PRELIMINARY
HYDROLOGY STUDY

For

Redwood West
APN 0463-213-01 & 32
Apple Valley, CA

September 27, 2023

Prepared by:

Merrell-Johnson Companies

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

Job No. 3813.006

9/28/2023

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 site encompasses approximately 93 acres of property located on the east side of Dachshund Avenue, between Quarry Road on the north and Cordova Road 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 runoff flows was the rational 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 offsite flow was examined and delineated from U.S.G.S. Map: Apple Valley North, review of the Apple Valley Master Plan of Drainage (MPD) and an examination of the project site.

The tributary watershed areas examined extend westerly from the eastern property boundary. The north tributary area encompasses approximately 45.4 acres and the south tributary area encompasses approximately 129.8 acres respectively. A third tributary area, encompassing approximately 199.1 acres passes the southeast corner of the project site and continues flowing westerly, along the alignment of Cordova Road. The project site was examined and falls outside of the limits of the Apple Valley MPD. Per the Apple Valley MPD, there are no master planned facilities within the project area.

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 1.08”. Per the aforementioned addendum, AMC II was used for the project site and the soil types were determined to be a mix of Type C and Type D soils per the Natural Resources Conservation Service’s “Web Soil Survey”. Soil Type C was used for a conservative analysis. Rainfall and Soils 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)
Node 11 – 14 (North - Eastern)	50	2,880	45.4	0.0174
Node 21 – 25 (South - Eastern)	98	5,280	129.8	0.0186
Node 31 – 36	120	8,141	199.1	0.0147

EXISTING CONDITIONS

The site encompasses approximately 93 acres of property located on the east side of Dachshund Avenue, between Quarry Road on the north and Cordova Road on the south in the northeastern area of the Town of Apple Valley, San Bernardino County, California. The property is currently vacant, undeveloped land. Dachshund Road and Cordova Road are unimproved dirt roads. Quarry Road is a private, paved road with dirt shoulders. The project site does not have access to Quarry Road.

Tributary off-site flows come from the east as sheet flows entering along the eastern property boundary. There is no runoff flow from areas north of Quarry Road due to existing improvements of the private roadway and an adjacent private railroad which parallels the roadway. The project site is outside the boundaries of the Apple Valley MPD.

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

Table B

Sub-Area	Q_{100} (cfs)
Node 11 – 15 (North - Eastern)	61.5
Node 21 – 26 (South - Eastern)	147.5
Node 31 – 36	173.9

CONCLUSIONS AND RECOMMENDATIONS

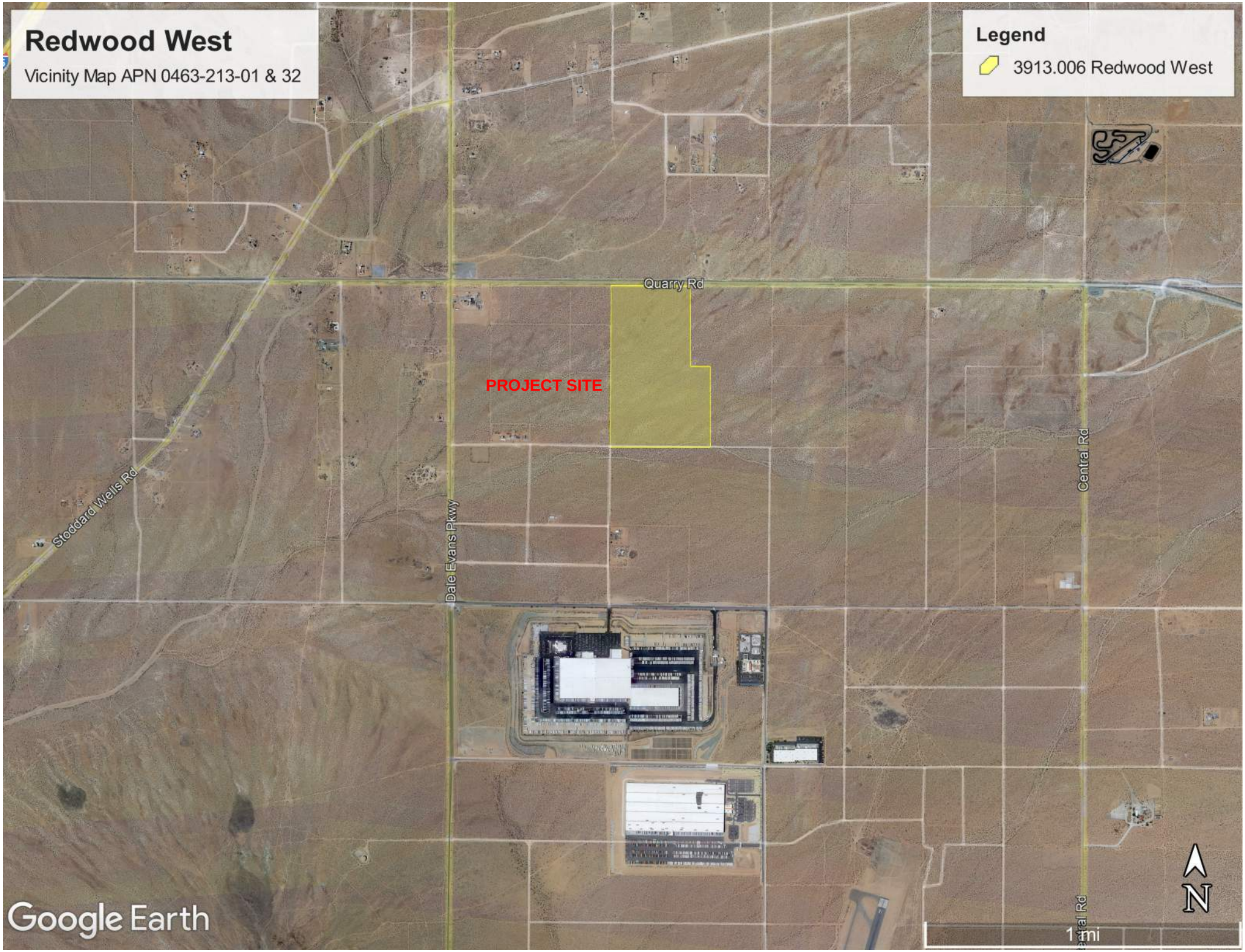
During our field investigation of the site, we observed the existing conditions as stated previously. Future development of the project is being performed in conjunction with engineered improvement plans. Off-site flows from the east will be intercepted along the easterly property boundary within a drainage ditch and storm drain system, conveyed to spreading basins, and outlet as sheet flows onto the new street improvements along Dachshund Avenue and Cordova Road.

On-site runoff flows will be intercepted within two drainage grate and storm drain systems within the on-site parking areas. These flows will be conveyed through the project site and into two separate vortex pre-treatment systems which will outlet into a retention basin located along the southern boundary of the project. Treated on-site runoff will be allowed to infiltrate within the retention basin. Off-site runoff and on-site runoff flows will not comingle. The increased on-site runoff flow due to development of the site will flow to the retention basin along the southern frontage of the project and allowed to infiltrate.

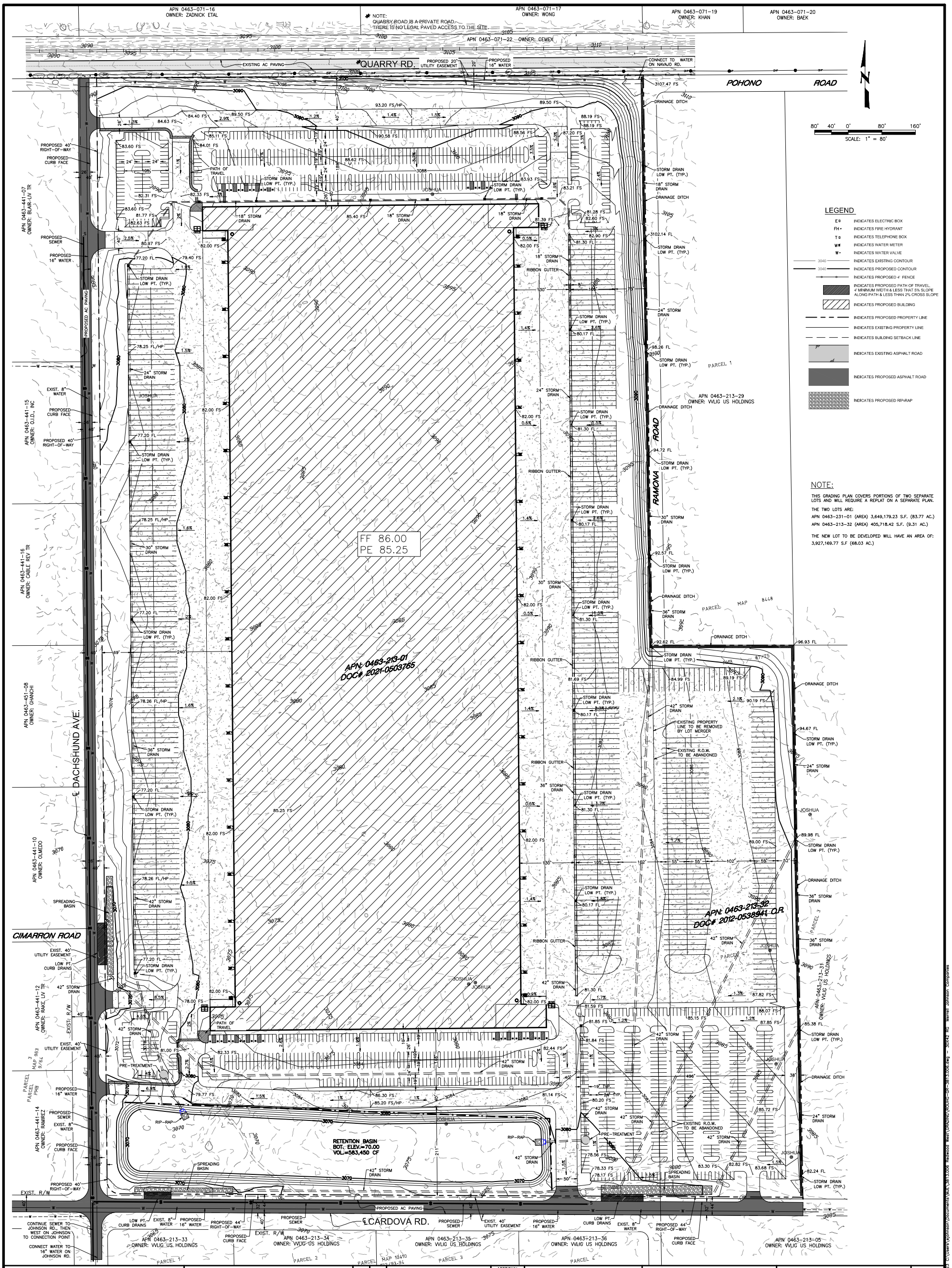
SECTION 2

EXHIBITS

VICINITY MAP


Redwood West
Vicinity Map APN 0463-213-01 & 32
Legend
3913.006 Redwood West
Quarry Rd
PROJECT SITE
Stoddard Wells Rd
Dale Evans Pkwy
Central Rd
N
1 mi
Google Earth

PROPOSED DEVELOPMENT PLAN



NOTE:

THIS GRADING PLAN COVERS PORTIONS OF TWO SEPARATE LOTS AND WILL REQUIRE A REPLAT ON A SEPARATE PLAN.

THE TWO LOTS ARE:
APN 0463-231-01 (AREA) 3,649,179.23 S.F. (83.77 AC.)
APN 0463-213-32 (AREA) 405,718.42 S.F. (9.31 AC.)

THE NEW LOT TO BE DEVELOPED WILL HAVE AN AREA OF:
3,927,169.77 S.F (68.03 AC.)

NOT FOR CONSTRUCTION

OWNER :

BUTTERFLY EQUITY PARTNERS AND/OR
RW APPLEVALLEY II AND/OR LINKUP, LLC
220 NEWPORT CENTER DRIVE, STE 11-557
NEWPORT BEACH, CA 92660

DATE	DELTA	REVISION DESCRIPTION	APPROVAL DATE	APPROVAL BY

MERRELL JOHNSON

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

CONCEPTUAL GRADING PLAN
WAREHOUSE
CARDOVA RD & DACHSHUND AVE.
68.2 ACRES

FOR:
REDWOOD WEST

DRAWN BY: EKJ
DATE: 9/18/23

JOB NO. 3813.006

SHEET 1 OF 1

SECTION 3

HYDROLOGY CALCULATIONS

RATIONAL CALCULATIONS – Q_{100}

OFF-SITE HYDROLOGY CALCULATIONS

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: 09/26/23

REDWOOD WEST - JOB 3813.006
OFF-SITE TRIBUTARY AREA - STREAM 1
NODE 11 - NODE 14
100-YEAR STORM EVENT - AMC II

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 = 1.080 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

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

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 1000.000(Ft.)
Top (of initial area) elevation = 3143.000(Ft.)
Bottom (of initial area) elevation = 3126.000(Ft.)
Difference in elevation = 17.000(Ft.)
Slope = 0.01700 s(%)= 1.70
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 18.796 min.
Rainfall intensity = 2.434(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.802
Subarea runoff = 11.516(CFS)
Total initial stream area = 5.900(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)

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

Depth of flow = 0.665(Ft.), Average velocity = 2.600(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  =     11.516(CFS)
  '     '    flow top width =     13.310(Ft.)
  '     '    velocity=    2.600(Ft/s)
  '     '    area =      4.429(Sq.Ft)
  '     '    Froude number =     0.794

Upstream point elevation =  3126.000(Ft.)
Downstream point elevation =  3111.000(Ft.)
Flow length =   916.000(Ft.)
Travel time  =    5.87 min.
Time of concentration =   24.67 min.
Depth of flow =   0.665(Ft.)
Average velocity =   2.600(Ft/s)
Total irregular channel flow =    11.516(CFS)
Irregular channel normal depth above invert elev. =   0.665(Ft.)
Average velocity of channel(s) =   2.600(Ft/s)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Time of concentration =    24.67 min.
Rainfall intensity =      2.012(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.781
Subarea runoff =     17.414(CFS) for   12.500(Ac.)
Total runoff =     28.930(CFS)
Effective area this stream =       18.40(Ac.)
Total Study Area (Main Stream No. 1) =       18.40(Ac.)
Area averaged Fm value =    0.265(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
_____________________________________________________________________
Depth of flow =   0.569(Ft.), Average velocity =   3.237(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  =     28.930(CFS)
  '     '    flow top width =     21.389(Ft.)
  '     '    velocity=    3.237(Ft/s)
  '     '    area =      8.938(Sq.Ft)
  '     '    Froude number =     0.882

Upstream point elevation =  3111.000(Ft.)
Downstream point elevation =  3093.000(Ft.)
Flow length =   964.000(Ft.)
Travel time  =    4.96 min.
Time of concentration =   29.63 min.
Depth of flow =   0.569(Ft.)
Average velocity =   3.237(Ft/s)
Total irregular channel flow =    28.930(CFS)
Irregular channel normal depth above invert elev. =   0.569(Ft.)
Average velocity of channel(s) =   3.237(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 = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Time of concentration =    29.63 min.  Tc
Rainfall intensity =      1.770(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.765
Subarea runoff =     32.549(CFS) for   27.000(Ac.)
Total runoff =     61.479(CFS)  Q100
Effective area this stream =       45.40(Ac.)
Total Study Area (Main Stream No. 1) =       45.40(Ac.)
Area averaged Fm value =    0.265(In/Hr)
End of computations, Total Study Area =           45.40 (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 =  86.0
```

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: 09/27/23

REDWOOD WEST - JOB 3813.006
OFF-SITE TRIBUTARY AREA - STREAM 2
NODE 21 - NODE 25
100-YEAR STORM EVENT - AMC II

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 = 1.080 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

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

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 997.000(Ft.)
Top (of initial area) elevation = 3184.000(Ft.)
Bottom (of initial area) elevation = 3164.000(Ft.)
Difference in elevation = 20.000(Ft.)
Slope = 0.02006 s(%)= 2.01
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 18.162 min.
Rainfall intensity = 2.493(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.804
Subarea runoff = 16.642(CFS)
Total initial stream area = 8.300(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)

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

Depth of flow = 0.735(Ft.), Average velocity = 3.078(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  =     16.642(CFS)
  '     '    flow top width =     14.706(Ft.)
  '     '    velocity=    3.078(Ft/s)
  '     '    area =      5.407(Sq.Ft)
  '     '    Froude number =     0.895

Upstream point elevation =  3164.000(Ft.)
Downstream point elevation =  3146.000(Ft.)
Flow length =   896.000(Ft.)
Travel time  =    4.85 min.
Time of concentration =   23.01 min.
Depth of flow =   0.735(Ft.)
Average velocity =   3.078(Ft/s)
Total irregular channel flow =    16.642(CFS)
Irregular channel normal depth above invert elev. =   0.735(Ft.)
Average velocity of channel(s) =   3.078(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 = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Time of concentration =    23.01 min.
Rainfall intensity =      2.112(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.787
Subarea runoff =     30.903(CFS) for   20.300(Ac.)
Total runoff =     47.545(CFS)
Effective area this stream =       28.60(Ac.)
Total Study Area (Main Stream No. 1) =       28.60(Ac.)
Area averaged Fm value =    0.265(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       24.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
_____________________________________________________________________
Depth of flow =   0.718(Ft.), Average velocity =   3.855(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  =     47.545(CFS)
  '     '    flow top width =     24.359(Ft.)
  '     '    velocity=    3.855(Ft/s)
  '     '    area =     12.334(Sq.Ft)
  '     '    Froude number =     0.955

Upstream point elevation =  3146.000(Ft.)
Downstream point elevation =  3120.000(Ft.)
Flow length =  1268.000(Ft.)
Travel time  =    5.48 min.
Time of concentration =   28.50 min.
Depth of flow =   0.718(Ft.)
Average velocity =   3.855(Ft/s)
Total irregular channel flow =    47.545(CFS)
Irregular channel normal depth above invert elev. =   0.718(Ft.)
Average velocity of channel(s) =   3.855(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 = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Time of concentration =    28.50 min.
Rainfall intensity =      1.819(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.769
Subarea runoff =     49.078(CFS) for   40.500(Ac.)
Total runoff =     96.623(CFS)
Effective area this stream =       69.10(Ac.)
Total Study Area (Main Stream No. 1) =       69.10(Ac.)
Area averaged Fm value =    0.265(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.000 to Point/Station       25.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   0.984(Ft.), Average velocity =   4.387(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1             0.00              2.00
      2            15.00              0.00
      3            30.00              0.00
      4            45.00              2.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =     96.623(CFS)
  '     '    flow top width =     29.761(Ft.)
  '     '    velocity=    4.387(Ft/s)
  '     '    area =     22.024(Sq.Ft)
  '     '    Froude number =     0.899

Upstream point elevation =  3120.000(Ft.)
```

```
Downstream point elevation =  3086.000(Ft.)
Flow length =  2119.000(Ft.)
Travel time  =    8.05 min.
Time of concentration =   36.55 min.
Depth of flow =   0.984(Ft.)
Average velocity =   4.387(Ft/s)
Total irregular channel flow =    96.623(CFS)
Irregular channel normal depth above invert elev. =   0.984(Ft.)
Average velocity of channel(s) =   4.387(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 = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Time of concentration =    36.55 min. Tc
Rainfall intensity =      1.528(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.744
Subarea runoff =     50.916(CFS) for   60.700(Ac.)
Total runoff =    147.539(CFS) Q100
Effective area this stream =      129.80(Ac.)
Total Study Area (Main Stream No. 1) =      129.80(Ac.)
Area averaged Fm value =    0.265(In/Hr)
End of computations, Total Study Area =          129.80 (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 =  86.0
```

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: 09/26/23

REDWOOD WEST - JOB 3813.006
OFF-SITE TRIBUTARY AREA - STREAM 3
NODE 31 - NODE 36
100-YEAR STORM EVENT - AMC II

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 = 1.080 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

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

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 835.000(Ft.)
Top (of initial area) elevation = 3200.000(Ft.)
Bottom (of initial area) elevation = 3188.000(Ft.)
Difference in elevation = 12.000(Ft.)
Slope = 0.01437 s(%)= 1.44
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 18.086 min.
Rainfall intensity = 2.500(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.805
Subarea runoff = 19.916(CFS)
Total initial stream area = 9.900(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)

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

Depth of flow = 0.838(Ft.), Average velocity = 2.838(Ft/s)
******* Irregular Channel Data **********

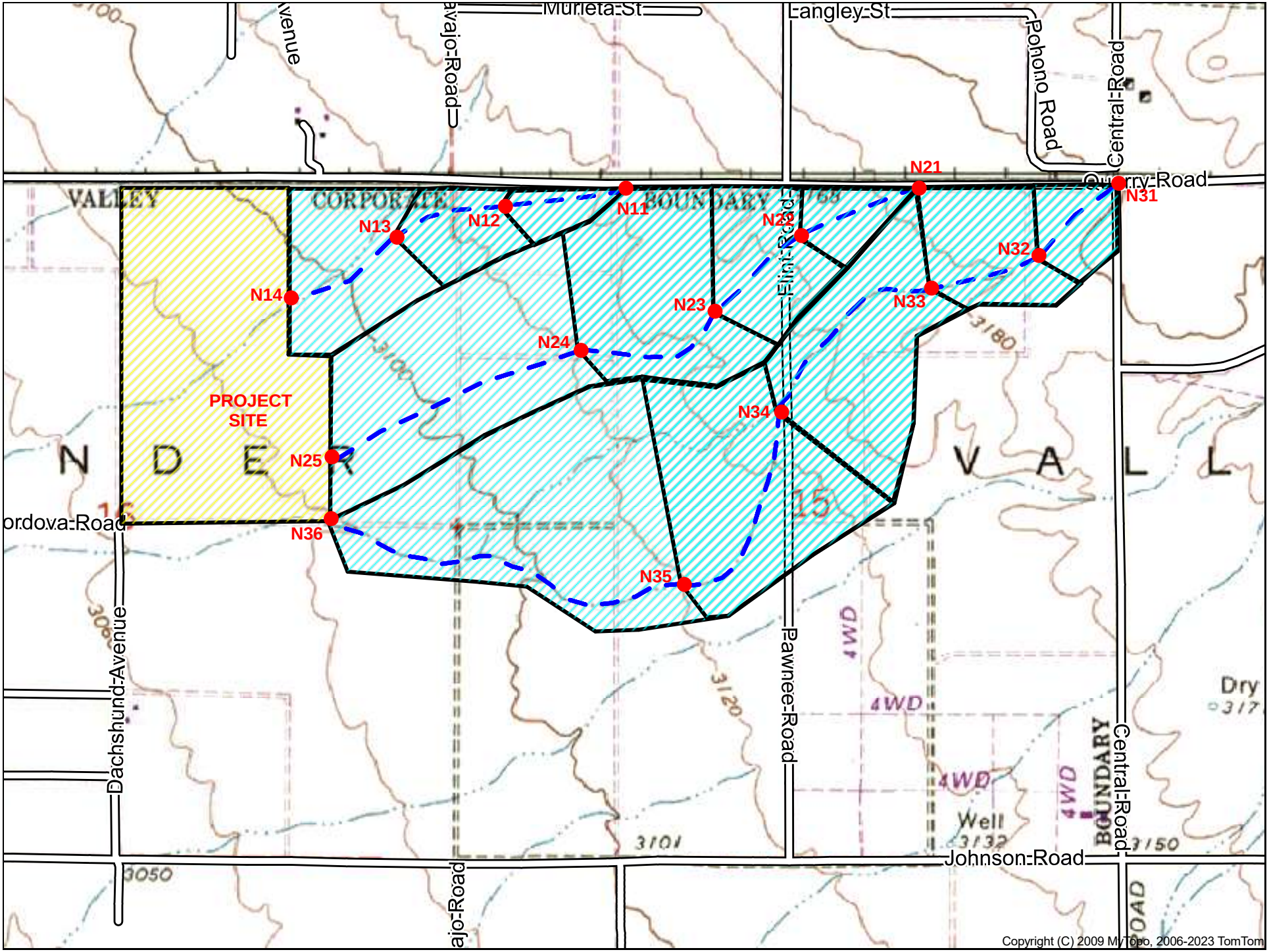
```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1             0.00              1.00
      2            10.00              0.00
      3            20.00              1.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     19.916(CFS)
  '     '    flow top width =     16.755(Ft.)
  '     '    velocity=    2.838(Ft/s)
  '     '    area =      7.018(Sq.Ft)
  '     '    Froude number =     0.773

Upstream point elevation =  3188.000(Ft.)
Downstream point elevation =  3175.000(Ft.)
Flow length =   906.000(Ft.)
Travel time  =    5.32 min.
Time of concentration =   23.41 min.
Depth of flow =   0.838(Ft.)
Average velocity =   2.838(Ft/s)
Total irregular channel flow =    19.916(CFS)
Irregular channel normal depth above invert elev. =   0.838(Ft.)
Average velocity of channel(s) =   2.838(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 = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Time of concentration =    23.41 min.
Rainfall intensity =      2.087(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.786
Subarea runoff =     29.612(CFS) for   20.300(Ac.)
Total runoff =     49.528(CFS)
Effective area this stream =       30.20(Ac.)
Total Study Area (Main Stream No. 1) =       30.20(Ac.)
Area averaged Fm value =    0.265(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       34.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
_____________________________________________________________________
Depth of flow =   0.763(Ft.), Average velocity =   3.680(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  =     49.528(CFS)
  '     '    flow top width =     25.265(Ft.)
  '     '    velocity=    3.680(Ft/s)
  '     '    area =     13.458(Sq.Ft)
  '     '    Froude number =     0.889

Upstream point elevation =  3175.000(Ft.)
Downstream point elevation =  3146.000(Ft.)
Flow length =  1660.000(Ft.)
Travel time  =    7.52 min.
Time of concentration =   30.92 min.
Depth of flow =   0.763(Ft.)
Average velocity =   3.680(Ft/s)
Total irregular channel flow =    49.528(CFS)
Irregular channel normal depth above invert elev. =   0.763(Ft.)
Average velocity of channel(s) =   3.680(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 = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Time of concentration =    30.92 min.
Rainfall intensity =      1.718(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.761
Subarea runoff =     43.678(CFS) for   41.100(Ac.)
Total runoff =     93.206(CFS)
Effective area this stream =       71.30(Ac.)
Total Study Area (Main Stream No. 1) =       71.30(Ac.)
Area averaged Fm value =    0.265(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.000 to Point/Station       35.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Depth of flow =   1.144(Ft.), Average velocity =   4.386(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1             0.00              2.00
      2            20.00              0.00
      3            30.00              0.00
      4            40.00              2.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =     93.206(CFS)
  '     '    flow top width =     27.157(Ft.)
  '     '    velocity=    4.386(Ft/s)
  '     '    area =     21.250(Sq.Ft)
  '     '    Froude number =     0.874

Upstream point elevation =  3146.000(Ft.)
```

```
Downstream point elevation =  3120.000(Ft.)
Flow length =  1742.000(Ft.)
Travel time  =    6.62 min.
Time of concentration =   37.54 min.
Depth of flow =   1.144(Ft.)
Average velocity =   4.386(Ft/s)
Total irregular channel flow =    93.206(CFS)
Irregular channel normal depth above invert elev. =   1.144(Ft.)
Average velocity of channel(s) =   4.386(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 = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Time of concentration =    37.54 min.
Rainfall intensity =      1.500(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.741
Subarea runoff =     42.001(CFS) for   50.400(Ac.)
Total runoff =    135.206(CFS)
Effective area this stream =      121.70(Ac.)
Total Study Area (Main Stream No. 1) =      121.70(Ac.)
Area averaged Fm value =    0.265(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       36.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
----------------------------------------------------------------------
Depth of flow =   1.059(Ft.), Average velocity =   4.173(Ft/s)
      ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              2.00
      2             20.00              0.00
      3             40.00              0.00
      4             60.00              2.00
Manning's 'N' friction factor =   0.035
------------------------------------------------------------------
Sub-Channel flow  =    135.206(CFS)
  '     '    flow top width =     41.184(Ft.)
  '     '    velocity=    4.173(Ft/s)
  '     '    area =     32.404(Sq.Ft)
  '     '    Froude number =     0.829

Upstream point elevation =  3120.000(Ft.)
Downstream point elevation =  3080.000(Ft.)
Flow length =  2998.000(Ft.)
Travel time  =   11.98 min.
Time of concentration =   49.52 min.
Depth of flow =   1.059(Ft.)
Average velocity =   4.173(Ft/s)
Total irregular channel flow =   135.206(CFS)
```

```
Irregular channel normal depth above invert elev. =   1.059(Ft.)
Average velocity of channel(s) =   4.173(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 = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Time of concentration =    49.52 min.  Tc
Rainfall intensity =      1.235(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.707
Subarea runoff =     38.653(CFS) for   77.400(Ac.)
Total runoff =    173.859(CFS)  Q100
Effective area this stream =      199.10(Ac.)
Total Study Area (Main Stream No. 1) =      199.10(Ac.)
Area averaged Fm value =    0.265(In/Hr)
End of computations, Total Study Area =          199.10 (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 =  86.0
```

TRIBUTARY DRAINAGE MAP


Murieta St
Langley St
Pohono Road
Central Road
Quarry Road
Navajo Road
Elinor Road
Pawnee Road
Dachshund Avenue
Cordova Road
Johnson Road
VALLEY
CORPORATE BOUNDARY
PROJECT SITE
N11
N12
N13
N14
N21
N22
N23
N24
N25
N31
N32
N33
N34
N35
N36
4WD
Well
Dry
3180
3120
3101
3050
3150
Copyright (C) 2009 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)*

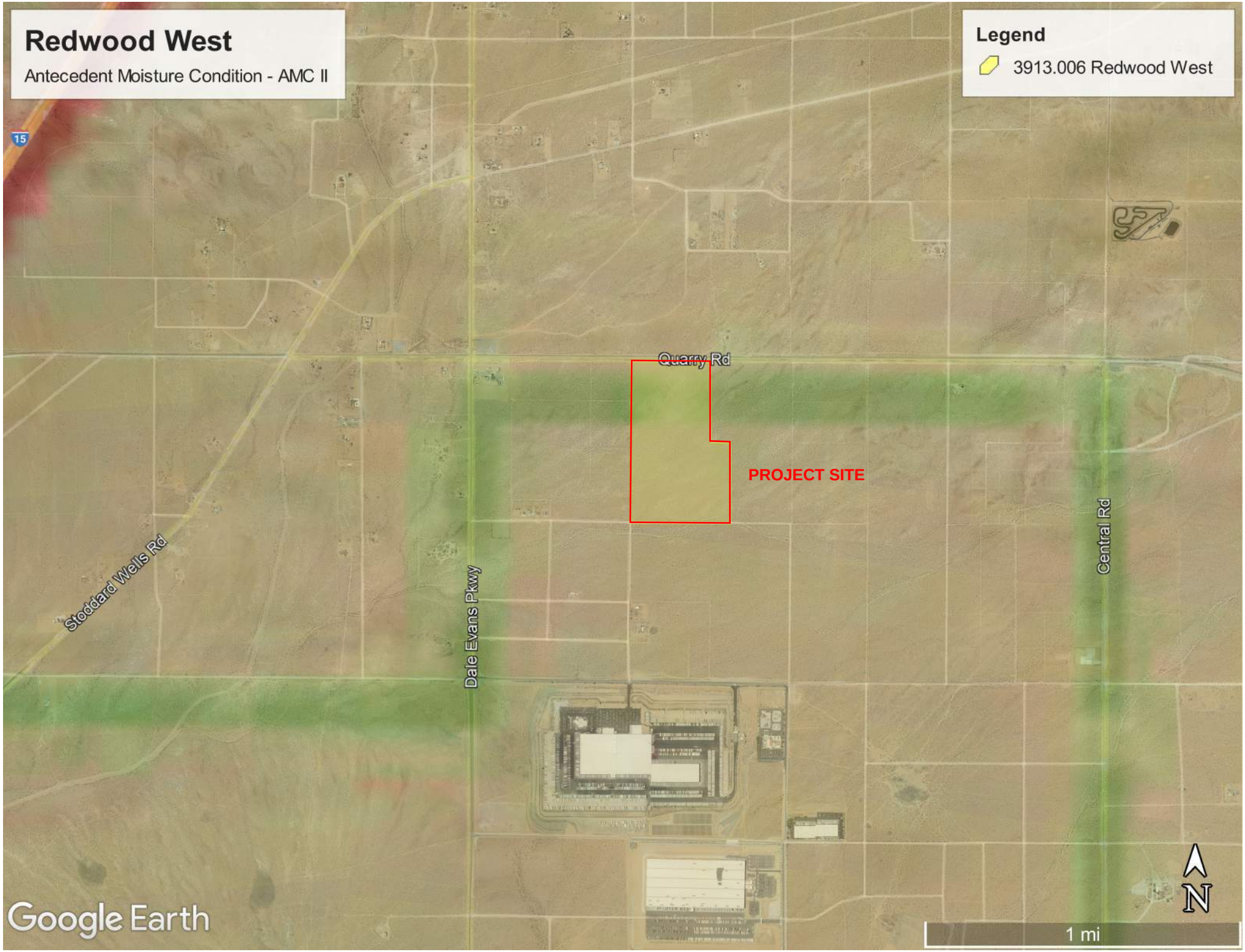
*1/2 (11-day - 1-day) =
1/2 (([10-day] + (1/10 ([20-day] - [10-day]))) - [1-day])

5 0 5 10 15
Miles

N
W E
S

Growing Season
- AMC I
- AMC II
- AMC III

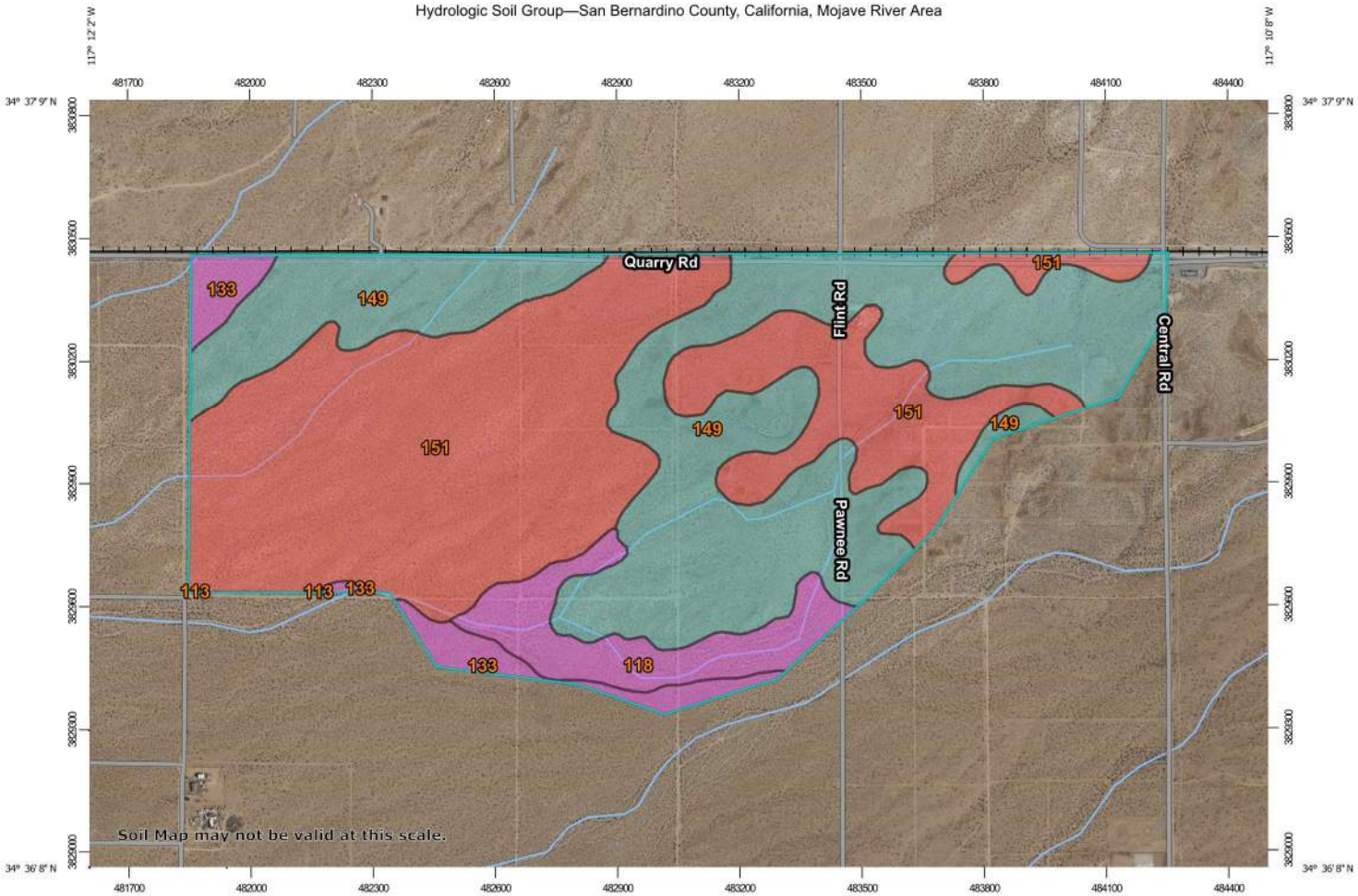
Baxter Valley
Ridgecrest
STATE HWY 127
I-15
Barstow
Boron
US HWY 395
Needles
I-40
Adelanto
George AFB
George AFB
Victorville
Apple Valley
Mountain View Acres
Hesperia
STATE HWY 247
Wrightwood
Big Bear City
Big Bear Lake
Crestline
Lake Arrowhead
Running Springs
Twentynine Palms
STATE HWY 62
Yucca Valley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


Redwood West
Antecedent Moisture Condition - AMC II
Legend
3913.006 Redwood West
15
Quarry Rd
PROJECT SITE
Stoddard Wells Rd
Dale Evans Pkwy
Central Rd
Google Earth
N
1 mi

EXHIBITS

SOILS MAP

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



Map Scale: 1:13,200 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 150 300 600 900

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: Mar 17, 2022—Jun 12, 2022

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
113	CAJON SAND, 2 TO 9 PERCENT SLOPES	A	0.1	0.0%
118	CAJON-ARIZO COMPLEX, 2 TO 15 PERCENT SLOPES*	A	32.5	6.7%
133	HELENDALE-BRYMAN LOAMY SANDS, 2 TO 5 PERCENT SLOPES*	A	18.5	3.8%
149	MIRAGE-JOSHUA COMPLEX, 2 TO 5 PERCENT SLOPES*	C	200.8	41.1%
151	NEBONA-CUDDEBACK COMPLEX, 2 TO 9 PERCENT SLOPES*	D	236.2	48.4%
Totals for Area of Interest			**488.2**	**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: Apple Valley, California, USA*
Latitude: 34.6149°, Longitude: -117.1939°
Elevation: 3104 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	0.083 (0.068-0.102)	0.116 (0.096-0.143)	0.163 (0.134-0.201)	0.203 (0.165-0.252)	0.261 (0.206-0.335)	0.309 (0.238-0.404)	0.359 (0.271-0.482)	0.415 (0.304-0.571)	0.494 (0.348-0.710)	0.560 (0.381-0.832)
10-min	0.119 (0.098-0.146)	0.167 (0.137-0.205)	0.234 (0.192-0.288)	0.291 (0.237-0.361)	0.374 (0.295-0.480)	0.442 (0.341-0.579)	0.515 (0.388-0.691)	0.594 (0.436-0.819)	0.709 (0.499-1.02)	0.803 (0.546-1.19)
15-min	0.144 (0.118-0.176)	0.202 (0.166-0.248)	0.282 (0.232-0.348)	0.352 (0.286-0.437)	0.453 (0.356-0.580)	0.535 (0.413-0.700)	0.623 (0.469-0.835)	0.719 (0.527-0.991)	0.857 (0.603-1.23)	0.971 (0.661-1.44)
30-min	0.197 (0.163-0.242)	0.277 (0.228-0.340)	0.387 (0.318-0.477)	0.483 (0.393-0.599)	0.621 (0.489-0.796)	0.734 (0.566-0.961)	0.855 (0.644-1.15)	0.986 (0.723-1.36)	1.18 (0.828-1.69)	1.33 (0.907-1.98)
60-min	0.250 (0.206-0.307)	0.351 (0.288-0.431)	0.491 (0.403-0.604)	0.612 (0.498-0.759)	0.787 (0.620-1.01)	0.930 (0.717-1.22)	1.08 (0.816-1.45)	1.25 (0.916-1.72)	1.49 (1.05-2.14)	1.69 (1.15-2.51)
2-hr	0.353 (0.291-0.433)	0.478 (0.393-0.586)	0.649 (0.533-0.799)	0.796 (0.648-0.988)	1.01 (0.793-1.29)	1.18 (0.908-1.54)	1.36 (1.02-1.82)	1.55 (1.14-2.14)	1.83 (1.29-2.63)	2.06 (1.40-3.05)
3-hr	0.428 (0.353-0.525)	0.571 (0.470-0.702)	0.768 (0.630-0.946)	0.936 (0.762-1.16)	1.18 (0.925-1.51)	1.37 (1.06-1.79)	1.57 (1.18-2.10)	1.79 (1.31-2.46)	2.10 (1.48-3.01)	2.35 (1.60-3.48)
6-hr	0.581 (0.478-0.712)	0.767 (0.631-0.942)	1.02 (0.838-1.26)	1.24 (1.00-1.53)	1.54 (1.21-1.97)	1.78 (1.37-2.33)	2.03 (1.53-2.72)	2.30 (1.69-3.17)	2.68 (1.88-3.84)	2.98 (2.03-4.42)
12-hr	0.743 (0.612-0.912)	0.988 (0.813-1.21)	1.32 (1.08-1.62)	1.59 (1.30-1.98)	1.98 (1.56-2.53)	2.28 (1.76-2.98)	2.59 (1.95-3.48)	2.92 (2.14-4.03)	3.38 (2.38-4.86)	3.75 (2.55-5.56)
24-hr	0.974 (0.864-1.12)	1.31 (1.16-1.51)	1.76 (1.56-2.04)	2.14 (1.87-2.49)	2.65 (2.25-3.20)	3.06 (2.54-3.76)	3.47 (2.81-4.38)	3.91 (3.08-5.06)	4.51 (3.41-6.08)	4.98 (3.64-6.96)
2-day	1.15 (1.02-1.32)	1.58 (1.40-1.81)	2.14 (1.89-2.47)	2.60 (2.28-3.03)	3.24 (2.75-3.90)	3.74 (3.10-4.59)	4.24 (3.44-5.35)	4.78 (3.76-6.18)	5.50 (4.16-7.43)	6.07 (4.44-8.48)
3-day	1.25 (1.11-1.44)	1.73 (1.53-1.99)	2.36 (2.08-2.73)	2.88 (2.52-3.35)	3.59 (3.04-4.32)	4.14 (3.44-5.10)	4.71 (3.82-5.94)	5.30 (4.18-6.87)	6.11 (4.62-8.25)	6.75 (4.93-9.43)
4-day	1.32 (1.17-1.52)	1.84 (1.63-2.11)	2.52 (2.22-2.90)	3.07 (2.69-3.58)	3.83 (3.25-4.61)	4.42 (3.67-5.44)	5.03 (4.07-6.33)	5.66 (4.46-7.32)	6.52 (4.93-8.80)	7.19 (5.25-10.1)
7-day	1.44 (1.28-1.66)	1.99 (1.76-2.29)	2.71 (2.39-3.13)	3.31 (2.90-3.85)	4.12 (3.50-4.97)	4.76 (3.95-5.85)	5.42 (4.39-6.82)	6.10 (4.80-7.90)	7.03 (5.31-9.49)	7.76 (5.67-10.8)
10-day	1.53 (1.35-1.76)	2.09 (1.85-2.41)	2.85 (2.52-3.29)	3.48 (3.04-4.05)	4.34 (3.68-5.22)	5.01 (4.16-6.16)	5.71 (4.62-7.19)	6.43 (5.06-8.33)	7.43 (5.61-10.0)	8.21 (6.00-11.5)
20-day	1.75 (1.55-2.01)	2.41 (2.14-2.78)	3.30 (2.92-3.81)	4.04 (3.54-4.71)	5.08 (4.30-6.11)	5.89 (4.89-7.24)	6.73 (5.46-8.48)	7.62 (6.00-9.86)	8.84 (6.68-11.9)	9.81 (7.16-13.7)
30-day	1.98 (1.75-2.28)	2.73 (2.42-3.15)	3.76 (3.33-4.35)	4.63 (4.06-5.39)	5.85 (4.96-7.04)	6.81 (5.65-8.37)	7.81 (6.33-9.84)	8.87 (6.99-11.5)	10.3 (7.81-14.0)	11.5 (8.40-16.1)
45-day	2.32 (2.06-2.67)	3.22 (2.85-3.71)	4.46 (3.94-5.15)	5.51 (4.82-6.41)	7.00 (5.93-8.43)	8.20 (6.81-10.1)	9.45 (7.66-11.9)	10.8 (8.50-14.0)	12.6 (9.56-17.1)	14.1 (10.3-19.8)
60-day	2.55 (2.26-2.93)	3.53 (3.12-4.06)	4.88 (4.32-5.64)	6.05 (5.30-7.04)	7.72 (6.54-9.29)	9.08 (7.53-11.2)	10.5 (8.51-13.2)	12.0 (9.48-15.6)	14.2 (10.7-19.2)	16.0 (11.7-22.3)

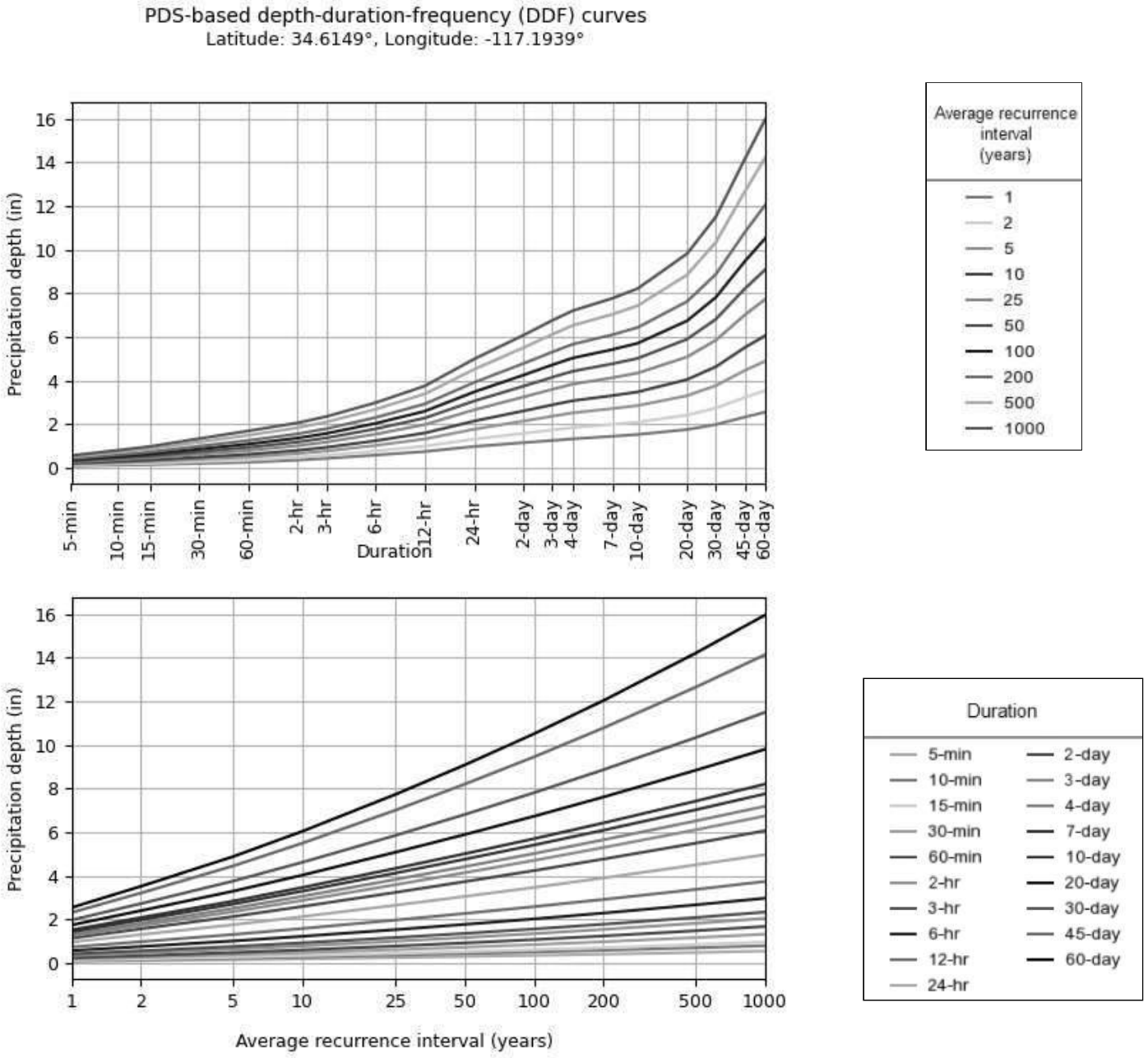
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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.

Back to Top

PF graphical



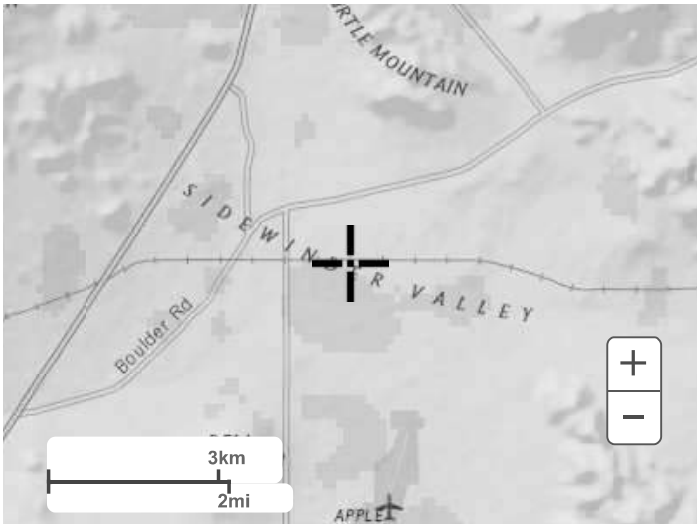
NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Tue Sep 19 23:38:28 2023

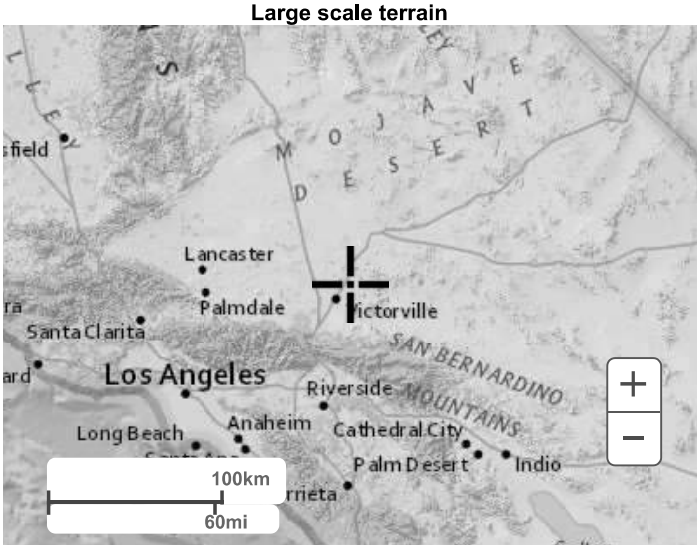
Back to Top

Maps & aerials

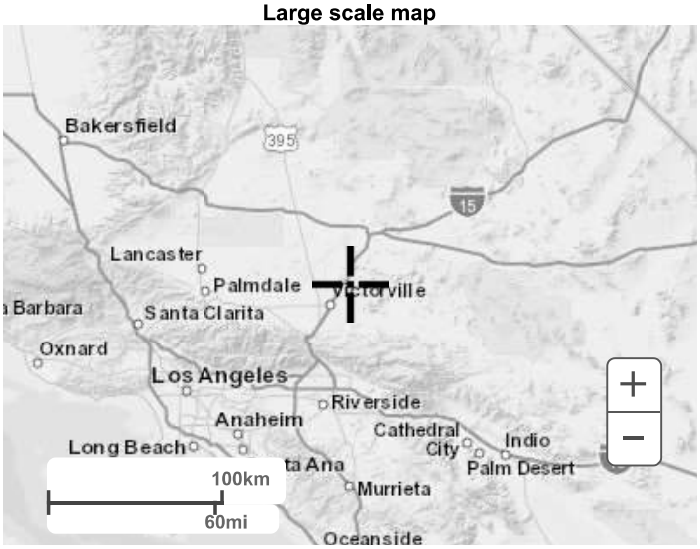
Small scale terrain



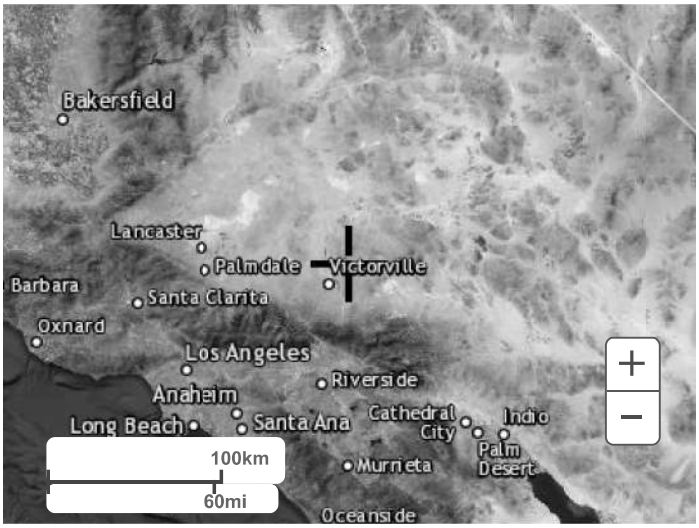
Large scale terrain



Large scale map



Large scale aerial

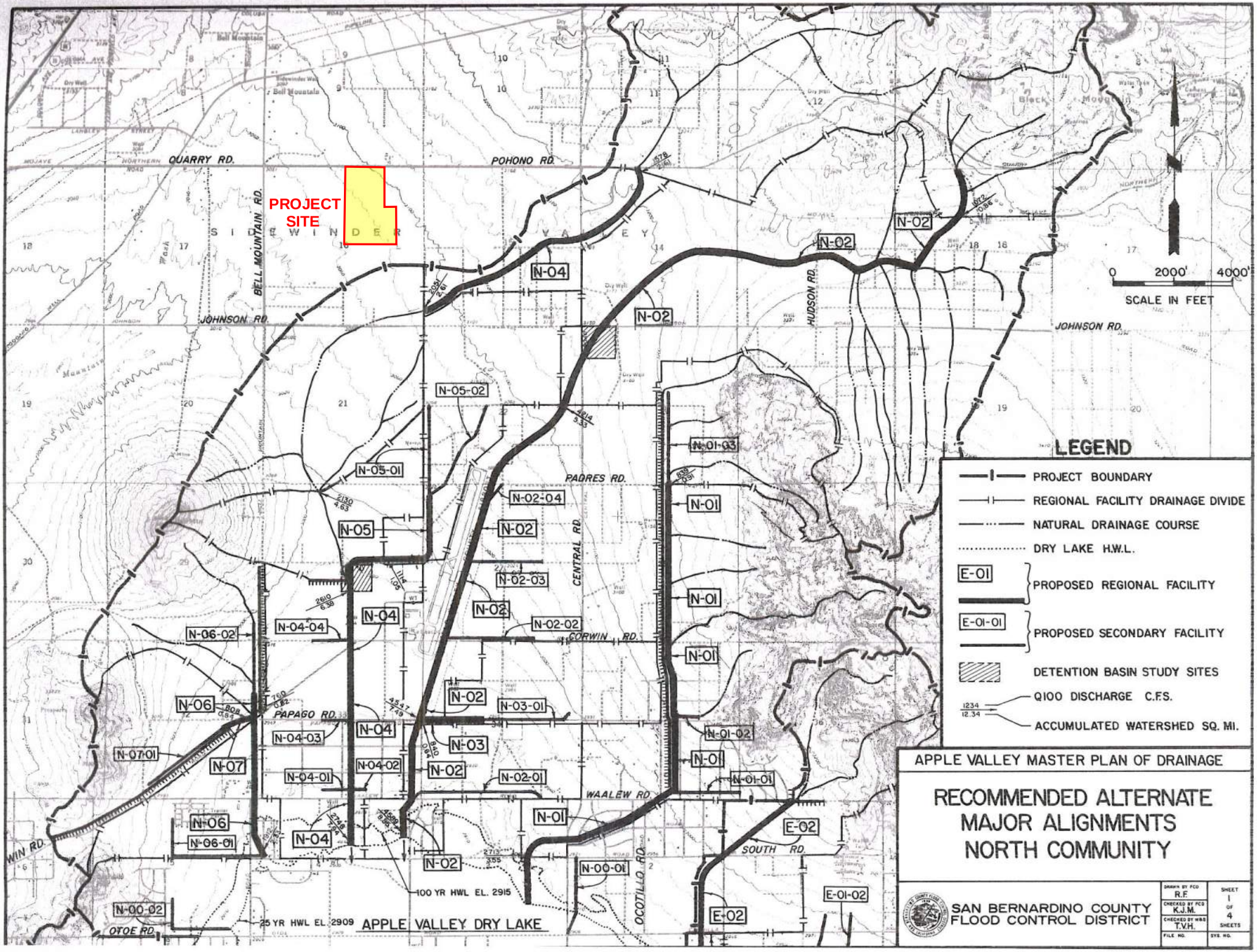


Back to Top

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

TOWN OF APPLE VALLEY

MASTER PLAN OF DRAINAGE MAP


PROJECT SITE
QUARRY RD.
POHONO RD.
JOHNSON RD.
BELL MOUNTAIN RD.
HUDSON RD.
PADRES RD.
CENTRAL RD.
CORWIN RD.
PAPAGO RD.
WAALEW RD.
SOUTH RD.
OCOTILLO RD.
OTOE RD.
APPLE VALLEY DRY LAKE
100 YR HWL EL. 2915
25 YR HWL EL. 2909
SIDEWINDER VALLEY
0 2000' 4000'
SCALE IN FEET
LEGEND
PROJECT BOUNDARY
REGIONAL FACILITY DRAINAGE DIVIDE
NATURAL DRAINAGE COURSE
DRY LAKE H.W.L.
E-01 PROPOSED REGIONAL FACILITY
E-01-01 PROPOSED SECONDARY FACILITY
DETENTION BASIN STUDY SITES
Q100 DISCHARGE C.F.S.
ACCUMULATED WATERSHED SQ. MI.
APPLE VALLEY MASTER PLAN OF DRAINAGE
RECOMMENDED ALTERNATE MAJOR ALIGNMENTS NORTH COMMUNITY
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
DRAWN BY FCD R.F.
CHECKED BY FCD K.J.M.
CHECKED BY W&S T.V.H.
FILE NO.
SHEET 1 OF 4 SHEETS
SYS. NO.