HYDROLOGY STUDY

For

REIDO FARMS, LLC
APN 0521-051-08
Tentative Parcel Map 20538
Daggett, CA

June 2, 2023

Prepared by:

Merrell-Johnson Companies

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

Job No. 3852.001

E. Cary Packer, PE
Associate Engineer
R.C.E. 51752 Exp. 06/30/24

Mark D. Rowan
Project Manager

TABLE OF CONTENTS

SECTION 1

DISCUSSION

INTRODUCTION

The purpose of this study was to determine the impact, if any, of the 100-year storm runoff flow tributary to the project site as delineated on the map contained in this study. The project parcel encompasses approximately 92 acres of property located on the west side of Minneola Road and north of the railroad tracks and Larch Street in the unincorporated area of Daggett, in San Bernardino County, California. The proposed development is to divide the existing parcel into two parcels 0f 67.4 and 24.5 acres.

METHODOLOGY

The method in determining these peak runoff flows was the rational method for areas north of Interstate 40 and the unit hydrograph method for areas south of Interstate 40 as specified in the 1986 San Bernardino County Hydrology Manual and the 2010 San Bernardino County Hydrology Manual Addendum for Arid Regions. The existing offsite flow was examined and delineated from U.S.G.S. Map: Minneola and an examination of the project site.

The tributary watershed areas examined lie southerly and southwesterly of the project site. The primary storm runoff is generated within the tributary areas lying south and southwest of the property between the existing railroad improvements and Interstate 40. The tributary area north of Interstate 40 consists of three primary flowlines, encompassing approximately 652.5 acres. The area south of Interstate 40 encompasses approximately 8,260 acres and multiple blueline streams. Storm runoff from this 8,260 acre area is captured by earthen berms upstream of Interstate 40 which divert the runoff to a central bridge structure on the interstate that allows storm runoff to flow through the freeway right-of-way.

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 1.41”. Per the aforementioned addendum, AMC I was used for the project site. Soils types ranged from primarily Type A soils north of Interstate 40, to some areas of Type C & D soils and unmapped soil types on the south side of Interstate 40. Due to the large area of unmapped soil types south of Interstate 40, a conservative value of Soil Type C was used in the unit hydrograph analysis. Rainfall and soil maps are included as exhibits in Section 3 of this report.

The offsite tributary area examined in this study is shown in Table A.

Table A

Sub-area	Elevation Difference (ft.)	Length (ft)	Area (Ac)	Avg. Slope (ft/ft)
Unit Hydrograph – South I40	3,152	46,042	8,260	0.0685
Node 11 – Node 16	140	7,553	162.8	0.0185
Node 21 – Node 26	140	7,039	197.5	0.0199
Node 31 – Node 36	75	5,651	292.2	0.0133

EXISTING CONDITIONS

The project parcel encompasses approximately 92 acres of property located on the west side of Minneola Road and north side of the existing railroad tracks and Larch Street in the unincorporated area of Daggett, in San Bernardino County, California. The property is currently vacant land zoned for rural living. Minneola Road is a paved roadway with dirt shoulders and Larch Street is a dedicated, ungraded road. The existing railroad improvements serve to capture the tributary runoff and convey it easterly to three storm culvert locations beneath the railroad tracks and onto the right-of-way of Larch Street.

The three culvert locations are shown on the tributary watershed map as Node 15, Node 26, and Node 36 located from west to east along the tracks. Node 15 is a 48” RCP and Nodes 26 & 36 consist of three 27” HDPE pipes at each location. The approximate flow capacity of the systems at nodes 15, 26, and 36 is 176 cfs, 156 cfs, and 156 cfs respectively.

Runoff flow through the culvert at Node 15 flows to the western property line and enters the project site as sheet flow along the western boundary of the site. There is no evidence of scour from large, concentrated flows crossing the project.

Runoff flow through culverts at Nodes 26 and 36 are conveyed easterly along the northern side of the tracks following the right-of-way of Larch Street. There is evidence of runoff flows following a natural channel depression between the tracks and Larch Street to Minneola Road. Flows pass under Minneola Road through a 24” CMP storm drain with excess flows crossing over Minneola Road as sheet flow following their historical flow paths.

Storm runoff from the tributary area south of Interstate 40 is concentrated and flows beneath the freeway improvements under a bridge structure. After passing underneath Interstate 40 runoff flows spread to flood plain sheet flows and flow northeasterly toward National Trails Highway and Minneola Road. The runoff flows along National Trails Hwy and the railroad improvements eastward past the project site.

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

Table B

Sub-Area	Q_{100} (cfs)
Unit Hydrograph – South of I-40	4,652
Node 11 – Node 16	125.3
Node 21 – Node 26	183.5
Node 31 – Node 36	89.3

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 from the west enter the project site along the western property boundary as sheet flow and flow across the project site then cross Minneola Road towards the Mojave River. Runoff flows passing underneath the railroad tracks through the existing culverts will flow along the north side of the tracks and follow the right-of-way of Larch Street.

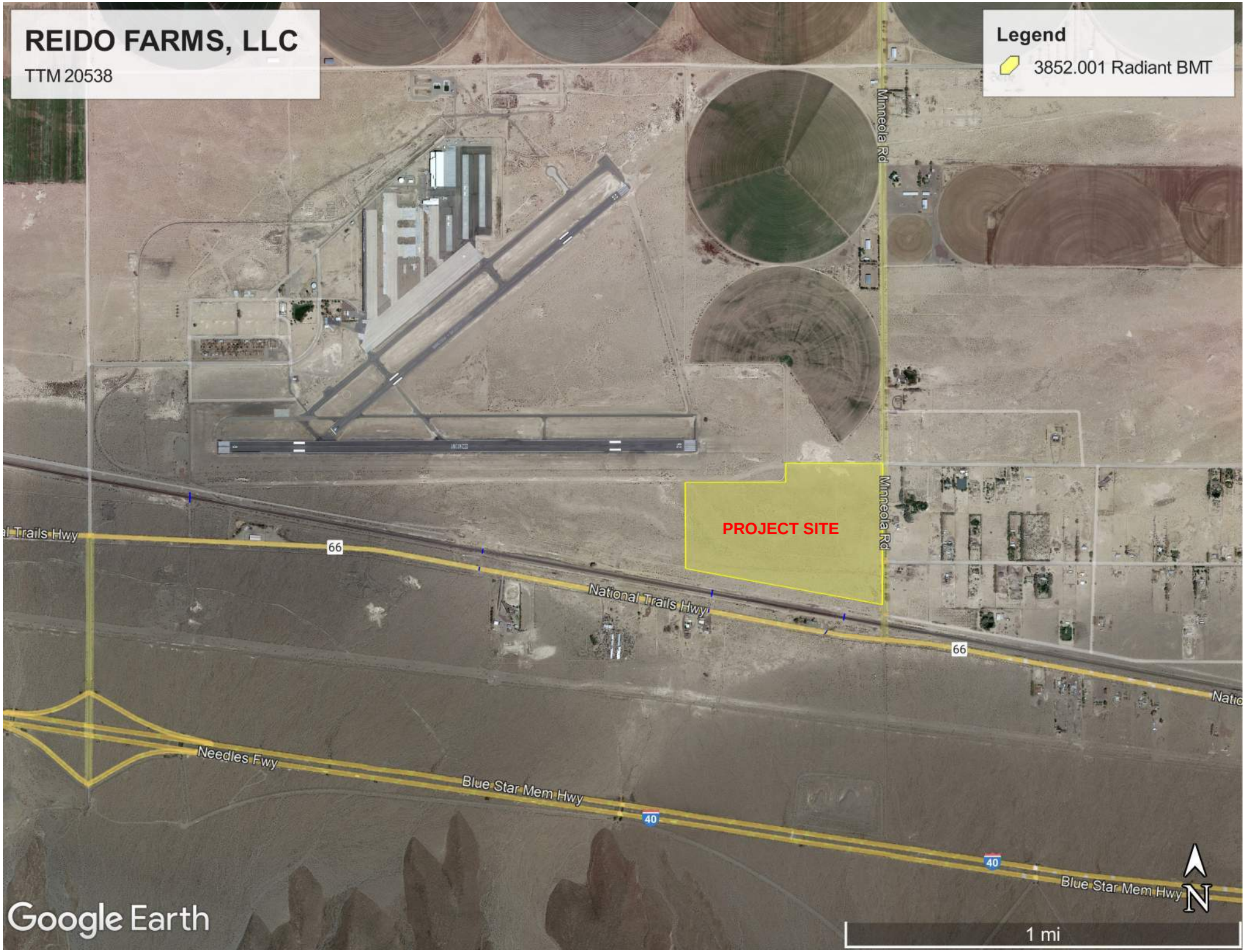
Storm runoff from areas south of Interstate 40 are concentrated as they flow through the freeway improvements and then spread back into a flood plain and sheet flows as the runoff flows northeasterly. Flows will be diverted by the existing railroad improvements and be directed easterly along National Trails Hwy and the railroad tracks.

Future construction within the project should be elevated above the adjacent terrain to protect them from storm runoff in the form of sheet flows. Off-site improvements of Larch Street and Minneola Road will serve to convey the runoff with in historical flow patterns and past the project.

SECTION 2

EXHIBITS

VICINITY MAP


REIDO FARMS, LLC
TTM 20538
Legend
3852.001 Radiant BMT
Minneola Rd
PROJECT SITE
Minneola Rd
al Trails Hwy
66
National Trails Hwy
66
Natio
Needles Fwy
Blue Star Mem Hwy
40
40
Blue Star Mem Hwy
N
Google Earth
1 mi

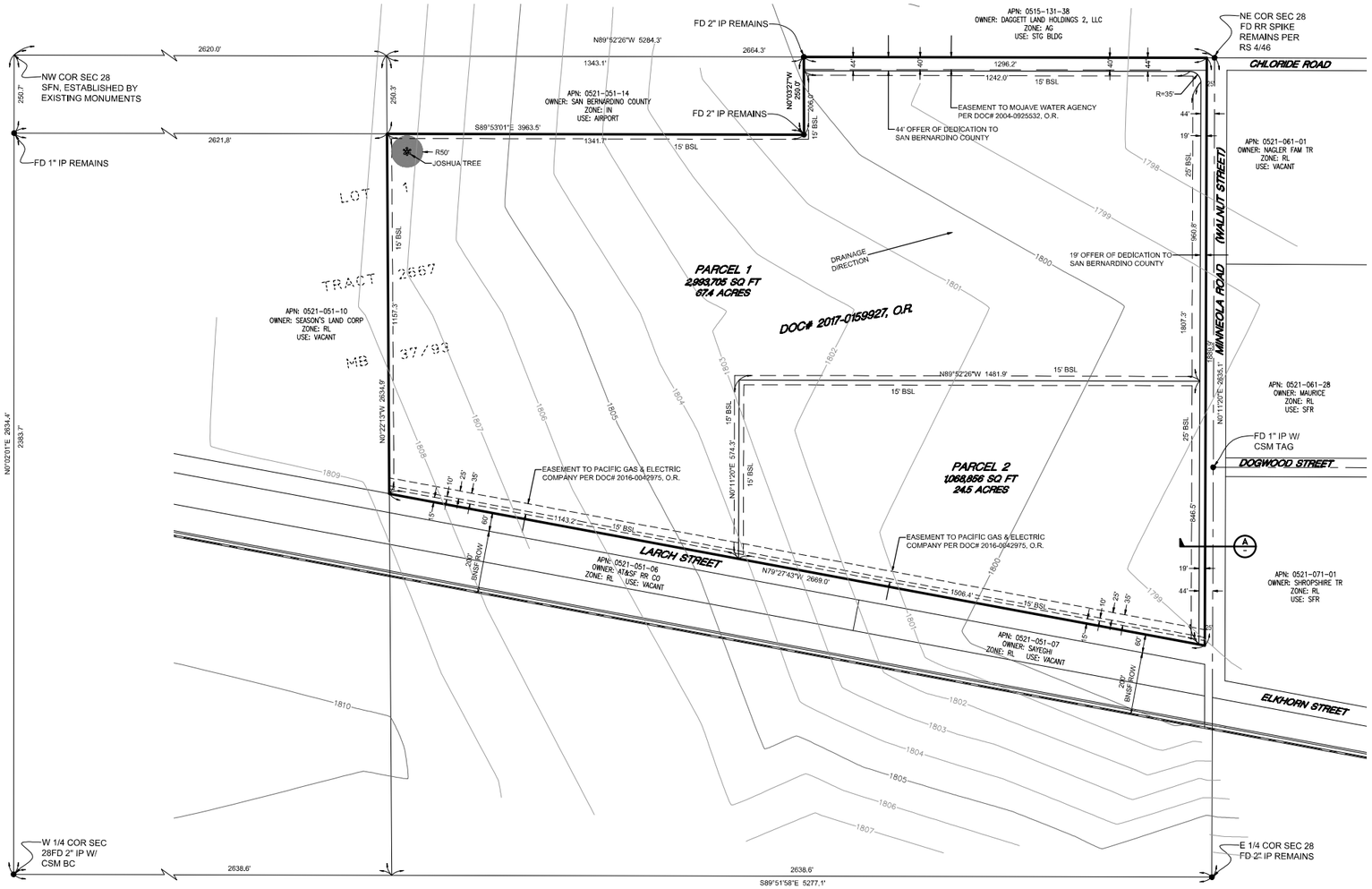
PROPOSED DEVELOPMENT PLAN

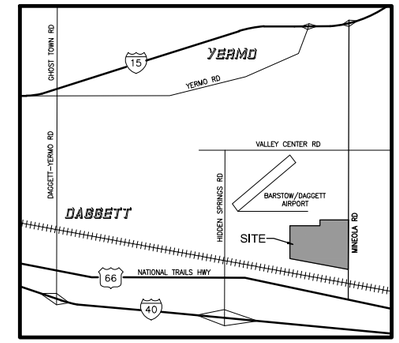
TENTATIVE
PARCEL MAP NO. 20538

BEING A SUBDIVISION OF LOT 1, TRACT 2667
AS RECORDED IN BOOK 37, PAGE 93, RECORDS OF
SAN BERNARDINO COUNTY, STATE OF CALIFORNIA

MERRELL JOHNSON COMPANIES MAY 2022

200' 100' 0' 200' 400'
SCALE: 1" = 200'





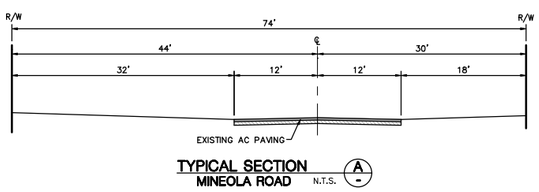
VICINITY MAP
N.T.S.

LEGEND

BSL
- INDICATES BUILDING SETBACK LINE
- INDICATES EASEMENTS AS SHOWN
- INDICATES PROPERTY LINE

PROJECT SCOPE:

1. THERE ARE 91.9 ACRES TO THIS LAND DIVISION.
2. THERE ARE 2 PARCELS TO THIS PARCEL MAP.
   PARCEL 1: VACANT
   PARCEL 2: SOLAR
3. EXISTING ZONING: RL (RURAL LIVING)
   PROPOSED ZONING: RL (RURAL LIVING)
4. THERE ARE NO NEW STREETS ON THIS PARCEL MAP.
5. THE AVERAGE SLOPE OF ALL FEASIBLE ACCESS ROUTES AND BUILDING SITES DOES NOT EXCEED (10%.)
6. THERE ARE NO WATER COURSES TRAVERSING THE PROPERTY.
7. THERE ARE NO PROTECTED OR ENDANGERED TREES EXISTING ON THIS SITE.



TYPICAL SECTION
MINEOLA ROAD A N.T.S.

LEGAL DESCRIPTION:

ALL OF LOT 1 OF TRACT NO. 2667, EXCEPTING THE WEST 2620 FEET AS MEASURED ALONG THE NORTH LINE OF SAID LOT, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 37, PAGE 93 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

ALSO EXCEPTING THAT PORTION THEREOF CONDEMNED BY THE COUNTY OF SAN BERNARDINO FOR AN AIRPORT, DESCRIBED AS FOLLOWS:

THE NORTH 250 FEET OF THE NORTHWEST QUARTER AND THE NORTH 250 FEET OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 28, TOWNSHIP 9 NORTH, RANGE 2 EAST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO THE GOVERNMENT TOWNSHIP PLAT THEREOF.

ALSO EXCEPTING THEREFROM AN UNDIVIDED 1/2 INTEREST IN OIL, GAS AND ALL MINERAL RIGHTS, AS RESERVED IN A DEED FROM FEDERICK P. HAUSER AND RODMAN WILDE HAUSER TO CECIL C. COOPER AND BESSIE B. COOPER RECORDED JUNE 15, 1908, IN BOOK 2245, PAGE 340, OF OFFICIAL RECORDS.

BENCHMARK

4.8 MILES WEST ALONG THE ATCHISON, TOPEKA AND SANTA FE RAILWAY FROM THE CROSSING OF MT. VIEW ROAD AT NEWBERRY, 3 FEET WEST-SOUTHWEST OF THE 21ST POLE EAST OF MILEPOST 731, 0.5 MILE EAST OF THE CROSSING OF MINNEOLA ROAD, 39.7 FEET SOUTH OF THE SOUTH RAIL OF THE SOUTH TRACK, 88 FEET NORTH OF THE CENTER LINE OF NATIONAL TRAILS HIGHWAY, 2.0 FEET NORTH OF A WITNESS POST, ABOUT 3 FEET LOWER THAN THE TRACK, AND SET IN THE TOP OF A CONCRETE POST PROJECTING 0.6 FOOT ABOVE THE GROUND. SEC 27, T9N, R2E
ELEV=1903.08

BASIS OF BEARINGS

TAKEN FROM THE EAST LINE OF THE NE 1/4 OF SECTION 28, T9N, R2E, SBM, AS SHOWN ON TRACT 2667, MB 37/93
BEING: N0°11'20"E

UTILITIES:

ELECTRIC: EDISON INTERNATIONAL
30553 RIMROCK ROAD
BARSTOW, CALIFORNIA 92311
(760) 252-6451

GAS: SOUTHWEST GAS CORP.
751 E. MAIN STREET
BARSTOW, CALIFORNIA 92311
(760) 256-3571

WATER: WELL

SEWER: SEPTIC

TELEPHONE: FRONTIER COMMUNICATIONS
(877) 236-2894

PARCEL MAP NO. 20538

APN 0521-051-08

OWNER/APPLICANT:
REIDO FARMS, LLC
C/O BRIAN VAIL
2410 FAIR OAKS BLVD., SUITE 110
SACRAMENTO, CA 95825
(916) 379-0955

PREPARED BY:
MERRELL JOHNSON COMPANIES
22221 HIGHWAY 18
APPLE VALLEY, CA 92307
(760) 240-8000

MAP PREPARATION DATE: APRIL 26, 2023

LICENSED LAND SURVEYOR
CRAIG JOHNSON
LS 7562
STATE OF CALIFORNIA

CRAIG JOHNSON L.S. 7562

MERRELL JOHNSON

MERRELL JOHNSON ENGINEERING, INC.
22221 U.S. HIGHWAY 18, APPLE VALLEY, CA 92307
760 240 8000 | MERRELLJOHNSON.COM

TENTATIVE
PARCEL MAP NO. 20538
LOT 1
TRACT 2667, MB 37/93
APN 0521-051-08
FOR:
REIDO FARMS, LLC

DRAWN BY: MM
DATE: 04/26/23
JOB NO. 3852.001
SHEET 1 OF 1

mmathews 10:19am 6 June 2023 P:\3852.001 Radiant BM\Maps\Tentative PM\TPM-3852.001.dwg — TPM Merrell Johnson Companies

SECTION 3

HYDROLOGY CALCULATIONS

OFF-SITE HYDROLOGY CALCULATIONS

RATIONAL CALCULATIONS – Q_{100}

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 7.0
Rational Hydrology Study Date: 06/05/23

REIDO FARMS, LLC - JOB 3852.001
OFF-SITE TRIBUTARY RUNOFF FLOW
NODE 11 - NODE 16
100-YEAR STORM EVENT - AMC I

MERRELL JOHNSON COMPANIES
22221 HIGHWAY 18
APPLE VALLEY, CA 92307
(760) 240-8000 * FAX (760) 240-1400

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.410 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 1

++
Process from Point/Station 11.000 to Point/Station 12.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.840(In/Hr)
Initial subarea data:
Initial area flow distance = 986.000(Ft.)
Top (of initial area) elevation = 2049.000(Ft.)
Bottom (of initial area) elevation = 2007.000(Ft.)
Difference in elevation = 42.000(Ft.)
Slope = 0.04260 s(%)= 4.26
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 15.554 min.
Rainfall intensity = 3.628(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.692
Subarea runoff = 13.047(CFS)
Total initial stream area = 5.200(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.840(In/Hr)

++
Process from Point/Station 12.000 to Point/Station 13.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Depth of flow = 0.606(Ft.), Average velocity = 3.556(Ft/s)
******* Irregular Channel Data **********

```
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1             0.00             1.00
      2            10.00             0.00
      3            20.00             1.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =     13.047(CFS)
  '     '    flow top width =     12.115(Ft.)
  '     '    velocity=    3.556(Ft/s)
  '     '    area =      3.669(Sq.Ft)
  '     '    Froude number =     1.139

Upstream point elevation =  2007.000(Ft.)
Downstream point elevation =  1976.000(Ft.)
Flow length =   893.000(Ft.)
Travel time  =    4.19 min.
Time of concentration =   19.74 min.
Depth of flow =   0.606(Ft.)
Average velocity =   3.556(Ft/s)
Total irregular channel flow =    13.047(CFS)
Irregular channel normal depth above invert elev. =   0.606(Ft.)
Average velocity of channel(s) =   3.556(Ft/s)

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Process from Point/Station       12.000 to Point/Station       13.000
**** SUBAREA FLOW ADDITION ****
__________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.840(In/Hr)
Time of concentration =    19.74 min.
Rainfall intensity =      3.070(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.654
Subarea runoff =     26.499(CFS) for   14.500(Ac.)
Total runoff =     39.547(CFS)
Effective area this stream =       19.70(Ac.)
Total Study Area (Main Stream No. 1) =       19.70(Ac.)
Area averaged Fm value =    0.840(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
__________________________________________________________________
Depth of flow =   0.560(Ft.), Average velocity =   4.524(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1             0.00             1.00
      2            10.00             0.00
      3            20.00             0.00
      4            30.00             1.00
```

```
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     39.547(CFS)
  '     '    flow top width =     21.205(Ft.)
  '     '    velocity=    4.524(Ft/s)
  '     '    area =      8.741(Sq.Ft)
  '     '    Froude number =     1.242

Upstream point elevation =  1976.000(Ft.)
Downstream point elevation =  1938.000(Ft.)
Flow length =  1023.000(Ft.)
Travel time  =    3.77 min.
Time of concentration =   23.51 min.
Depth of flow =   0.560(Ft.)
Average velocity =   4.524(Ft/s)
Total irregular channel flow =    39.547(CFS)
Irregular channel normal depth above invert elev. =   0.560(Ft.)
Average velocity of channel(s) =   4.524(Ft/s)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.840(In/Hr)
Time of concentration =    23.51 min.
Rainfall intensity =      2.717(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.622
Subarea runoff =     48.805(CFS) for   32.600(Ac.)
Total runoff =     88.352(CFS)
Effective area this stream =       52.30(Ac.)
Total Study Area (Main Stream No. 1) =       52.30(Ac.)
Area averaged Fm value =    0.840(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
_____________________________________________________________________
Depth of flow =   1.308(Ft.), Average velocity =   4.083(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              2.00
      2             10.00              0.00
      3             20.00              0.00
      4             30.00              2.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     88.352(CFS)
  '     '    flow top width =     23.082(Ft.)
  '     '    velocity=    4.083(Ft/s)
  '     '    area =     21.638(Sq.Ft)
```

```
  '     '    Froude number =     0.743

Upstream point elevation =  1938.000(Ft.)
Downstream point elevation =  1919.000(Ft.)
Flow length =  1857.000(Ft.)
Travel time  =    7.58 min.
Time of concentration =   31.09 min.
Depth of flow =   1.308(Ft.)
Average velocity =   4.083(Ft/s)
Total irregular channel flow =    88.352(CFS)
Irregular channel normal depth above invert elev. =   1.308(Ft.)
Average velocity of channel(s) =   4.083(Ft/s)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.840(In/Hr)
Time of concentration =    31.09 min.
Rainfall intensity =      2.234(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.562
Subarea runoff =     31.109(CFS) for   42.900(Ac.)
Total runoff =    119.460(CFS)
Effective area this stream =       95.20(Ac.)
Total Study Area (Main Stream No. 1) =       95.20(Ac.)
Area averaged Fm value =    0.840(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   2.323(Ft.), Average velocity =   3.095(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1             0.00              3.00
      2            15.00              0.00
      3            20.00              0.00
      4            35.00              3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =    119.460(CFS)
  '     '    flow top width =     28.229(Ft.)
  '     '    velocity=    3.095(Ft/s)
  '     '    area =     38.594(Sq.Ft)
  '     '    Froude number =     0.467

Upstream point elevation =  1919.000(Ft.)
Downstream point elevation =  1909.000(Ft.)
Flow length =  2794.000(Ft.)
Travel time  =   15.04 min.
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Time of concentration =   46.13 min.
Depth of flow =   2.323(Ft.)
Average velocity =   3.095(Ft/s)
Total irregular channel flow =   119.460(CFS)
Irregular channel normal depth above invert elev. =   2.323(Ft.)
Average velocity of channel(s) =   3.095(Ft/s)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.840(In/Hr)
Time of concentration =    46.13 min.
Rainfall intensity =      1.695(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.454
Subarea runoff =      5.804(CFS) for   67.600(Ac.)
Total runoff =    125.265(CFS)
Effective area this stream =      162.80(Ac.)
Total Study Area (Main Stream No. 1) =      162.80(Ac.)
Area averaged Fm value =    0.840(In/Hr)
End of computations, Total Study Area =          162.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number =  67.0
```

T_c

Q_{100}

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 7.0
Rational Hydrology Study Date: 06/05/23

REIDO FARMS, LLC - JOB 3582.001
OFF-SITE TRIBUTARY STORM RUNOFF
NODE 21 - NODE 26
100-YEAR STORM EVENT - AMC 1

MERRELL JOHNSON COMPANIES
22221 HIGHWAY 18
APPLE VALLEY, CA 92307
(760) 240-8000 * FAX (760) 240-1400

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.410 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 1

++
Process from Point/Station 21.000 to Point/Station 22.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.840(In/Hr)
Initial subarea data:
Initial area flow distance = 875.000(Ft.)
Top (of initial area) elevation = 2049.000(Ft.)
Bottom (of initial area) elevation = 2024.000(Ft.)
Difference in elevation = 25.000(Ft.)
Slope = 0.02857 s(%)= 2.86
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 16.061 min.
Rainfall intensity = 3.547(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.687
Subarea runoff = 14.863(CFS)
Total initial stream area = 6.100(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.840(In/Hr)

++
Process from Point/Station 22.000 to Point/Station 23.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Depth of flow = 0.364(Ft.), Average velocity = 3.458(Ft/s)
******* Irregular Channel Data **********

```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1             0.00              2.00
      2            10.00              0.00
      3            20.00              0.00
      4            30.00              2.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     14.863(CFS)
  '     '    flow top width =     13.637(Ft.)
  '     '    velocity=    3.458(Ft/s)
  '     '    area =      4.298(Sq.Ft)
  '     '    Froude number =     1.085

Upstream point elevation =  2024.000(Ft.)
Downstream point elevation =  1996.000(Ft.)
Flow length =   899.000(Ft.)
Travel time  =    4.33 min.
Time of concentration =   20.39 min.
Depth of flow =   0.364(Ft.)
Average velocity =   3.458(Ft/s)
Total irregular channel flow =    14.863(CFS)
Irregular channel normal depth above invert elev. =   0.364(Ft.)
Average velocity of channel(s) =   3.458(Ft/s)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       23.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.840(In/Hr)
Time of concentration =    20.39 min.
Rainfall intensity =      3.001(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.648
Subarea runoff =     33.569(CFS) for   18.800(Ac.)
Total runoff =     48.432(CFS)
Effective area this stream =       24.90(Ac.)
Total Study Area (Main Stream No. 1) =       24.90(Ac.)
Area averaged Fm value =    0.840(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       24.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
_____________________________________________________________________
Depth of flow =   0.671(Ft.), Average velocity =   5.402(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1             0.00              2.00
      2            10.00              0.00
      3            20.00              0.00
      4            30.00              2.00
```

```
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     48.432(CFS)
  '     '    flow top width =     16.712(Ft.)
  '     '    velocity=    5.402(Ft/s)
  '     '    area =      8.965(Sq.Ft)
  '     '    Froude number =     1.300

Upstream point elevation =  1996.000(Ft.)
Downstream point elevation =  1957.000(Ft.)
Flow length =  1039.000(Ft.)
Travel time  =    3.21 min.
Time of concentration =   23.60 min.
Depth of flow =   0.671(Ft.)
Average velocity =   5.402(Ft/s)
Total irregular channel flow =    48.432(CFS)
Irregular channel normal depth above invert elev. =   0.671(Ft.)
Average velocity of channel(s) =   5.402(Ft/s)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       24.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.840(In/Hr)
Time of concentration =    23.60 min.
Rainfall intensity =      2.710(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.621
Subarea runoff =     56.567(CFS) for   37.500(Ac.)
Total runoff =    104.999(CFS)
Effective area this stream =       62.40(Ac.)
Total Study Area (Main Stream No. 1) =       62.40(Ac.)
Area averaged Fm value =    0.840(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.000 to Point/Station       25.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
_____________________________________________________________________
Depth of flow =   0.933(Ft.), Average velocity =   5.726(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              3.00
      2             15.00              0.00
      3             30.00              0.00
      4             45.00              3.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =    104.999(CFS)
  '     '    flow top width =     24.326(Ft.)
  '     '    velocity=    5.726(Ft/s)
  '     '    area =     18.338(Sq.Ft)
```

```
  '     '    Froude number =     1.162

Upstream point elevation =  1957.000(Ft.)
Downstream point elevation =  1925.000(Ft.)
Flow length =  1195.000(Ft.)
Travel time  =    3.48 min.
Time of concentration =   27.08 min.
Depth of flow =   0.933(Ft.)
Average velocity =   5.726(Ft/s)
Total irregular channel flow =   104.999(CFS)
Irregular channel normal depth above invert elev. =   0.933(Ft.)
Average velocity of channel(s) =   5.726(Ft/s)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.000 to Point/Station       25.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.840(In/Hr)
Time of concentration =    27.08 min.
Rainfall intensity =      2.461(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.593
Subarea runoff =     78.533(CFS) for   63.400(Ac.)
Total runoff =    183.531(CFS)
Effective area this stream =      125.80(Ac.)
Total Study Area (Main Stream No. 1) =      125.80(Ac.)
Area averaged Fm value =    0.840(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       26.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   1.729(Ft.), Average velocity =   3.705(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1             0.00              3.00
      2            15.00              0.00
      3            35.00              0.00
      4            50.00              3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =    183.531(CFS)
  '     '    flow top width =     37.293(Ft.)
  '     '    velocity=    3.705(Ft/s)
  '     '    area =     49.537(Sq.Ft)
  '     '    Froude number =     0.566

Upstream point elevation =  1925.000(Ft.)
Downstream point elevation =  1909.000(Ft.)
Flow length =  3031.000(Ft.)
Travel time  =   13.64 min.
```

```
Time of concentration =   40.71 min.
Depth of flow =   1.729(Ft.)
Average velocity =   3.705(Ft/s)
Total irregular channel flow =   183.531(CFS)
Irregular channel normal depth above invert elev. =   1.729(Ft.)
Average velocity of channel(s) =   3.705(Ft/s)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       26.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.840(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =    179.502(CFS)
therefore the upstream flow rate of Q =    183.531(CFS) is being used
Time of concentration =    40.71 min.Tc
Rainfall intensity =      1.850(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.491
Subarea runoff =      0.000(CFS) for   71.700(Ac.)
Total runoff =    183.531(CFS) Q100
Effective area this stream =      197.50(Ac.)
Total Study Area (Main Stream No. 1) =      197.50(Ac.)
Area averaged Fm value =    0.840(In/Hr)
End of computations, Total Study Area =          197.50 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number =  67.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2004 Version 7.0
Rational Hydrology Study Date: 06/05/23

REIDO FARMS, LLC - JOB 3258.001
OFF-SITE TRIBUTARY STORM RUNOFF FLOW
NODE 31 - NODE 36
100-YEAR STORM EVENT - AMC I

MERRELL JOHNSON COMPANIES
22221 HIGHWAY 18
APPLE VALLEY, CA 92307
(760) 240-8000 * FAX (760) 240-1400

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.410 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 1

++
Process from Point/Station 31.000 to Point/Station 32.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.840(In/Hr)
Initial subarea data:
Initial area flow distance = 997.000(Ft.)
Top (of initial area) elevation = 1977.000(Ft.)
Bottom (of initial area) elevation = 1942.000(Ft.)
Difference in elevation = 35.000(Ft.)
Slope = 0.03511 s(%)= 3.51
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 16.239 min.
Rainfall intensity = 3.520(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.685
Subarea runoff = 23.879(CFS)
Total initial stream area = 9.900(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.840(In/Hr)

++
Process from Point/Station 32.000 to Point/Station 33.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Depth of flow = 0.634(Ft.), Average velocity = 3.321(Ft/s)
******* Irregular Channel Data **********

```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1             0.00              1.00
      2            10.00              0.00
      3            15.00              0.00
      4            25.00              1.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     23.879(CFS)
  '     '    flow top width =     17.680(Ft.)
  '     '    velocity=    3.321(Ft/s)
  '     '    area =      7.190(Sq.Ft)
  '     '    Froude number =     0.918

Upstream point elevation =  1942.000(Ft.)
Downstream point elevation =  1926.000(Ft.)
Flow length =   784.000(Ft.)
Travel time  =    3.93 min.
Time of concentration =   20.17 min.
Depth of flow =   0.634(Ft.)
Average velocity =   3.321(Ft/s)
Total irregular channel flow =    23.879(CFS)
Irregular channel normal depth above invert elev. =   0.634(Ft.)
Average velocity of channel(s) =   3.321(Ft/s)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       33.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.840(In/Hr)
Time of concentration =    20.17 min.
Rainfall intensity =      3.024(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.650
Subarea runoff =     38.630(CFS) for   21.900(Ac.)
Total runoff =     62.509(CFS)
Effective area this stream =       31.80(Ac.)
Total Study Area (Main Stream No. 1) =       31.80(Ac.)
Area averaged Fm value =    0.840(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       34.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
_____________________________________________________________________
Depth of flow =   1.105(Ft.), Average velocity =   3.643(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1             0.00              2.00
      2            10.00              0.00
      3            20.00              0.00
      4            30.00              2.00
```

```
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     62.509(CFS)
  '     '    flow top width =     21.052(Ft.)
  '     '    velocity=    3.643(Ft/s)
  '     '    area =     17.159(Sq.Ft)
  '     '    Froude number =     0.711

Upstream point elevation =  1926.000(Ft.)
Downstream point elevation =  1916.000(Ft.)
Flow length =  1020.000(Ft.)
Travel time  =    4.67 min.
Time of concentration =   24.84 min.
Depth of flow =   1.105(Ft.)
Average velocity =   3.643(Ft/s)
Total irregular channel flow =    62.509(CFS)
Irregular channel normal depth above invert elev. =   1.105(Ft.)
Average velocity of channel(s) =   3.643(Ft/s)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       34.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.840(In/Hr)
Time of concentration =    24.84 min.
Rainfall intensity =      2.614(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.611
Subarea runoff =     61.880(CFS) for   46.100(Ac.)
Total runoff =    124.389(CFS)
Effective area this stream =       77.90(Ac.)
Total Study Area (Main Stream No. 1) =       77.90(Ac.)
Area averaged Fm value =    0.840(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.000 to Point/Station       35.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
_____________________________________________________________________
Depth of flow =   1.640(Ft.), Average velocity =   3.269(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              3.00
      2             15.00              0.00
      3             30.00              0.00
      4             45.00              3.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =    124.389(CFS)
  '     '    flow top width =     31.402(Ft.)
  '     '    velocity=    3.269(Ft/s)
  '     '    area =     38.054(Sq.Ft)
```

```
  '     '    Froude number =     0.523

Upstream point elevation =  1916.000(Ft.)
Downstream point elevation =  1909.000(Ft.)
Flow length =  1505.000(Ft.)
Travel time  =    7.67 min.
Time of concentration =   32.51 min.
Depth of flow =   1.640(Ft.)
Average velocity =   3.269(Ft/s)
Total irregular channel flow =   124.389(CFS)
Irregular channel normal depth above invert elev. =   1.640(Ft.)
Average velocity of channel(s) =   3.269(Ft/s)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.000 to Point/Station       35.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.840(In/Hr)
Time of concentration =    32.51 min.
Rainfall intensity =      2.165(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.551
Subarea runoff =     71.452(CFS) for   86.300(Ac.)
Total runoff =    195.842(CFS)
Effective area this stream =      164.20(Ac.)
Total Study Area (Main Stream No. 1) =      164.20(Ac.)
Area averaged Fm value =    0.840(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       36.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   1.798(Ft.), Average velocity =   3.759(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1             0.00              3.00
      2            15.00              0.00
      3            35.00              0.00
      4            50.00              3.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =    195.842(CFS)
  '     '    flow top width =     37.975(Ft.)
  '     '    velocity=    3.759(Ft/s)
  '     '    area =     52.105(Sq.Ft)
  '     '    Froude number =     0.565

Upstream point elevation =  1909.000(Ft.)
Downstream point elevation =  1902.000(Ft.)
Flow length =  1345.000(Ft.)
Travel time  =    5.96 min.
```

```
Time of concentration =   38.48 min.
Depth of flow =   1.798(Ft.)
Average velocity =   3.759(Ft/s)
Total irregular channel flow =   195.842(CFS)
Irregular channel normal depth above invert elev. =   1.798(Ft.)
Average velocity of channel(s) =   3.759(Ft/s)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       36.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Adjusted SCS curve number for AMC 1 = 47.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.840(In/Hr)
Time of concentration =    38.48 min.
Rainfall intensity =      1.924(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.507
Subarea runoff =     89.345(CFS) for  128.000(Ac.)
Total runoff =    285.187(CFS)
Effective area this stream =      292.20(Ac.)
Total Study Area (Main Stream No. 1) =      292.20(Ac.)
Area averaged Fm value =    0.840(In/Hr)
End of computations, Total Study Area =          292.20 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number =  67.0
```

T_c

Q_{100}

UNIT HYDROGRAPH CALCULATIONS: 100-YEAR STORM

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

Study date 06/04/23

++

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

MERRELL JOHNSON COMPANIES
22221 HIGHWAY 18
APPLE VALLEY, CA 92307
(760) 240-8000 * FAX (760) 240-1400

REIDO FARMS, LLC - JOB 3852.001
OFF-SITE STORM RUNOFF
UNIT HYDROGRAPH - SOUTH OF INTERSTATE 40
100-YEAR STORM EVENT - AMC I

Storm Event Year = 100

Antecedent Moisture Condition = 1

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 (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
8260.00	1	0.77
Rainfall data for year 2		
8260.00	6	0.83
Rainfall data for year 2		
8260.00	24	1.29

Rainfall data for year 100

```
          8260.00            1           1.40
------------------------------------------------------------------------
Rainfall data for year 100
          8260.00            6           2.26
------------------------------------------------------------------------
Rainfall data for year 100
          8260.00           24           3.45
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 1)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 91.0      79.8       8260.00      1.000     0.373    1.000    0.373

Area-averaged adjusted loss rate Fm (In/Hr) =  0.373

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC1)           Yield Fr
  8260.00   1.000         91.0      79.8       2.53     0.459

Area-averaged catchment yield fraction, Y =  0.459
Area-averaged low loss fraction, Yb =  0.541
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watercourse length =   45326.00(Ft.)
Length from concentration point to centroid =   23512.00(Ft.)
Elevation difference along watercourse =    3152.00(Ft.)
Mannings friction factor along watercourse =  0.040
Watershed area =    8260.00(Ac.)
Catchment Lag time =   1.248 hours
Unit interval =  10.000 minutes
Unit interval percentage of lag time = 13.3537
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.373(In/Hr)
Average low loss rate fraction (Yb) = 0.541 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.664(In)
Computed peak 30-minute rainfall =  1.137(In)
Specified peak 1-hour rainfall =  1.400(In)
Computed peak 3-hour rainfall =  1.878(In)
Specified peak 6-hour rainfall =  2.260(In)
Specified peak 24-hour rainfall =  3.450(In)


Rainfall depth area reduction factors:
Using a total area of    8260.00(Ac.) (Ref: fig. E-4)
```

5-minute factor = 0.709 Adjusted rainfall = 0.471(In)
30-minute factor = 0.714 Adjusted rainfall = 0.812(In)
1-hour factor = 0.716 Adjusted rainfall = 1.002(In)
3-hour factor = 0.954 Adjusted rainfall = 1.792(In)
6-hour factor = 0.977 Adjusted rainfall = 2.209(In)
24-hour factor = 0.988 Adjusted rainfall = 3.408(In)

U n i t H y d r o g r a p h

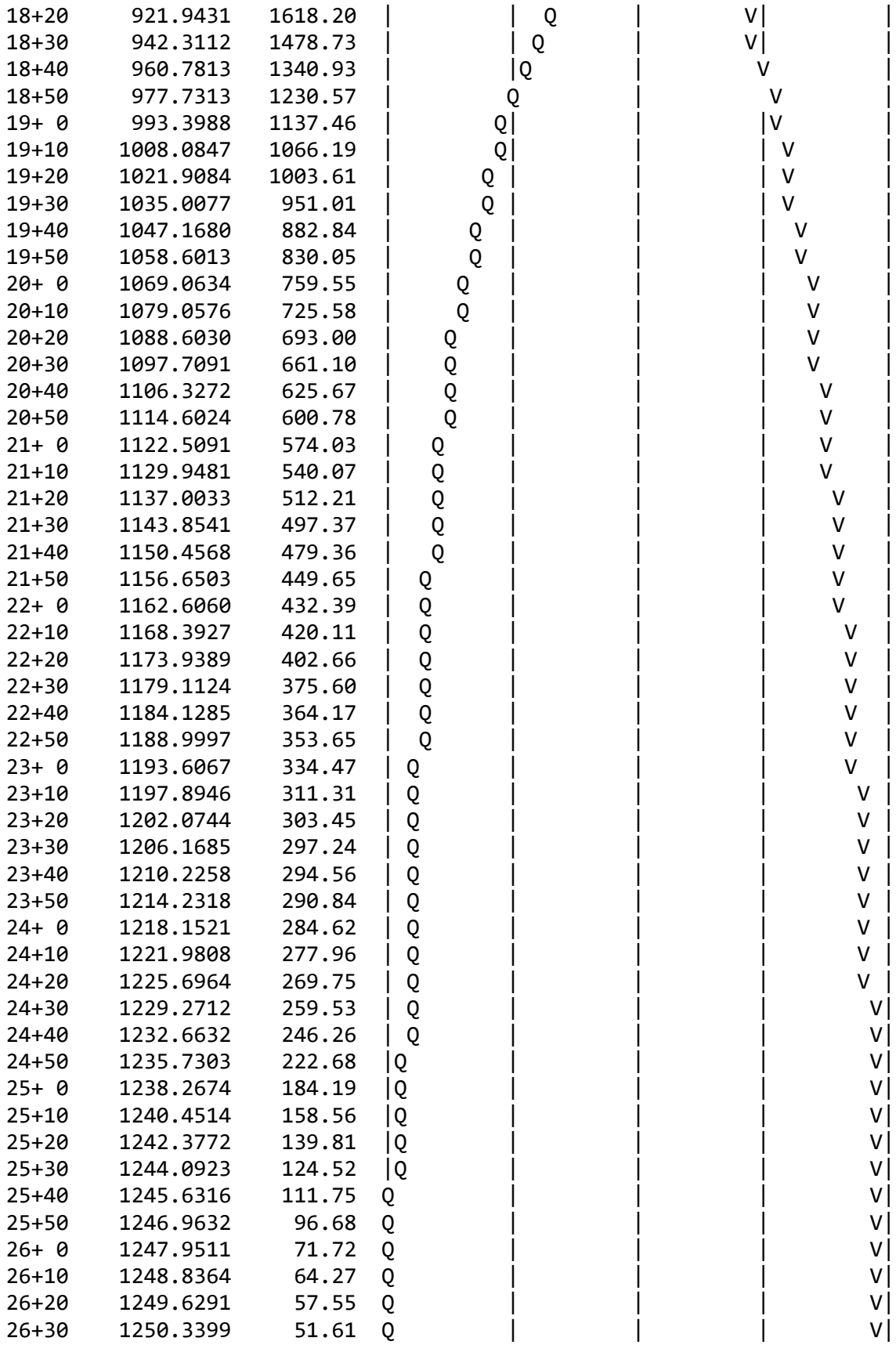
Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 49947.19 (CFS))		
1	0.590	294.563
2	2.374	891.122
3	5.301	1461.984
4	9.537	2115.669
5	17.221	3837.958
6	29.543	6154.718
7	41.111	5777.967
8	49.888	4383.861
9	56.723	3413.657
10	61.818	2544.835
11	65.888	2033.048
12	69.348	1727.818
13	72.377	1512.948
14	74.927	1273.647
15	77.230	1150.170
16	79.222	995.076
17	80.981	878.596
18	82.539	778.060
19	83.975	717.233
20	85.298	661.126
21	86.563	631.485
22	87.668	552.379
23	88.699	514.538
24	89.529	414.649
25	90.318	394.339
26	91.069	375.032
27	91.784	356.854
28	92.427	321.327
29	93.045	308.910
30	93.633	293.492
31	94.148	257.135
32	94.602	226.774
33	95.056	226.774
34	95.505	224.347

```
 35              95.878                186.429
 36              96.226                173.415
 37              96.573                173.415
 38              96.903                165.129
 39              97.154                125.285
 40              97.395                120.057
 41              97.635                120.057
 42              97.840                102.420
 43              97.975                 67.631
 44              98.109                 66.698
 45              98.242                 66.730
 46              98.391                 74.254
 47              98.551                 80.038
 48              98.712                 80.038
 49              98.872                 80.038
 50              99.032                 80.038
 51              99.192                 80.038
 52              99.353                 80.038
 53              99.500                 73.582
 54              99.590                 45.065
 55              99.674                 41.686
 56              99.757                 41.686
 57              99.841                 41.686
 58              99.924                 41.686
 59             100.000                 37.959
--------------------------------------------------------------------------
--------------------------------------------------------------------------
--------------------------------------------------------------------------
Total soil rain loss =      1.58(In)
Total effective rainfall =      1.83(In)
Peak flow rate in flood hydrograph =   4651.61(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  10   Minute intervals ((CFS))

--------------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0     1175.0    2350.0    3525.0    4700.0
--------------------------------------------------------------------------
  0+10       0.0138      1.00  Q         |         |         |         |
  0+20       0.0695      4.04  Q         |         |         |         |
  0+30       0.1942      9.05  Q         |         |         |         |
  0+40       0.4189     16.32  Q         |         |         |         |
  0+50       0.8253     29.50  Q         |         |         |         |
  1+ 0       1.5233     50.67  Q         |         |         |         |
  1+10       2.4974     70.72  Q         |         |         |         |
  1+20       3.6842     86.16  Q         |         |         |         |
  1+30       5.0398     98.42  Q         |         |         |         |
```

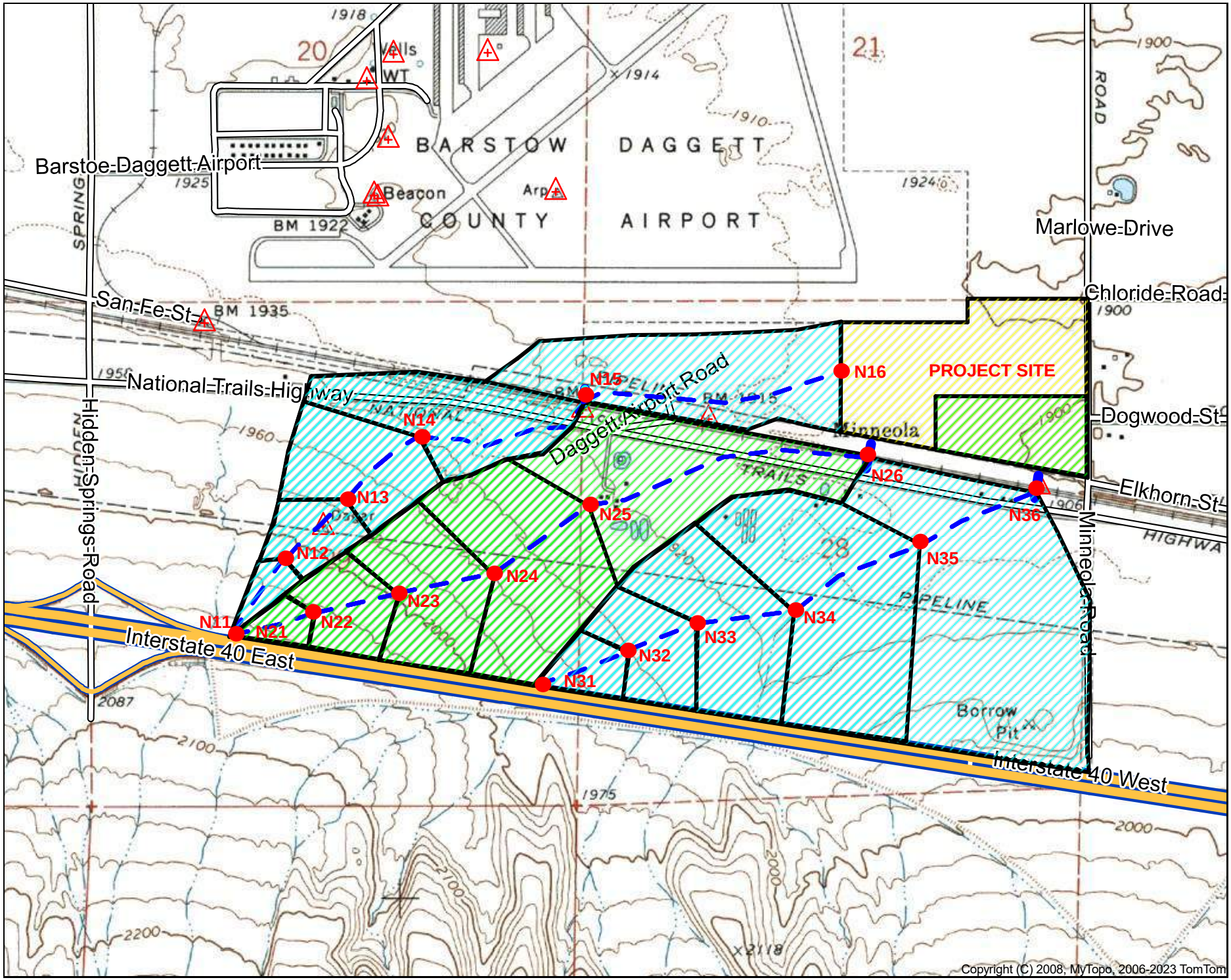
```
1+40       6.5250    107.82  Q          |          |          |          |
1+50       8.1166    115.55  Q          |          |          |          |
2+ 0       9.8013    122.31  VQ         |          |          |          |
2+10      11.5699    128.40  VQ         |          |          |          |
2+20      13.4118    133.73  VQ         |          |          |          |
2+30      15.3221    138.68  VQ         |          |          |          |
2+40      17.2940    143.16  VQ         |          |          |          |
2+50      19.3227    147.29  VQ         |          |          |          |
3+ 0      21.4042    151.12  VQ         |          |          |          |
3+10      23.5362    154.78  VQ         |          |          |          |
3+20      25.7166    158.30  VQ         |          |          |          |
3+30      27.9446    161.75  VQ         |          |          |          |
3+40      30.2171    164.98  VQ         |          |          |          |
3+50      32.5329    168.13   Q         |          |          |          |
4+ 0      34.8878    170.97  |Q         |          |          |          |
4+10      37.2816    173.79  |Q         |          |          |          |
4+20      39.7138    176.58  |Q         |          |          |          |
4+30      42.1842    179.35  |Q         |          |          |          |
4+40      44.6917    182.05  |Q         |          |          |          |
4+50      47.2364    184.74  |Q         |          |          |          |
5+ 0      49.8181    187.43  |Q         |          |          |          |
5+10      52.4357    190.04  |Q         |          |          |          |
5+20      55.0885    192.59  |Q         |          |          |          |
5+30      57.7772    195.19  |Q         |          |          |          |
5+40      60.5022    197.84  |Q         |          |          |          |
5+50      63.2625    200.40  |QV        |          |          |          |
6+ 0      66.0583    202.97  |QV        |          |          |          |
6+10      68.8902    205.60  |QV        |          |          |          |
6+20      71.7586    208.25  |QV        |          |          |          |
6+30      74.6624    210.82  |QV        |          |          |          |
6+40      77.6023    213.43  |QV        |          |          |          |
6+50      80.5790    216.11  |QV        |          |          |          |
7+ 0      83.5926    218.79  |QV        |          |          |          |
7+10      86.6424    221.41  |QV        |          |          |          |
7+20      89.7293    224.11  |QV        |          |          |          |
7+30      92.8541    226.87  |QV        |          |          |          |
7+40      96.0184    229.73  |Q V       |          |          |          |
7+50      99.2235    232.69  |Q V       |          |          |          |
8+ 0     102.4704    235.73  | QV       |          |          |          |
8+10     105.7604    238.85  | QV       |          |          |          |
8+20     109.0946    242.07  | QV       |          |          |          |
8+30     112.4745    245.37  | QV       |          |          |          |
8+40     115.9012    248.78  | QV       |          |          |          |
8+50     119.3760    252.27  | QV       |          |          |          |
9+ 0     122.8990    255.77  | QV       |          |          |          |
9+10     126.4717    259.37  | Q V      |          |          |          |
9+20     130.0956    263.10  | Q V      |          |          |          |
9+30     133.7726    266.95  | Q V      |          |          |          |
9+40     137.5045    270.93  | Q V      |          |          |          |
9+50     141.2931    275.05  | Q V      |          |          |          |
```

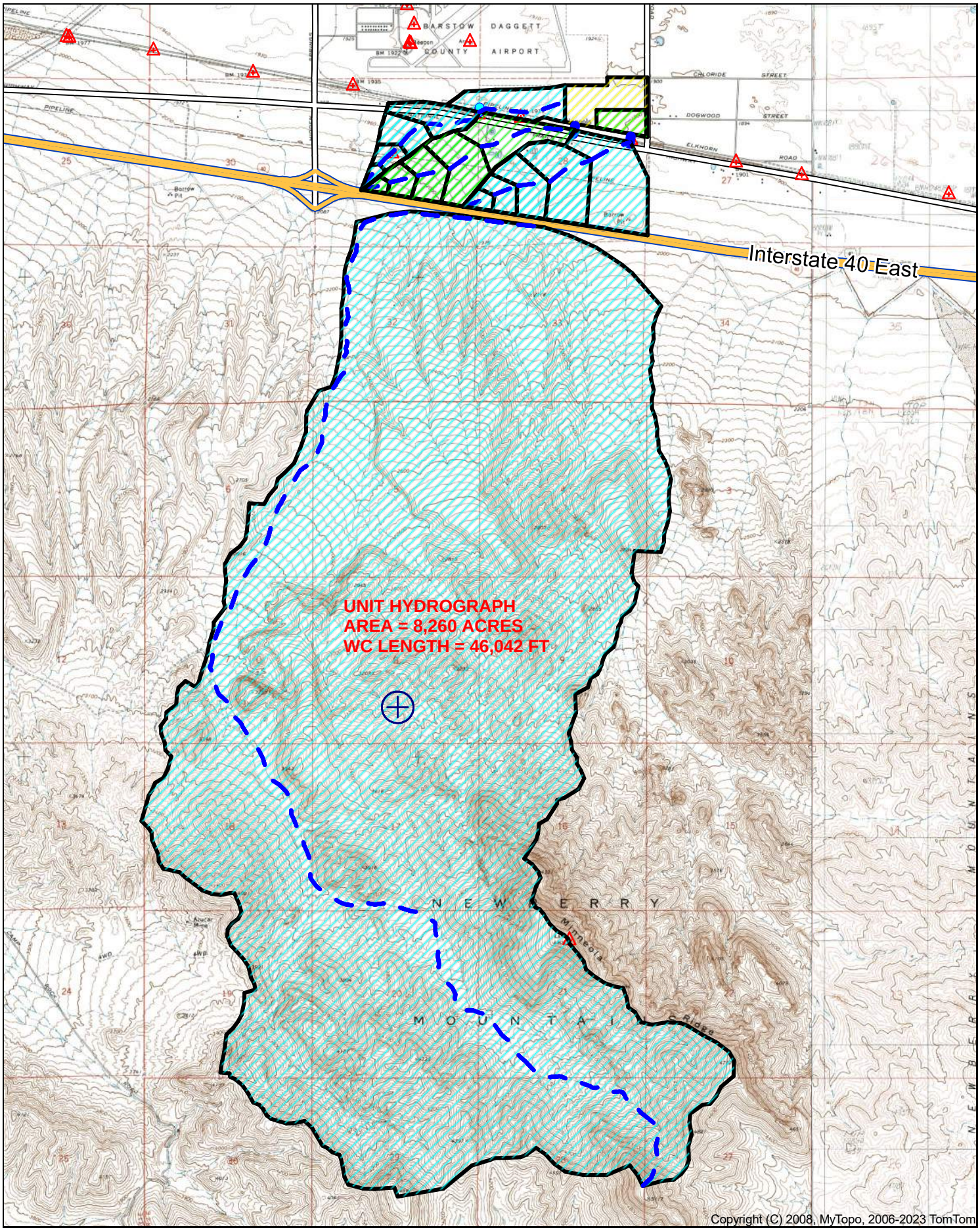
10+ 0	145.1386	279.19	Q V				
10+10	149.0433	283.48	Q V				
10+20	153.0096	287.95	Q V				
10+30	157.0398	292.60	Q V				
10+40	161.1368	297.44	Q V				
10+50	165.3032	302.48	Q V				
11+ 0	169.5421	307.75	Q V				
11+10	173.8569	313.25	Q V				
11+20	178.2510	319.01	Q V				
11+30	182.7282	325.04	Q V				
11+40	187.2926	331.37	Q V				
11+50	191.9486	338.02	Q V				
12+ 0	196.7010	345.02	Q V				
12+10	201.5537	352.31	Q V				
12+20	206.5101	359.83	Q V				
12+30	211.5737	367.62	Q V				
12+40	216.7486	375.70	Q V				
12+50	222.0350	383.79	Q V				
13+ 0	227.4310	391.76	Q V				
13+10	232.9473	400.48	Q V				
13+20	238.5995	410.35	Q V				
13+30	244.4031	421.34	Q V				
13+40	250.3746	433.53	Q V				
13+50	256.5308	446.94	Q V				
14+ 0	262.8900	461.68	Q V				
14+10	269.5148	480.96	Q V				
14+20	276.5150	508.22	Q V				
14+30	284.0019	543.55	Q V				
14+40	292.1048	588.27	Q V				
14+50	301.1141	654.08	Q V				
15+ 0	311.4178	748.05	Q V				
15+10	323.0344	843.37	Q V				
15+20	335.8526	930.60	Q V				
15+30	349.7721	1010.56	Q V				
15+40	364.6683	1081.47	Q V				
15+50	380.5404	1152.31	Q V				
16+ 0	397.7725	1251.05	Q V				
16+10	418.2353	1485.60	QV				
16+20	443.2910	1819.05	VQ				
16+30	473.1986	2171.29	V Q				
16+40	510.0579	2675.99	V Q				
16+50	560.5685	3667.07	V			Q	
17+ 0	624.6403	4651.61	Q_{100}				Q
17+10	684.7644	4365.01	V			Q	
17+20	735.2381	3664.39	V			Q	
17+30	778.3327	3128.67	V Q				
17+40	814.7344	2642.77	Q V				
17+50	846.4923	2305.62	Q V				
18+ 0	874.5898	2039.88	Q V				
18+10	899.6538	1819.65	Q V				



26+40	1250.9796	46.44	Q	|	|	|	V|
26+50	1251.5568	41.91	Q	|	|	|	V|
27+ 0	1252.0836	38.25	Q	|	|	|	V|
27+10	1252.5645	34.91	Q	|	|	|	V|
27+20	1253.0035	31.87	Q	|	|	|	V|
27+30	1253.4032	29.02	Q	|	|	|	V|
27+40	1253.7684	26.51	Q	|	|	|	V|
27+50	1254.1018	24.20	Q	|	|	|	V|
28+ 0	1254.4086	22.28	Q	|	|	|	V|
28+10	1254.6906	20.47	Q	|	|	|	V|
28+20	1254.9491	18.77	Q	|	|	|	V|
28+30	1255.1858	17.18	Q	|	|	|	V|
28+40	1255.4027	15.75	Q	|	|	|	V|
28+50	1255.6008	14.39	Q	|	|	|	V|
29+ 0	1255.7814	13.11	Q	|	|	|	V|
29+10	1255.9465	11.99	Q	|	|	|	V|
29+20	1256.0978	10.99	Q	|	|	|	V|
29+30	1256.2358	10.01	Q	|	|	|	V|
29+40	1256.3606	9.07	Q	|	|	|	V|
29+50	1256.4745	8.27	Q	|	|	|	V|
30+ 0	1256.5782	7.53	Q	|	|	|	V|
30+10	1256.6719	6.81	Q	|	|	|	V|
30+20	1256.7563	6.12	Q	|	|	|	V|
30+30	1256.8333	5.59	Q	|	|	|	V|
30+40	1256.9034	5.09	Q	|	|	|	V|
30+50	1256.9666	4.59	Q	|	|	|	V|
31+ 0	1257.0240	4.17	Q	|	|	|	V|
31+10	1257.0773	3.87	Q	|	|	|	V|
31+20	1257.1265	3.58	Q	|	|	|	V|
31+30	1257.1718	3.29	Q	|	|	|	V|
31+40	1257.2130	2.99	Q	|	|	|	V|
31+50	1257.2497	2.67	Q	|	|	|	V|
32+ 0	1257.2822	2.36	Q	|	|	|	V|
32+10	1257.3104	2.05	Q	|	|	|	V|
32+20	1257.3344	1.75	Q	|	|	|	V|
32+30	1257.3544	1.45	Q	|	|	|	V|
32+40	1257.3703	1.16	Q	|	|	|	V|
32+50	1257.3825	0.89	Q	|	|	|	V|
33+ 0	1257.3925	0.72	Q	|	|	|	V|
33+10	1257.4003	0.57	Q	|	|	|	V|
33+20	1257.4061	0.42	Q	|	|	|	V|
33+30	1257.4099	0.28	Q	|	|	|	V|
33+40	1257.4117	0.13	Q	|	|	|	V

TRIBUTARY DRAINAGE MAP


Barstoe-Daggett-Airport
BARSTOW DAGGETT
COUNTY AIRPORT
Beacon
BM 1922
BM 1935
San-Fe-St
National-Trails-Highway
Hidden-Springs-Road
Daggett-Airport-Road
Marlowe-Drive
Chloride-Road
Dogwood-St
Elkhorn-St
Minneola-Road
Minneola
PROJECT SITE
N11
N12
N13
N14
N15
N16
N21
N22
N23
N24
N25
N26
N31
N32
N33
N34
N35
N36
Interstate 40 East
Interstate 40 West
PIPELINE
Borrow Pit
Copyright (C) 2008, MyTopo, 2006-2023 TomTom


Interstate 40 East
UNIT HYDROGRAPH
AREA = 8,260 ACRES
WC LENGTH = 46,042 FT
BARSTOW
DAGGETT
AIRPORT
COUNTY
CHLORIDE
STREET
DOGWOOD
STREET
ELKHORN
ROAD
PIPELINE
Borrow Pit
NEWBERRY
MOUNTAIN
Minneola
Azucar Mine
Copyright (C) 2008, MyTopo, 2006-2023 TomTom

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])

5 0 5 10 15
Miles

N
W E
S

Growing Season
- AMC I
- AMC II
- AMC III

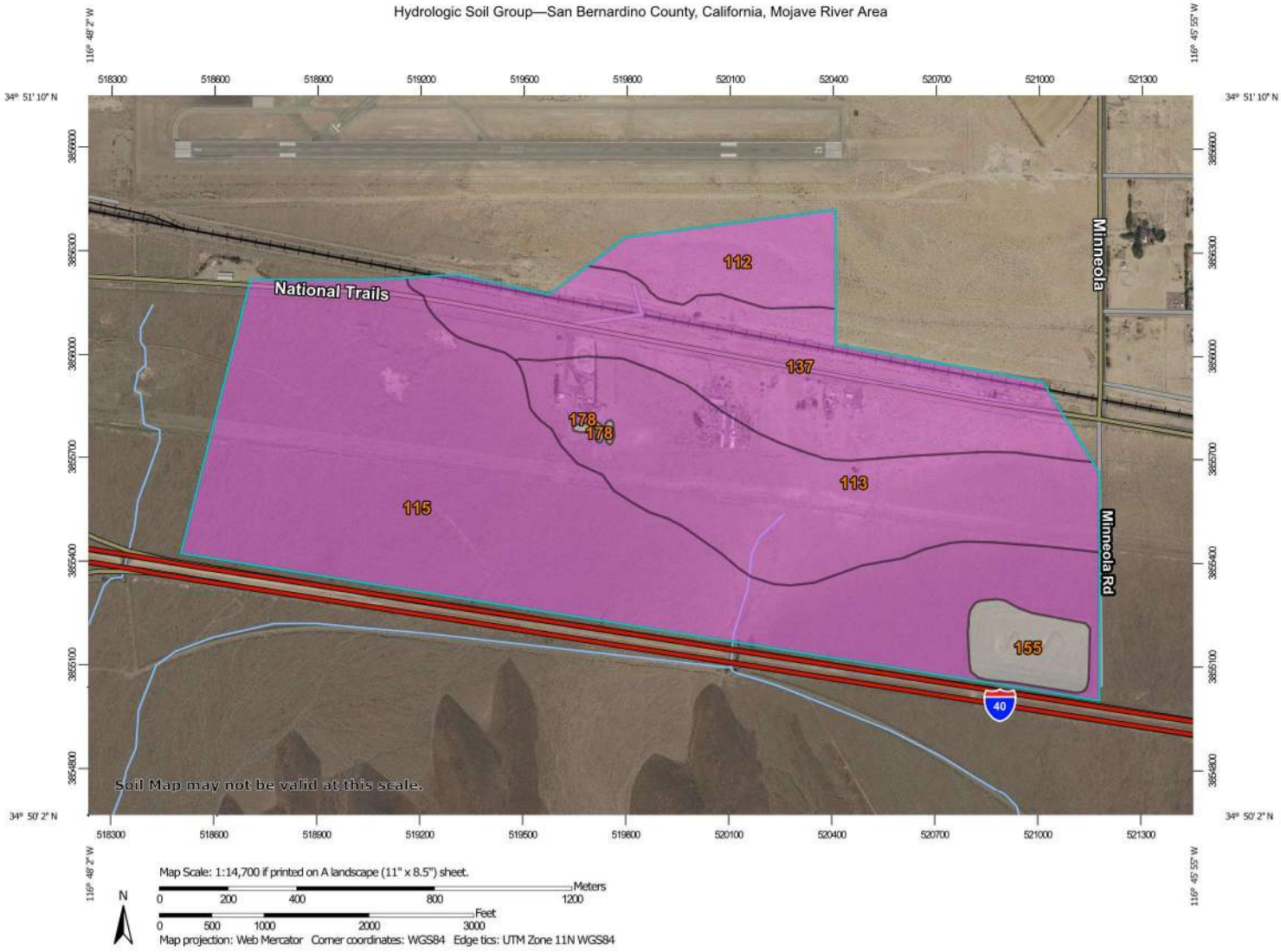
Barstow
Ridgecrest
Boron
Lucerne Valley
Adelanto
George AFB
Victorville
Apple Valley
Mountain View Acres
Hesperia
Wrightwood
Crestline
Lake Arrowhead
Running Springs
Big Bear City
Big Bear Lake
Yucca Valley
Morongo Valley
Joshua Tree
Twentynine Palms
Needles
Havasu Lake
Big River
Claremont
STATE HWY 247
STATE HWY 62
I-15
I-40
US HWY 395
STATE HWY 127


REIDO FARMS
Antecedent Moisture Condition I
Legend
3852.001 Radiant BMT
PROJECT SITE
Minneola Rd
66
National Trails Hwy
66
Blue Star Mem Hwy
Google Earth
N
3000 ft

EXHIBITS

SOILS MAP

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



Map Scale: 1:14,700 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 200 400 800 1200

Feet: 0 500 1000 2000 3000

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

MAP LEGEND

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

MAP INFORMATION

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 14, Sep 1, 2022

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

Date(s) aerial images were photographed: Feb 27, 2021—May 27, 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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
112	CAJON SAND, 0 TO 2 PERCENT SLOPES	A	35.0	5.6%
113	CAJON SAND, 2 TO 9 PERCENT SLOPES	A	133.3	21.5%
115	CAJON GRAVELLY SAND, 2 TO 15 PERCENT SLOPES	A	308.9	49.8%
137	KIMBERLINA LOAMY FINE SAND, COOL, 0 TO 2 PERCENT SLOPES	A	124.0	20.0%
155	PITS		18.5	3.0%
178	WATER		0.9	0.1%
Totals for Area of Interest			**620.7**	**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.

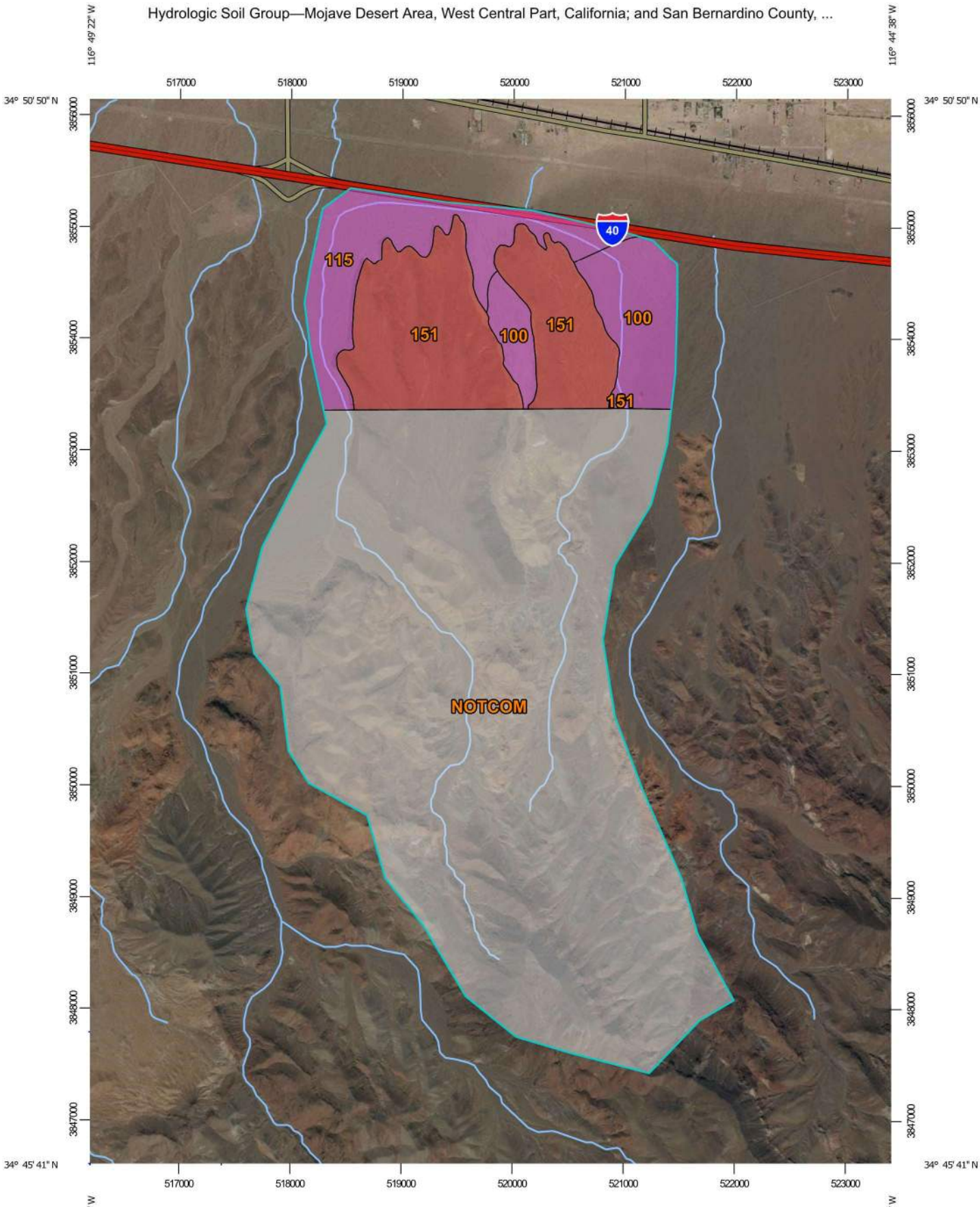
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher


116° 49' 22" W
116° 44' 38" W
517000
518000
519000
520000
521000
522000
523000
34° 50' 50" N
34° 45' 41" N
3856000
3855000
3854000
3853000
3852000
3851000
3850000
3849000
3848000
3847000
40
115
151
100
151
100
151
NOTCOM
Map Scale: 1:46,500 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0
500
1000
2000
3000
Feet
0
2000
4000
8000
12000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

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

MAP INFORMATION

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

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: Mojave Desert Area, West Central Part, California
Survey Area Data: Version 15, Sep 1, 2022

Soil Survey Area: San Bernardino County, California, Mojave River Area
Survey Area Data: Version 14, Sep 1, 2022

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Feb 27, 2021—May 27, 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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
NOTCOM	No Digital Data Available		4,068.9	73.9%
Subtotals for Soil Survey Area			**4,068.9**	**73.9%**
Totals for Area of Interest			**5,502.7**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
100	ARIZO GRAVELLY LOAMY SAND, 2 TO 9 PERCENT SLOPES	A	315.8	5.7%
115	CAJON GRAVELLY SAND, 2 TO 15 PERCENT SLOPES	A	390.8	7.1%
151	NEBONA-CUDDEBACK COMPLEX, 2 TO 9 PERCENT SLOPES*	D	727.1	13.2%
Subtotals for Soil Survey Area			**1,433.7**	**26.1%**
Totals for Area of Interest			**5,502.7**	**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 POINT RAINFALLS

NOAA Atlas 14, Volume 6, Version 2
Location name: Daggett, California, USA*
Latitude: 34.8433°, Longitude: -116.7876°
Elevation: 1942 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	0.099 (0.081-0.122)	0.138 (0.113-0.170)	0.194 (0.158-0.240)	0.243 (0.197-0.303)	0.316 (0.248-0.407)	0.378 (0.291-0.497)	0.446 (0.335-0.600)	0.522 (0.382-0.721)	0.635 (0.446-0.912)	0.730 (0.497-1.08)
10-min	0.142 (0.116-0.175)	0.198 (0.162-0.244)	0.277 (0.226-0.343)	0.348 (0.282-0.434)	0.454 (0.356-0.584)	0.542 (0.417-0.712)	0.640 (0.481-0.860)	0.748 (0.548-1.03)	0.910 (0.640-1.31)	1.05 (0.712-1.55)
15-min	0.172 (0.140-0.212)	0.239 (0.195-0.295)	0.335 (0.274-0.415)	0.421 (0.341-0.525)	0.548 (0.430-0.706)	0.656 (0.504-0.862)	0.774 (0.581-1.04)	0.905 (0.662-1.25)	1.10 (0.774-1.58)	1.27 (0.862-1.88)
30-min	0.230 (0.189-0.284)	0.321 (0.262-0.396)	0.450 (0.367-0.558)	0.565 (0.458-0.705)	0.736 (0.578-0.948)	0.881 (0.677-1.16)	1.04 (0.781-1.40)	1.22 (0.889-1.68)	1.48 (1.04-2.12)	1.70 (1.16-2.52)
60-min	0.312 (0.255-0.385)	0.434 (0.355-0.536)	0.609 (0.497-0.754)	0.765 (0.619-0.954)	0.996 (0.782-1.28)	1.19 (0.916-1.56)	1.41 (1.06-1.89)	1.64 (1.20-2.27)	2.00 (1.41-2.87)	2.30 (1.56-3.41)
2-hr	0.380 (0.311-0.469)	0.515 (0.421-0.636)	0.704 (0.575-0.872)	0.869 (0.704-1.08)	1.11 (0.871-1.43)	1.31 (1.01-1.72)	1.52 (1.15-2.05)	1.76 (1.29-2.43)	2.10 (1.48-3.02)	2.39 (1.63-3.55)
3-hr	0.440 (0.360-0.543)	0.591 (0.483-0.730)	0.801 (0.654-0.992)	0.983 (0.796-1.23)	1.24 (0.977-1.60)	1.46 (1.12-1.92)	1.69 (1.27-2.27)	1.94 (1.42-2.68)	2.30 (1.62-3.30)	2.59 (1.77-3.85)
6-hr	0.532 (0.436-0.656)	0.712 (0.582-0.879)	0.958 (0.781-1.19)	1.17 (0.945-1.46)	1.46 (1.15-1.89)	1.70 (1.31-2.24)	1.96 (1.47-2.63)	2.23 (1.63-3.08)	2.61 (1.84-3.75)	2.93 (1.99-4.34)
12-hr	0.587 (0.481-0.724)	0.787 (0.644-0.972)	1.06 (0.864-1.31)	1.29 (1.04-1.61)	1.61 (1.26-2.07)	1.86 (1.43-2.45)	2.13 (1.60-2.86)	2.41 (1.76-3.33)	2.81 (1.98-4.03)	3.13 (2.13-4.64)
24-hr	0.752 (0.667-0.865)	1.02 (0.902-1.17)	1.37 (1.21-1.59)	1.67 (1.46-1.94)	2.08 (1.76-2.50)	2.40 (2.00-2.96)	2.74 (2.22-3.45)	3.09 (2.44-4.00)	3.58 (2.71-4.83)	3.97 (2.90-5.54)
2-day	0.865 (0.768-0.995)	1.19 (1.05-1.37)	1.61 (1.42-1.86)	1.96 (1.72-2.28)	2.45 (2.07-2.94)	2.82 (2.34-3.47)	3.21 (2.60-4.04)	3.62 (2.85-4.68)	4.18 (3.16-5.63)	4.62 (3.37-6.44)
3-day	0.921 (0.817-1.06)	1.27 (1.13-1.47)	1.74 (1.54-2.01)	2.12 (1.86-2.47)	2.64 (2.24-3.18)	3.05 (2.53-3.75)	3.47 (2.81-4.37)	3.90 (3.08-5.05)	4.50 (3.40-6.07)	4.96 (3.63-6.93)
4-day	0.958 (0.850-1.10)	1.33 (1.18-1.53)	1.82 (1.61-2.10)	2.22 (1.95-2.59)	2.77 (2.35-3.34)	3.20 (2.66-3.93)	3.64 (2.95-4.58)	4.09 (3.22-5.30)	4.71 (3.56-6.36)	5.20 (3.80-7.26)
7-day	1.03 (0.912-1.18)	1.44 (1.28-1.66)	1.98 (1.75-2.29)	2.42 (2.12-2.82)	3.02 (2.56-3.64)	3.49 (2.90-4.28)	3.96 (3.21-4.98)	4.45 (3.51-5.76)	5.11 (3.87-6.90)	5.63 (4.12-7.86)
10-day	1.09 (0.963-1.25)	1.53 (1.36-1.76)	2.11 (1.86-2.43)	2.58 (2.26-3.00)	3.21 (2.72-3.87)	3.70 (3.08-4.55)	4.20 (3.40-5.29)	4.72 (3.72-6.10)	5.41 (4.09-7.30)	5.96 (4.35-8.32)
20-day	1.24 (1.10-1.43)	1.75 (1.55-2.02)	2.42 (2.13-2.79)	2.95 (2.59-3.44)	3.67 (3.11-4.42)	4.22 (3.51-5.19)	4.78 (3.88-6.02)	5.36 (4.22-6.93)	6.13 (4.64-8.28)	6.74 (4.93-9.41)
30-day	1.38 (1.23-1.59)	1.94 (1.72-2.24)	2.66 (2.36-3.08)	3.25 (2.85-3.78)	4.03 (3.42-4.85)	4.62 (3.84-5.68)	5.23 (4.24-6.58)	5.85 (4.61-7.57)	6.69 (5.06-9.02)	7.34 (5.37-10.3)
45-day	1.58 (1.41-1.82)	2.20 (1.95-2.53)	2.99 (2.64-3.46)	3.63 (3.18-4.22)	4.48 (3.80-5.39)	5.13 (4.26-6.30)	5.79 (4.69-7.29)	6.46 (5.10-8.37)	7.38 (5.58-9.95)	8.09 (5.91-11.3)
60-day	1.75 (1.56-2.02)	2.41 (2.13-2.77)	3.24 (2.86-3.74)	3.91 (3.43-4.56)	4.81 (4.08-5.79)	5.50 (4.56-6.75)	6.19 (5.01-7.79)	6.90 (5.44-8.93)	7.86 (5.94-10.6)	8.61 (6.29-12.0)

[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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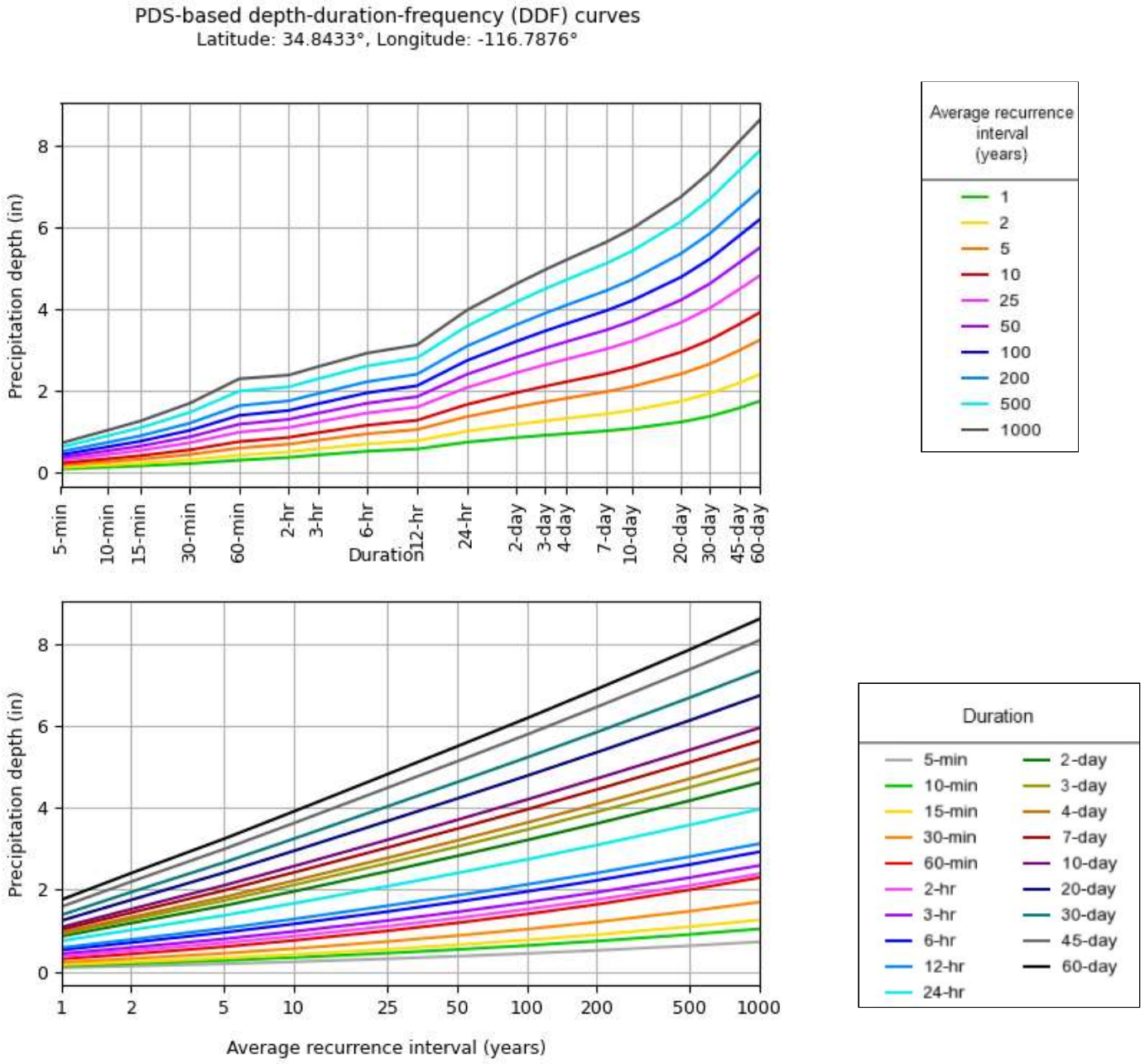
PF graphical



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Sun Jun 4 17:04:43 2023

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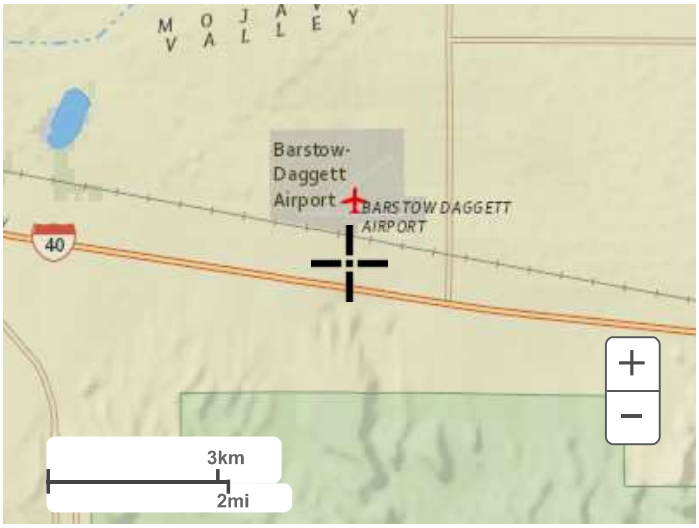
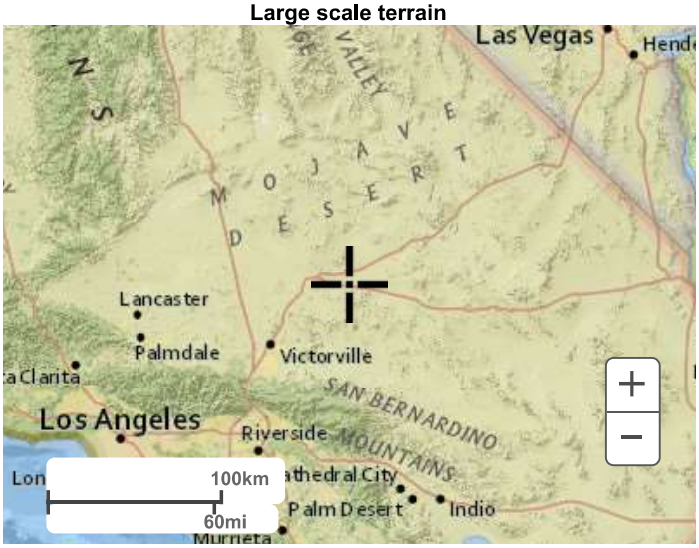
Maps & aerials

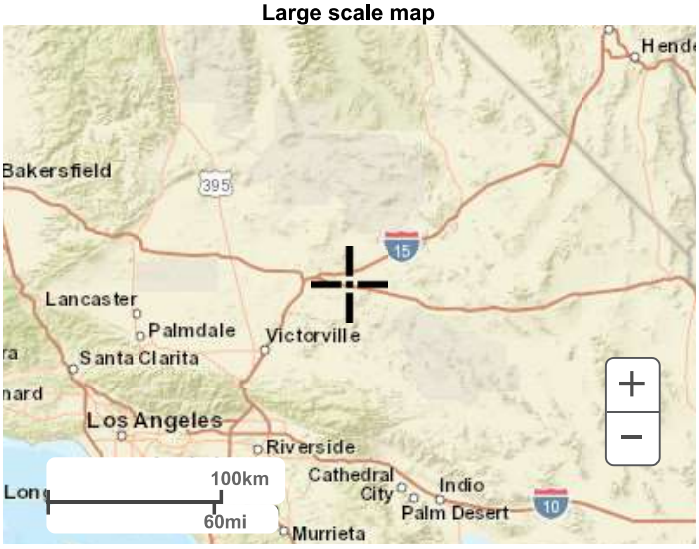
Small scale terrain



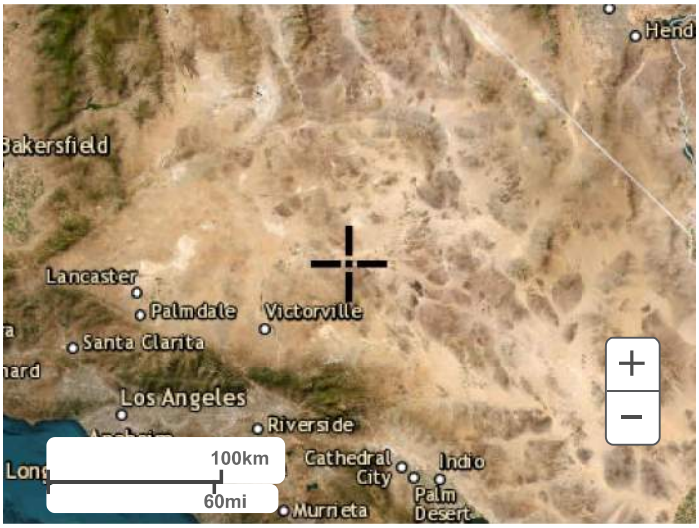
Large scale terrain



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

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NOAA Atlas 14, Volume 6, Version 2
Location name: Newberry Springs, California, USA*
Latitude: 34.8016°, Longitude: -116.7999°
Elevation: 2975 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	0.096 (0.079-0.118)	0.136 (0.111-0.168)	0.192 (0.157-0.238)	0.241 (0.195-0.301)	0.314 (0.246-0.404)	0.374 (0.288-0.491)	0.440 (0.331-0.591)	0.512 (0.375-0.707)	0.619 (0.436-0.889)	0.709 (0.483-1.05)
10-min	0.138 (0.113-0.170)	0.195 (0.159-0.240)	0.275 (0.225-0.341)	0.346 (0.280-0.431)	0.450 (0.353-0.579)	0.536 (0.413-0.704)	0.630 (0.474-0.847)	0.734 (0.537-1.01)	0.887 (0.624-1.27)	1.02 (0.692-1.51)
15-min	0.166 (0.136-0.205)	0.235 (0.193-0.290)	0.333 (0.272-0.412)	0.418 (0.339-0.522)	0.544 (0.427-0.700)	0.649 (0.499-0.851)	0.762 (0.573-1.02)	0.888 (0.650-1.23)	1.07 (0.755-1.54)	1.23 (0.837-1.82)
30-min	0.224 (0.184-0.276)	0.317 (0.259-0.391)	0.448 (0.366-0.555)	0.563 (0.456-0.702)	0.732 (0.575-0.943)	0.873 (0.672-1.15)	1.03 (0.772-1.38)	1.20 (0.875-1.65)	1.44 (1.02-2.08)	1.66 (1.13-2.46)
60-min	0.306 (0.250-0.377)	0.432 (0.354-0.533)	0.611 (0.499-0.756)	0.768 (0.622-0.958)	0.998 (0.784-1.28)	1.19 (0.916-1.56)	1.40 (1.05-1.88)	1.63 (1.19-2.25)	1.97 (1.39-2.83)	2.26 (1.54-3.35)
2-hr	0.403 (0.330-0.497)	0.550 (0.450-0.679)	0.755 (0.616-0.934)	0.931 (0.754-1.16)	1.19 (0.932-1.53)	1.40 (1.08-1.83)	1.62 (1.22-2.18)	1.87 (1.37-2.58)	2.23 (1.57-3.20)	2.52 (1.72-3.74)
3-hr	0.480 (0.393-0.592)	0.648 (0.530-0.800)	0.880 (0.719-1.09)	1.08 (0.874-1.35)	1.36 (1.07-1.76)	1.60 (1.23-2.10)	1.84 (1.39-2.48)	2.11 (1.55-2.92)	2.50 (1.76-3.59)	2.82 (1.92-4.18)
6-hr	0.615 (0.504-0.759)	0.826 (0.676-1.02)	1.11 (0.908-1.38)	1.35 (1.10-1.69)	1.70 (1.33-2.18)	1.97 (1.52-2.59)	2.26 (1.70-3.04)	2.58 (1.88-3.56)	3.02 (2.12-4.34)	3.39 (2.31-5.03)
12-hr	0.746 (0.611-0.919)	0.999 (0.818-1.23)	1.34 (1.09-1.66)	1.63 (1.32-2.03)	2.03 (1.59-2.61)	2.35 (1.81-3.08)	2.68 (2.02-3.60)	3.04 (2.23-4.20)	3.56 (2.50-5.10)	3.98 (2.71-5.90)
24-hr	0.959 (0.851-1.10)	1.29 (1.14-1.48)	1.73 (1.53-2.00)	2.10 (1.84-2.44)	2.61 (2.22-3.14)	3.02 (2.51-3.71)	3.45 (2.79-4.34)	3.90 (3.07-5.05)	4.53 (3.43-6.12)	5.05 (3.69-7.05)
2-day	1.14 (1.01-1.31)	1.54 (1.36-1.77)	2.06 (1.82-2.38)	2.51 (2.20-2.92)	3.13 (2.66-3.77)	3.62 (3.01-4.45)	4.14 (3.35-5.21)	4.68 (3.69-6.06)	5.46 (4.13-7.36)	6.09 (4.45-8.50)
3-day	1.22 (1.08-1.41)	1.66 (1.47-1.91)	2.24 (1.98-2.58)	2.72 (2.38-3.16)	3.40 (2.88-4.09)	3.93 (3.27-4.83)	4.50 (3.65-5.66)	5.10 (4.02-6.60)	5.94 (4.50-8.02)	6.63 (4.84-9.26)
4-day	1.29 (1.14-1.48)	1.75 (1.55-2.02)	2.35 (2.08-2.72)	2.86 (2.51-3.33)	3.57 (3.03-4.30)	4.14 (3.43-5.08)	4.72 (3.83-5.95)	5.35 (4.22-6.93)	6.23 (4.71-8.41)	6.95 (5.08-9.71)
7-day	1.42 (1.26-1.63)	1.93 (1.71-2.22)	2.58 (2.28-2.98)	3.11 (2.73-3.62)	3.85 (3.27-4.64)	4.44 (3.69-5.46)	5.06 (4.10-6.37)	5.72 (4.51-7.40)	6.65 (5.03-8.97)	7.42 (5.42-10.4)
10-day	1.52 (1.35-1.74)	2.06 (1.83-2.37)	2.74 (2.42-3.17)	3.30 (2.89-3.84)	4.05 (3.44-4.88)	4.65 (3.86-5.71)	5.27 (4.27-6.64)	5.94 (4.68-7.69)	6.87 (5.20-9.27)	7.65 (5.59-10.7)
20-day	1.80 (1.60-2.08)	2.42 (2.14-2.79)	3.17 (2.80-3.66)	3.76 (3.30-4.38)	4.54 (3.85-5.46)	5.13 (4.26-6.30)	5.74 (4.65-7.23)	6.39 (5.04-8.28)	7.34 (5.55-9.90)	8.14 (5.94-11.4)
30-day	2.08 (1.85-2.40)	2.77 (2.46-3.19)	3.58 (3.16-4.13)	4.20 (3.68-4.88)	4.97 (4.22-5.98)	5.56 (4.62-6.84)	6.18 (5.01-7.78)	6.84 (5.39-8.86)	7.80 (5.90-10.5)	8.65 (6.32-12.1)
45-day	2.46 (2.18-2.83)	3.21 (2.85-3.70)	4.08 (3.60-4.71)	4.72 (4.13-5.49)	5.48 (4.64-6.59)	6.02 (5.00-7.40)	6.60 (5.35-8.31)	7.24 (5.70-9.37)	8.17 (6.18-11.0)	9.02 (6.59-12.6)
60-day	2.76 (2.45-3.17)	3.56 (3.15-4.10)	4.43 (3.92-5.12)	5.06 (4.44-5.90)	5.81 (4.93-6.99)	6.32 (5.25-7.76)	6.83 (5.53-8.60)	7.44 (5.86-9.63)	8.33 (6.30-11.2)	9.17 (6.70-12.8)

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

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

Please refer to NOAA Atlas 14 document for more information.

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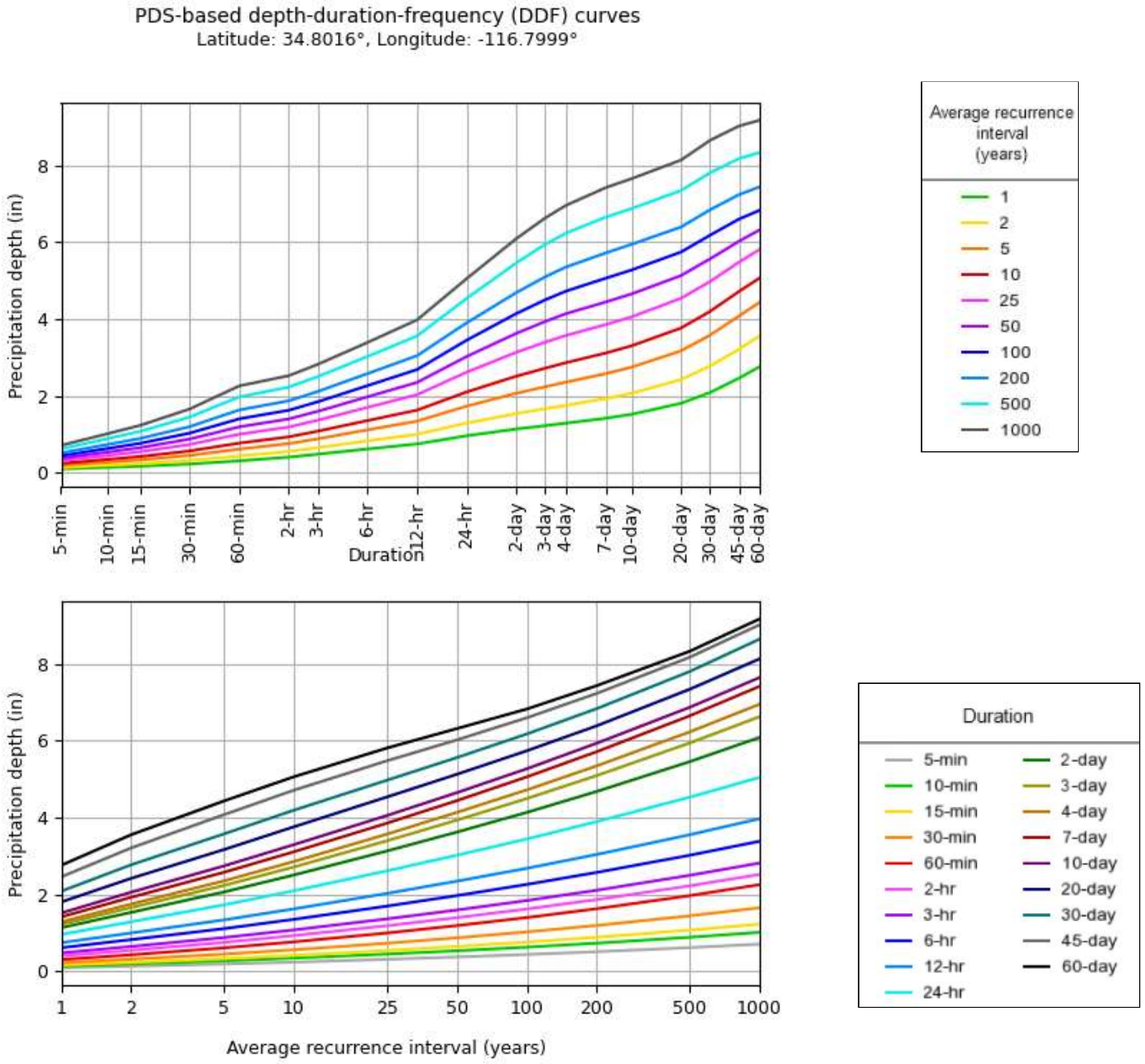
PF graphical



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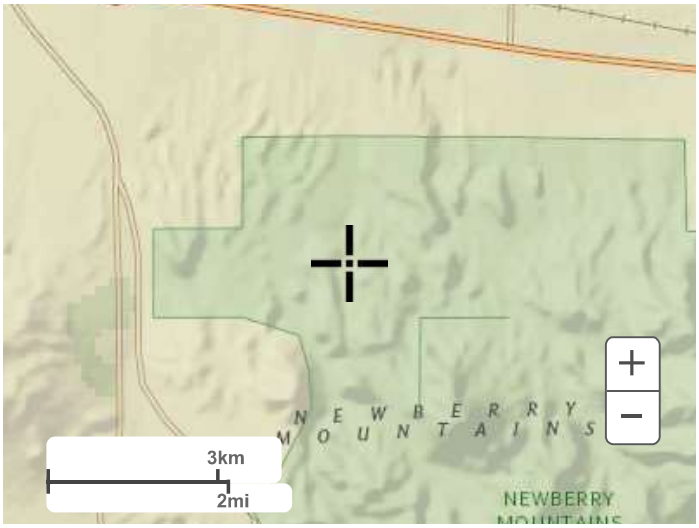
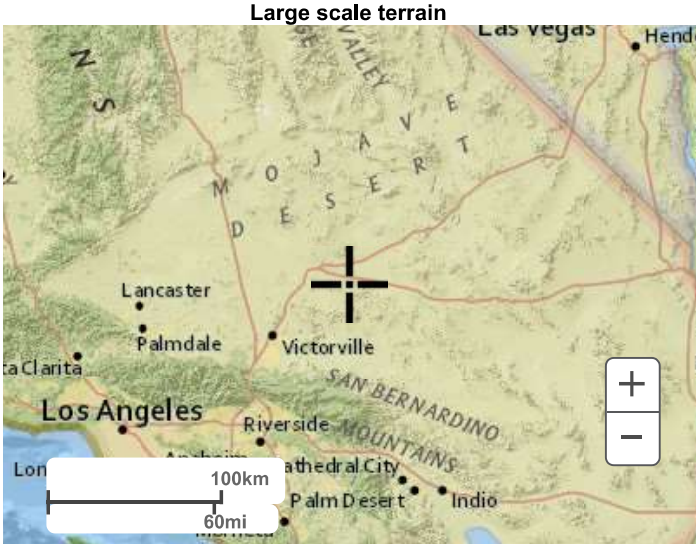
Maps & aerials

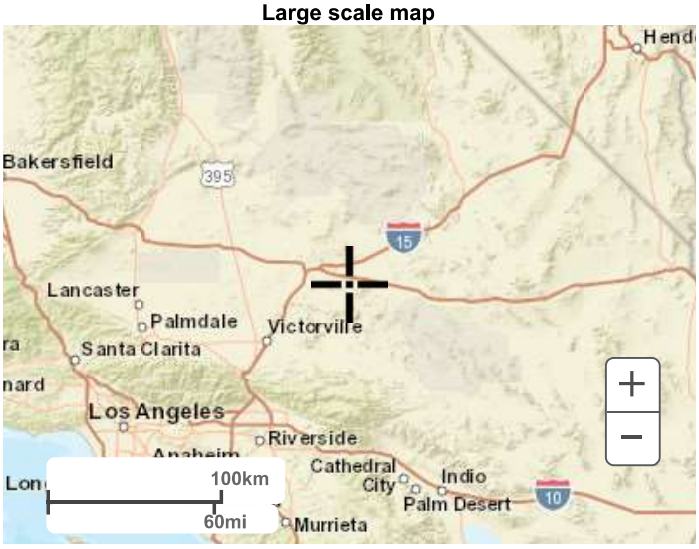
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

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