        |        |
2+45      0.7604      3.70    QV      |        |        |        |
2+50      0.7860      3.72    QV      |        |        |        |
2+55      0.8116      3.73    QV      |        |        |        |
3+ 0      0.8374      3.75    QV      |        |        |        |
3+ 5      0.8633      3.76    QV      |        |        |        |
3+10      0.8893      3.77    Q V     |        |        |        |
3+15      0.9154      3.79    Q V     |        |        |        |
3+20      0.9416      3.80    Q V     |        |        |        |
3+25      0.9679      3.82    Q V     |        |        |        |
3+30      0.9943      3.84    Q V     |        |        |        |
3+35      1.0208      3.85    Q V     |        |        |        |
3+40      1.0475      3.87    Q V     |        |        |        |
3+45      1.0742      3.88    Q V     |        |        |        |
3+50      1.1010      3.90    Q V     |        |        |        |
3+55      1.1280      3.91    Q V     |        |        |        |
4+ 0      1.1551      3.93    Q V     |        |        |        |
4+ 5      1.1822      3.95    Q V     |        |        |        |
4+10      1.2096      3.96    Q V     |        |        |        |
4+15      1.2370      3.98    Q V     |        |        |        |
4+20      1.2645      4.00    Q V     |        |        |        |
4+25      1.2922      4.01    Q V     |        |        |        |
4+30      1.3199      4.03    Q V     |        |        |        |
4+35      1.3478      4.05    Q   V   |        |        |        |
4+40      1.3758      4.07    Q   V   |        |        |        |
4+45      1.4040      4.09    Q   V   |        |        |        |
4+50      1.4323      4.11    Q   V   |        |        |        |
```

```
4+55      1.4607      4.12   Q    V          |          |          |          |
5+ 0      1.4892      4.14   Q    V          |          |          |          |
5+ 5      1.5178      4.16   Q    V          |          |          |          |
5+10      1.5466      4.18   Q    V          |          |          |          |
5+15      1.5756      4.20   Q    V          |          |          |          |
5+20      1.6046      4.22   Q    V          |          |          |          |
5+25      1.6338      4.24   Q    V          |          |          |          |
5+30      1.6632      4.26   Q    V          |          |          |          |
5+35      1.6927      4.28   Q    V          |          |          |          |
5+40      1.7223      4.30   Q    V          |          |          |          |
5+45      1.7521      4.32   Q    V          |          |          |          |
5+50      1.7820      4.34   Q      V        |          |          |          |
5+55      1.8120      4.36   Q      V        |          |          |          |
6+ 0      1.8423      4.39   Q      V        |          |          |          |
6+ 5      1.8726      4.41   Q      V        |          |          |          |
6+10      1.9032      4.43   Q      V        |          |          |          |
6+15      1.9338      4.45   Q      V        |          |          |          |
6+20      1.9647      4.48   Q      V        |          |          |          |
6+25      1.9957      4.50   Q      V        |          |          |          |
6+30      2.0269      4.53   Q      V        |          |          |          |
6+35      2.0582      4.55   Q      V        |          |          |          |
6+40      2.0897      4.57   Q      V        |          |          |          |
6+45      2.1213      4.60   Q      V        |          |          |          |
6+50      2.1532      4.62   Q      V        |          |          |          |
6+55      2.1852      4.65   Q      V        |          |          |          |
7+ 0      2.2174      4.68   Q        V      |          |          |          |
7+ 5      2.2498      4.70   Q        V      |          |          |          |
7+10      2.2823      4.73   Q        V      |          |          |          |
7+15      2.3151      4.75   Q        V      |          |          |          |
7+20      2.3480      4.78   Q        V      |          |          |          |
7+25      2.3811      4.81   Q        V      |          |          |          |
7+30      2.4145      4.84   Q        V      |          |          |          |
7+35      2.4480      4.87   Q        V      |          |          |          |
7+40      2.4817      4.90   Q        V      |          |          |          |
7+45      2.5156      4.92   Q        V      |          |          |          |
7+50      2.5498      4.96   Q        V      |          |          |          |
7+55      2.5841      4.99   Q        V      |          |          |          |
8+ 0      2.6187      5.02   Q        V      |          |          |          |
8+ 5      2.6534      5.05   Q          V    |          |          |          |
8+10      2.6884      5.08   Q          V    |          |          |          |
8+15      2.7236      5.11   Q          V    |          |          |          |
8+20      2.7591      5.15   Q          V    |          |          |          |
8+25      2.7948      5.18   Q          V    |          |          |          |
8+30      2.8307      5.22   Q          V    |          |          |          |
8+35      2.8668      5.25   Q          V    |          |          |          |
8+40      2.9032      5.29   Q          V    |          |          |          |
8+45      2.9399      5.32   Q          V    |          |          |          |
8+50      2.9768      5.36   Q          V    |          |          |          |
8+55      3.0140      5.40   Q          V    |          |          |          |
9+ 0      3.0514      5.44   Q          V    |          |          |          |
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 9+ 5      3.0891      5.47   Q        V  |              |         |              |
 9+10      3.1271      5.52   Q         V |              |         |              |
 9+15      3.1653      5.55   Q         V |              |         |              |
 9+20      3.2039      5.60   Q         V |              |         |              |
 9+25      3.2427      5.64   Q         V |              |         |              |
 9+30      3.2818      5.68   Q         V |              |         |              |
 9+35      3.3212      5.72   Q         V |              |         |              |
 9+40      3.3610      5.77   Q         V |              |         |              |
 9+45      3.4010      5.81   Q         V |              |         |              |
 9+50      3.4414      5.86   Q         V |              |         |              |
 9+55      3.4821      5.91   Q         V |              |         |              |
10+ 0      3.5231      5.96   Q         V |              |         |              |
10+ 5      3.5645      6.01   Q          V|              |         |              |
10+10      3.6062      6.06   Q          V|              |         |              |
10+15      3.6483      6.11   Q          V|              |         |              |
10+20      3.6908      6.17   Q          V|              |         |              |
10+25      3.7336      6.22   Q          V|              |         |              |
10+30      3.7768      6.28   Q          V|              |         |              |
10+35      3.8204      6.33   Q          V|              |         |              |
10+40      3.8644      6.39   Q          V|              |         |              |
10+45      3.9088      6.45   Q          V|              |         |              |
10+50      3.9537      6.51   Q          V|              |         |              |
10+55      3.9990      6.57   Q           V|             |         |              |
11+ 0      4.0447      6.64   Q           V|             |         |              |
11+ 5      4.0909      6.70   Q           V|             |         |              |
11+10      4.1375      6.78   Q           V|             |         |              |
11+15      4.1846      6.84   Q           V|             |         |              |
11+20      4.2323      6.92   Q           V|             |         |              |
11+25      4.2804      6.99   Q           V|             |         |              |
11+30      4.3291      7.07   Q           V|             |         |              |
11+35      4.3782      7.14   Q           V|             |         |              |
11+40      4.4280      7.23   Q            V             |         |              |
11+45      4.4783      7.30   Q            V             |         |              |
11+50      4.5292      7.40   Q            V             |         |              |
11+55      4.5807      7.48   Q            V             |         |              |
12+ 0      4.6329      7.57  |Q            V             |         |              |
12+ 5      4.6847      7.52  |Q            V             |         |              |
12+10      4.7343      7.20   Q            V             |         |              |
12+15      4.7835      7.15   Q            V             |         |              |
12+20      4.8330      7.19   Q            V             |         |              |
12+25      4.8829      7.25   Q           |V             |         |              |
12+30      4.9335      7.34   Q           |V             |         |              |
12+35      4.9847      7.43   Q           |V             |         |              |
12+40      5.0367      7.55  |Q           |V             |         |              |
12+45      5.0894      7.66  |Q           |V             |         |              |
12+50      5.1431      7.79  |Q           |V             |         |              |
12+55      5.1976      7.91  |Q           |V             |         |              |
13+ 0      5.2531      8.06  |Q           |V             |         |              |
13+ 5      5.3094      8.19  |Q           |  V           |         |              |
13+10      5.3669      8.35  |Q           |  V           |         |              |
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13+15      5.4254      8.49   |Q           |  V        |           |              |
13+20      5.4850      8.66   |Q           |  V        |           |              |
13+25      5.5458      8.82   |Q           |  V        |           |              |
13+30      5.6078      9.01   |Q           |  V        |           |              |
13+35      5.6711      9.19   |Q           |  V        |           |              |
13+40      5.7358      9.40   |Q           |  V        |           |              |
13+45      5.8019      9.59   |Q           |   V       |           |              |
13+50      5.8696      9.83   |Q           |   V       |           |              |
13+55      5.9388     10.05   |Q           |   V       |           |              |
14+ 0      6.0098     10.32   |Q           |   V       |           |              |
14+ 5      6.0827     10.58   |Q           |   V       |           |              |
14+10      6.1579     10.92   |Q           |   V       |           |              |
14+15      6.2351     11.22   |Q           |    V      |           |              |
14+20      6.3148     11.57   |Q           |    V      |           |              |
14+25      6.3968     11.90   |Q           |    V      |           |              |
14+30      6.4816     12.32   |Q           |    V      |           |              |
14+35      6.5691     12.70   |Q           |    V      |           |              |
14+40      6.6599     13.19   |Q           |     V     |           |              |
14+45      6.7539     13.65   |Q           |     V     |           |              |
14+50      6.8520     14.23   |Q           |     V     |           |              |
14+55      6.9539     14.80   |Q           |     V     |           |              |
15+ 0      7.0607     15.52   | Q          |     V     |           |              |
15+ 5      7.1725     16.23   | Q          |      V    |           |              |
15+10      7.2906     17.15   | Q          |      V    |           |              |
15+15      7.4151     18.07   | Q          |      V    |           |              |
15+20      7.5480     19.30   | Q          |       V   |           |              |
15+25      7.6862     20.07   | Q          |       V   |           |              |
15+30      7.8259     20.28   | Q          |       V   |           |              |
15+35      7.9743     21.55   | Q          |        V  |           |              |
15+40      8.1390     23.91   |   Q        |        V  |           |              |
15+45      8.3239     26.85   |   Q        |        V  |           |              |
15+50      8.5428     31.78   |      Q     |         V||           |              |
15+55      8.8182     39.99   |        Q   |         V||           |              |
16+ 0      9.2236     58.86   |          Q |          V|           |              |
16+ 5     10.1579    135.67   |            |       Q | V         |              |
16+10     11.8757    249.42   |            |          |        V  |    Q         |
16+15     12.6732    115.80   |            |       Q  |        V  |              |
16+20     13.1332     66.80   |        Q   |          |        V| |              |
16+25     13.4470     45.56   |       Q    |          |         V |              |
16+30     13.6846     34.49   |     Q      |          |          |V             |
16+35     13.8682     26.67   |   Q        |          |          |V             |
16+40     14.0253     22.80   |    Q       |          |          |V             |
16+45     14.1497     18.06   |  Q         |          |          |  V           |
16+50     14.2544     15.20   |  Q         |          |          |  V           |
16+55     14.3502     13.91   |Q           |          |          |  V           |
17+ 0     14.4391     12.91   |Q           |          |          |  V           |
17+ 5     14.5221     12.06   |Q           |          |          |  V           |
17+10     14.6000     11.30   |Q           |          |          |   V          |
17+15     14.6735     10.68   |Q           |          |          |   V          |
17+20     14.7433     10.14   |Q           |          |          |   V          |
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17+25     14.8099     9.66   |Q        |         |         |    V    |
17+30     14.8735     9.24   |Q        |         |         |    V    |
17+35     14.9346     8.87   |Q        |         |         |    V    |
17+40     14.9934     8.53   |Q        |         |         |    V    |
17+45     15.0500     8.22   |Q        |         |         |    V    |
17+50     15.1047     7.94   |Q        |         |         |    V    |
17+55     15.1576     7.69   |Q        |         |         |    V    |
18+ 0     15.2089     7.45   Q         |         |         |    V    |
18+ 5     15.2597     7.37   Q         |         |         |    V    |
18+10     15.3120     7.59   |Q        |         |         |    V    |
18+15     15.3639     7.54   |Q        |         |         |    V    |
18+20     15.4149     7.42   Q         |         |         |    V    |
18+25     15.4651     7.28   Q         |         |         |     V   |
18+30     15.5142     7.13   Q         |         |         |     V   |
18+35     15.5623     6.99   Q         |         |         |     V   |
18+40     15.6095     6.85   Q         |         |         |     V   |
18+45     15.6558     6.71   Q         |         |         |     V   |
18+50     15.7011     6.58   Q         |         |         |     V   |
18+55     15.7456     6.46   Q         |         |         |     V   |
19+ 0     15.7892     6.34   Q         |         |         |     V   |
19+ 5     15.8321     6.23   Q         |         |         |     V   |
19+10     15.8742     6.12   Q         |         |         |     V   |
19+15     15.9157     6.01   Q         |         |         |      V  |
19+20     15.9564     5.92   Q         |         |         |      V  |
19+25     15.9965     5.82   Q         |         |         |      V  |
19+30     16.0360     5.73   Q         |         |         |      V  |
19+35     16.0748     5.64   Q         |         |         |      V  |
19+40     16.1131     5.56   Q         |         |         |      V  |
19+45     16.1508     5.48   Q         |         |         |      V  |
19+50     16.1880     5.40   Q         |         |         |      V  |
19+55     16.2247     5.33   Q         |         |         |      V  |
20+ 0     16.2609     5.25   Q         |         |         |      V  |
20+ 5     16.2966     5.18   Q         |         |         |      V  |
20+10     16.3319     5.12   Q         |         |         |      V  |
20+15     16.3667     5.05   Q         |         |         |       V |
20+20     16.4010     4.99   Q         |         |         |       V |
20+25     16.4350     4.93   Q         |         |         |       V |
20+30     16.4685     4.87   Q         |         |         |       V |
20+35     16.5017     4.81   Q         |         |         |       V |
20+40     16.5344     4.76   Q         |         |         |       V |
20+45     16.5668     4.70   Q         |         |         |       V |
20+50     16.5989     4.65   Q         |         |         |       V |
20+55     16.6305     4.60   Q         |         |         |       V |
21+ 0     16.6619     4.55   Q         |         |         |       V |
21+ 5     16.6929     4.50   Q         |         |         |       V |
21+10     16.7236     4.46   Q         |         |         |       V |
21+15     16.7540     4.41   Q         |         |         |       V |
21+20     16.7841     4.37   Q         |         |         |        V|
21+25     16.8139     4.32   Q         |         |         |        V|
21+30     16.8434     4.28   Q         |         |         |        V|
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21+35      16.8726      4.24   Q      |          |          |              V |
21+40      16.9015      4.20   Q      |          |          |              V |
21+45      16.9302      4.16   Q      |          |          |              V |
21+50      16.9586      4.13   Q      |          |          |              V |
21+55      16.9868      4.09   Q      |          |          |              V |
22+ 0      17.0147      4.05   Q      |          |          |              V |
22+ 5      17.0423      4.02   Q      |          |          |              V |
22+10      17.0698      3.98   Q      |          |          |              V |
22+15      17.0969      3.95   Q      |          |          |              V |
22+20      17.1239      3.92   Q      |          |          |              V |
22+25      17.1507      3.88   Q      |          |          |              V |
22+30      17.1772      3.85   Q      |          |          |              V |
22+35      17.2035      3.82   Q      |          |          |              V |
22+40      17.2296      3.79   Q      |          |          |              V|
22+45      17.2555      3.76   Q      |          |          |              V|
22+50      17.2812      3.73   Q      |          |          |              V|
22+55      17.3067      3.70   Q      |          |          |              V|
23+ 0      17.3320      3.68   Q      |          |          |              V|
23+ 5      17.3571      3.65   Q      |          |          |              V|
23+10      17.3821      3.62   Q      |          |          |              V|
23+15      17.4068      3.59   Q      |          |          |              V|
23+20      17.4314      3.57   Q      |          |          |              V|
23+25      17.4558      3.54   Q      |          |          |              V|
23+30      17.4800      3.52   Q      |          |          |              V|
23+35      17.5041      3.49   Q      |          |          |              V|
23+40      17.5280      3.47   Q      |          |          |              V|
23+45      17.5517      3.45   Q      |          |          |              V|
23+50      17.5753      3.42   Q      |          |          |              V|
23+55      17.5987      3.40   Q      |          |          |              V|
24+ 0      17.6220      3.38   Q      |          |          |              V|
24+ 5      17.6414      2.81   Q      |          |          |              V|
24+10      17.6492      1.14   Q      |          |          |              V|
24+15      17.6531      0.56   Q      |          |          |              V|
24+20      17.6552      0.30   Q      |          |          |              V|
24+25      17.6563      0.16   Q      |          |          |              V|
24+30      17.6569      0.08   Q      |          |          |              V|
24+35      17.6572      0.04   Q      |          |          |              V|
24+40      17.6572      0.01   Q      |          |          |              V|
           -------------------------------------------------------------------
```

2010 ANTECEDENT MOISTURE CONDITION (AMC) MAP

Figure ADD-1
Antecedent Moisture
Condition (AMC)

5-day Rainfall - NOAA Atlas 14
(50% of Total Rainfall Prior to Peak)*

*1/2 (11-day - 1-day) =
1/2 ([10-day] + (1/10 ([20-day] - [10-day]))) - [1-day])
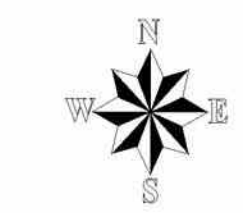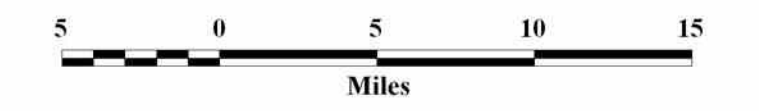
Growing Season
AMC I
AMC II
AMC III
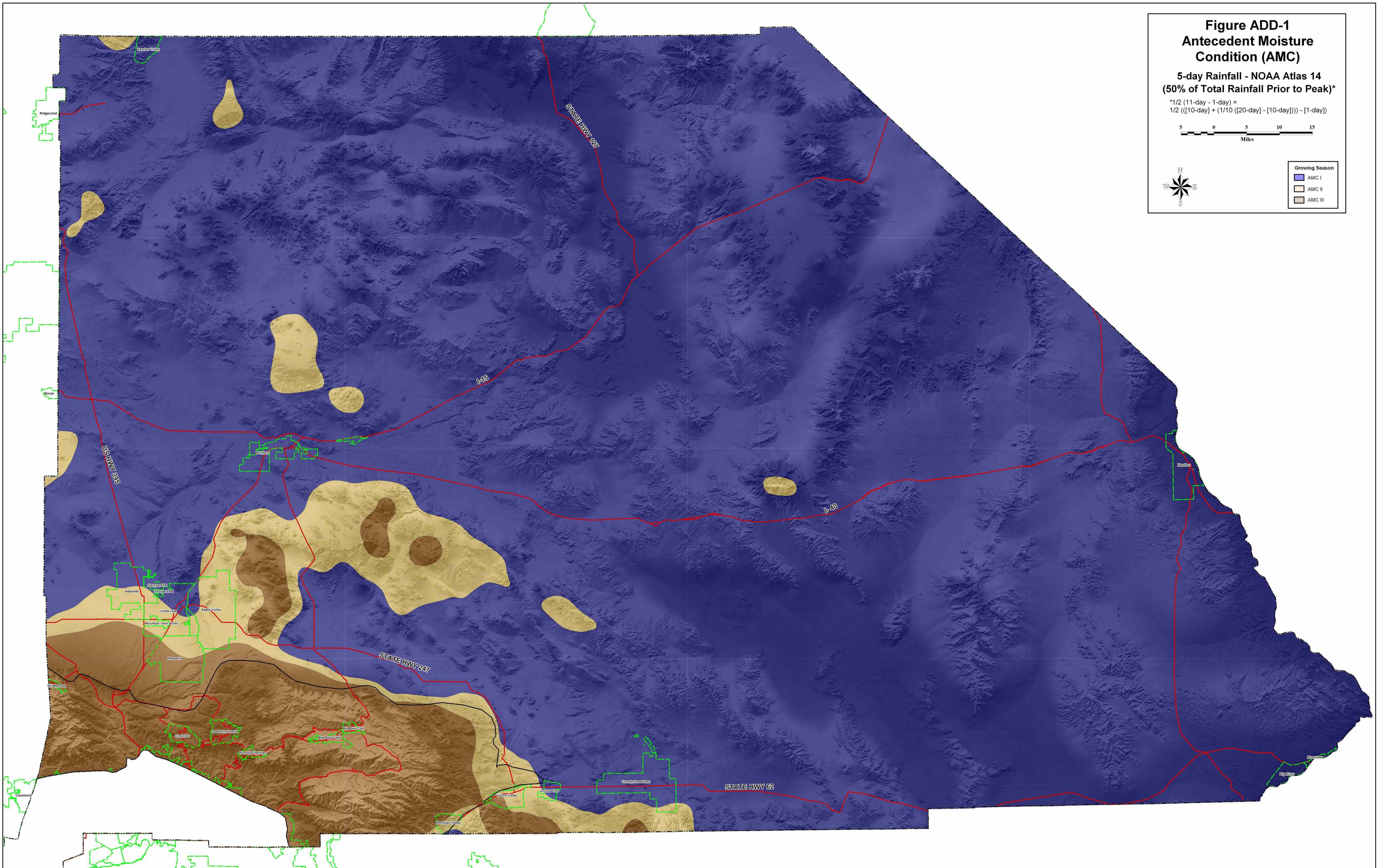
Uncommon Development

Antecedent Moisture Condition II

Quarry Rd

Central Rd

Central Rd

PROJECT SITE

Google Earth

N

1 mi

SOILS MAP

Hydrologic Soil Group—San Bernardino County, California, Mojave River Area

Web Soil Survey
National Cooperative Soil Survey

Natural Resources
Conservation Service
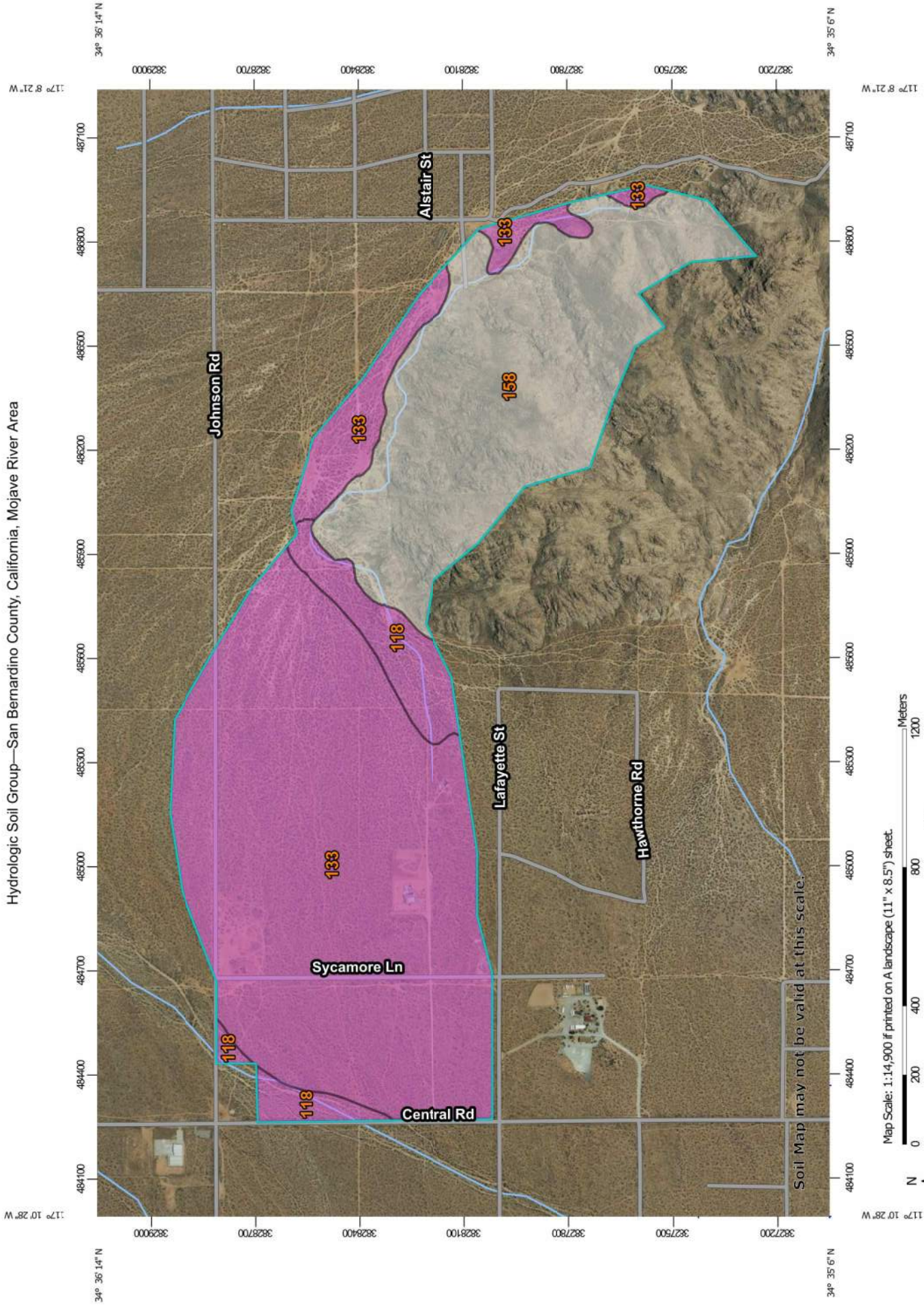
Map Scale: 1:14,900 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 11N WGS84

Soil Map may not be valid at this scale.

MAP LEGEND

MAP INFORMATION

Area of Interest (AOI)
☐ Area of Interest (AOI)

Soils

Soil Rating Polygons
- ■ A
- ■ A/D
- ■ B
- ■ B/D
- ■ C
- ■ C/D
- ■ D
- ■ Not rated or not available

Soil Rating Lines
- ⌇ A
- ⌇ A/D
- ⌇ B
- ⌇ B/D
- ⌇ C
- ⌇ C/D
- ⌇ D
- ⌇ Not rated or not available

Soil Rating Points
- ■ A
- ■ A/D
- ■ B
- ■ B/D

- ■ C
- ■ C/D
- ■ D
- ■ Not rated or not available

Water Features
- ⌇ Streams and Canals

Transportation
- ╫ Rails
- ⌇ Interstate Highways
- ⌇ US Routes
- ⌇ Major Roads
- ⌇ Local Roads

Background
- ▦ Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino County, California, Mojave River Area
Survey Area Data: Version 13, Sep 13, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 27, 2021—May 24, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

USDA **Natural Resources**
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

7/28/2022
Page 2 of 4

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
118	CAJON-ARIZO COMPLEX, 2 TO 15 PERCENT SLOPES*	A	31.5	6.5%
133	HELENDALE-BRYMAN LOAMY SANDS, 2 TO 5 PERCENT SLOPES*	A	293.0	60.3%
158	ROCK OUTCROP-LITHIC TORRIORTHENTS COMPLEX, 15 TO 50 PERCENT SLOPES*		161.4	33.2%
Totals for Area of Interest			**485.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NOAA Atlas 14, Volume 6, Version 2
Location name: Apple Valley, California, USA*
Latitude: 34.5984°, Longitude: -117.1618°
Elevation: 3215.65 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	0.082 (0.067-0.100)	0.115 (0.094-0.141)	0.161 (0.132-0.198)	0.200 (0.163-0.249)	0.258 (0.203-0.330)	0.305 (0.235-0.399)	0.355 (0.267-0.475)	0.409 (0.300-0.564)	0.487 (0.343-0.699)	0.552 (0.376-0.819)
10-min	0.117 (0.096-0.144)	0.165 (0.135-0.202)	0.230 (0.189-0.284)	0.287 (0.234-0.357)	0.369 (0.291-0.474)	0.436 (0.337-0.571)	0.508 (0.383-0.681)	0.586 (0.430-0.808)	0.698 (0.492-1.00)	0.791 (0.538-1.17)
15-min	0.142 (0.117-0.174)	0.199 (0.164-0.244)	0.279 (0.229-0.343)	0.347 (0.283-0.431)	0.447 (0.352-0.573)	0.528 (0.407-0.691)	0.615 (0.463-0.824)	0.709 (0.520-0.977)	0.845 (0.595-1.21)	0.957 (0.651-1.42)
30-min	0.195 (0.160-0.239)	0.273 (0.225-0.336)	0.383 (0.314-0.471)	0.477 (0.388-0.592)	0.613 (0.483-0.787)	0.725 (0.560-0.949)	0.844 (0.636-1.13)	0.974 (0.714-1.34)	1.16 (0.817-1.67)	1.31 (0.894-1.95)
60-min	0.248 (0.204-0.304)	0.348 (0.286-0.427)	0.487 (0.399-0.599)	0.607 (0.494-0.753)	0.780 (0.615-1.00)	0.922 (0.712-1.21)	1.07 (0.809-1.44)	1.24 (0.908-1.71)	1.48 (1.04-2.12)	1.67 (1.14-2.48)
2-hr	0.350 (0.288-0.429)	0.473 (0.389-0.580)	0.642 (0.527-0.791)	0.787 (0.640-0.977)	0.994 (0.783-1.27)	1.16 (0.897-1.52)	1.34 (1.01-1.80)	1.53 (1.12-2.11)	1.81 (1.27-2.59)	2.03 (1.38-3.01)
3-hr	0.425 (0.350-0.521)	0.566 (0.466-0.695)	0.760 (0.624-0.936)	0.925 (0.753-1.15)	1.16 (0.914-1.49)	1.35 (1.04-1.77)	1.55 (1.17-2.08)	1.77 (1.29-2.43)	2.07 (1.46-2.97)	2.32 (1.58-3.44)
6-hr	0.577 (0.475-0.707)	0.760 (0.625-0.933)	1.01 (0.828-1.24)	1.22 (0.992-1.51)	1.52 (1.20-1.95)	1.75 (1.35-2.30)	2.00 (1.51-2.68)	2.27 (1.66-3.12)	2.64 (1.86-3.79)	2.94 (2.00-4.36)
12-hr	0.738 (0.608-0.905)	0.977 (0.804-1.20)	1.30 (1.07-1.60)	1.57 (1.28-1.95)	1.95 (1.53-2.50)	2.24 (1.73-2.94)	2.55 (1.92-3.42)	2.88 (2.11-3.96)	3.33 (2.34-4.78)	3.69 (2.51-5.47)
24-hr	0.967 (0.858-1.11)	1.30 (1.15-1.50)	1.74 (1.54-2.01)	2.11 (1.85-2.46)	2.61 (2.22-3.15)	3.01 (2.50-3.70)	3.42 (2.77-4.30)	3.84 (3.03-4.98)	4.43 (3.35-5.98)	4.89 (3.57-6.84)
2-day	1.15 (1.02-1.32)	1.57 (1.39-1.80)	2.12 (1.87-2.45)	2.58 (2.26-3.00)	3.21 (2.72-3.86)	3.69 (3.07-4.54)	4.19 (3.40-5.28)	4.71 (3.71-6.10)	5.42 (4.10-7.32)	5.98 (4.37-8.35)
3-day	1.25 (1.10-1.43)	1.72 (1.52-1.98)	2.34 (2.07-2.71)	2.86 (2.50-3.33)	3.56 (3.01-4.28)	4.10 (3.40-5.04)	4.65 (3.77-5.86)	5.23 (4.12-6.78)	6.02 (4.55-8.13)	6.64 (4.85-9.28)
4-day	1.32 (1.17-1.52)	1.83 (1.62-2.10)	2.50 (2.21-2.88)	3.05 (2.67-3.55)	3.80 (3.22-4.57)	4.37 (3.63-5.38)	4.97 (4.03-6.26)	5.58 (4.40-7.23)	6.43 (4.86-8.67)	7.09 (5.18-9.90)
7-day	1.44 (1.27-1.65)	1.98 (1.75-2.28)	2.69 (2.38-3.11)	3.29 (2.88-3.83)	4.10 (3.47-4.93)	4.73 (3.92-5.81)	5.37 (4.35-6.77)	6.04 (4.76-7.83)	6.96 (5.26-9.40)	7.68 (5.61-10.7)
10-day	1.52 (1.35-1.75)	2.08 (1.84-2.40)	2.84 (2.50-3.27)	3.46 (3.03-4.03)	4.32 (3.66-5.20)	4.99 (4.14-6.13)	5.68 (4.60-7.15)	6.39 (5.04-8.28)	7.38 (5.58-9.96)	8.15 (5.96-11.4)
20-day	1.74 (1.54-2.00)	2.39 (2.12-2.76)	3.28 (2.90-3.79)	4.02 (3.52-4.68)	5.05 (4.28-6.08)	5.86 (4.86-7.20)	6.69 (5.42-8.43)	7.57 (5.97-9.81)	8.78 (6.64-11.8)	9.73 (7.11-13.6)
30-day	1.97 (1.74-2.26)	2.71 (2.40-3.13)	3.73 (3.30-4.31)	4.59 (4.02-5.35)	5.80 (4.92-6.98)	6.75 (5.61-8.30)	7.74 (6.27-9.75)	8.78 (6.92-11.4)	10.2 (7.72-13.8)	11.3 (8.29-15.9)
45-day	2.31 (2.05-2.66)	3.20 (2.83-3.69)	4.42 (3.91-5.11)	5.46 (4.79-6.36)	6.94 (5.88-8.35)	8.12 (6.74-9.98)	9.35 (7.57-11.8)	10.6 (8.39-13.8)	12.4 (9.41-16.8)	13.9 (10.1-19.4)
60-day	2.53 (2.25-2.92)	3.50 (3.10-4.03)	4.84 (4.28-5.59)	5.99 (5.25-6.97)	7.63 (6.47-9.18)	8.95 (7.43-11.0)	10.3 (8.38-13.0)	11.8 (9.31-15.3)	13.9 (10.5-18.7)	15.5 (11.4-21.7)

[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
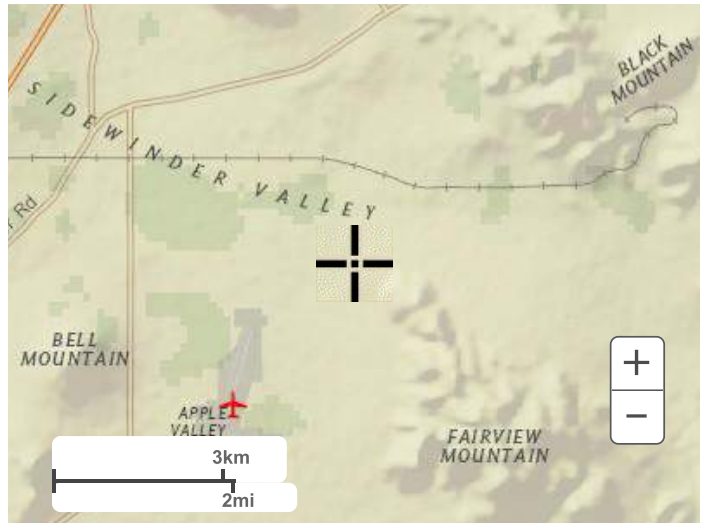
PDS-based depth-duration-frequency (DDF) curves
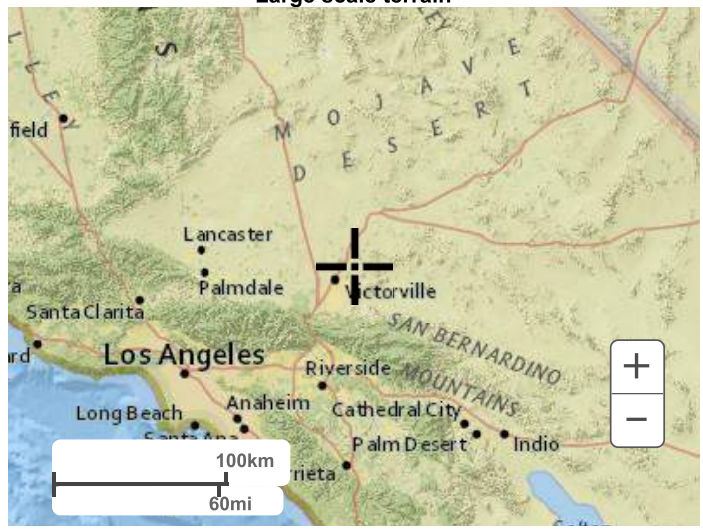### Latitude: 34.5984°, Longitude: -117.1618°

Average recurrence interval (years)
- 1
- 2
- 5
- 10
- 25
- 50
- 100
- 200
- 500
- 1000

Duration
- 5-min
- 10-min
- 15-min
- 30-min
- 60-min
- 2-hr
- 3-hr
- 6-hr
- 12-hr
- 24-hr
- 2-day
- 3-day
- 4-day
- 7-day
- 10-day
- 20-day
- 30-day
- 45-day
- 60-day

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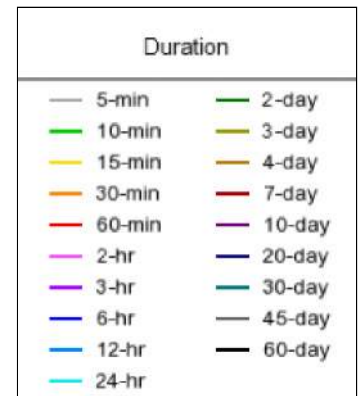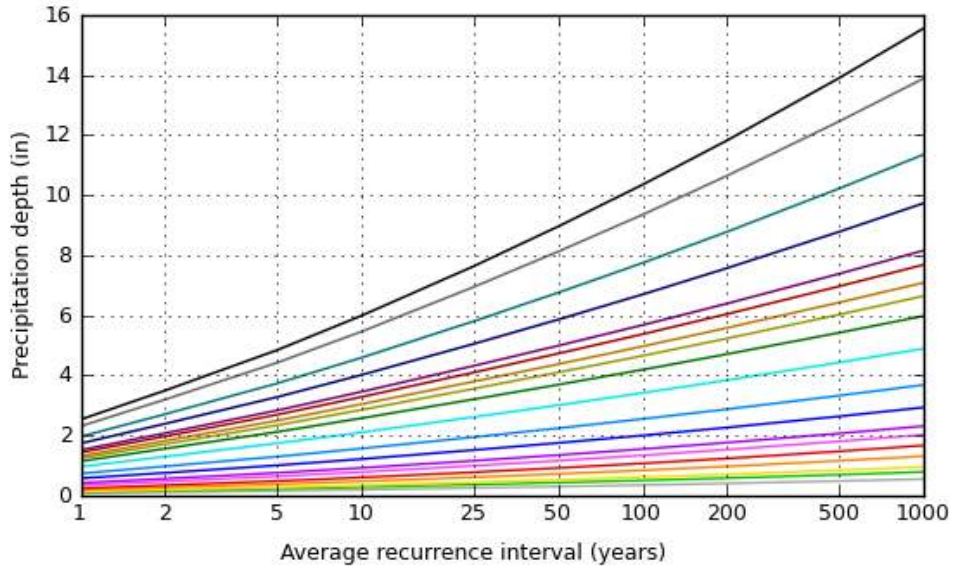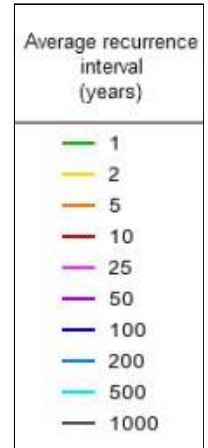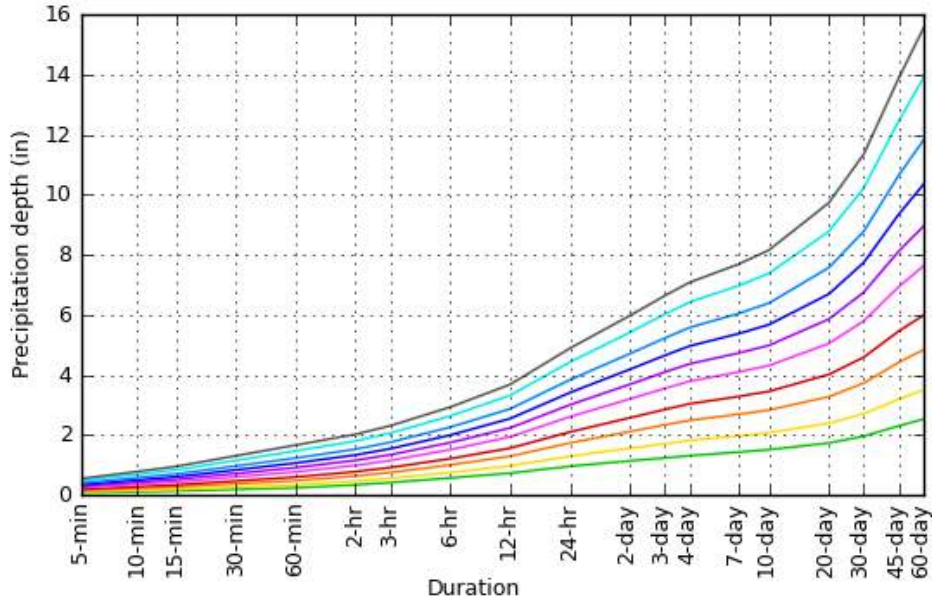
Maps & aerials

Small scale terrain

Large scale terrain

Large scale map

Large scale aerial

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