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SAKE ENGINEERS, INC.

Engineering - Surveying - Land Development

400 S. Ramona Ave. Suite 202, Corona, CA 92879

Tel (951) 279-4041 Fax (951) 279-2830

PRELIMINARY HYDROLOGY AND HYDRAULIC REPORT

For

GLEN HELEN GAS STATION
SOUTH OF INTERSECTION OF
GLEN HELEN PAKWY
AND CAJON BLVD
SAN BERNARDINO, CA 92410

APN 0349-182-11

DRNSTY-2022-00077

Prepared For:

HENRY OLIVER
951-232-4378
4370 HALLMARK PRKWY, SUITE 101
SAN BERNARDINO, CA 92407

DECEMBER 2023
Job No. 3432

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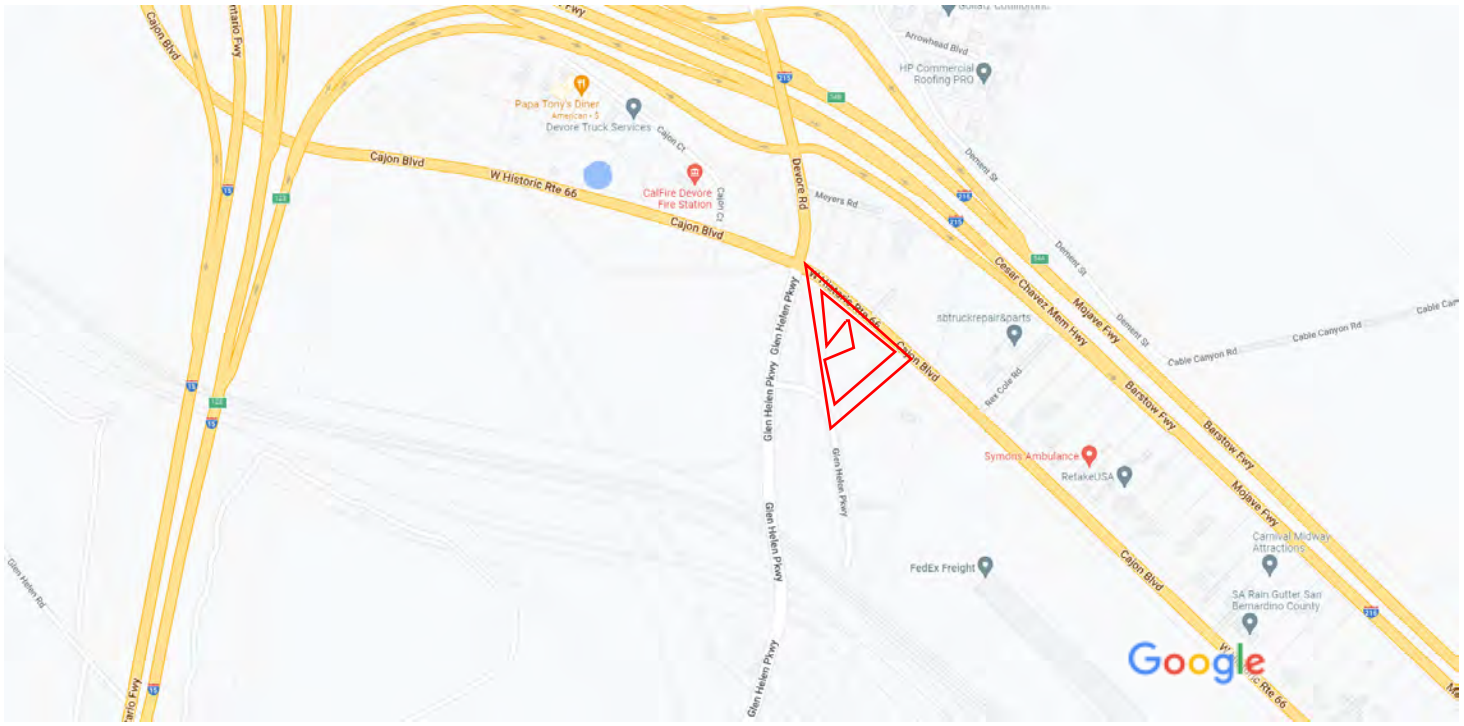
Firmette Map
Rainfall from NOAA Atlas 14
Soil Type : GIS SOIL A
Storm Tech Calculations
Hydrology Map - Pre Development
Hydrology Map - Post Development

Google Maps

Glen Helen Pkwy

GLEN HELEN PKWY GAS STATION JN3432



Map data ©2022 200 ft

Glen Helen Pkwy

San Bernardino, CA

Directions Save Nearby Send to phone Share

INTRODUCTION

The purpose of this preliminary report is to document hydrology and hydraulic calculations for the construction of Glen Helen Gas Station located near Devore Junction South of the intersection of Glen Helen Parkway and Cajon Blvd.
(APN 0349-182-11)
This parcel has an area of 1.6 acre.
San Bernardino County Flood Control District criteria as documented in Hydrology Design Manual dated April 1986 has been used for these calculations.

FEMA Flood Zone Designation for the project : See Attached Firmette

PRE-DEVELOPMENT

The existing site is relatively flat with highest elevation of 2045 at the North end of the site and 2031 at the East side of the site at Cajon Blvd. The storm runoff sheet flows towards East. There are small area of improvements on site. There are no offsite areas draining to the project site.

POST-DEVELOPEMENT

The proposed development is a gas station with a convenience store and drive thru restaurant and the associated facilities and parking areas, with impervious areas covering 80% of the site. Storm runoff flows away from structures and thru vee gutters towards the East corner, perpetuating the existing drainage pattern. There are no offsite areas tributary to the project site.

PEAK RUNOFF (CFS)

	EXISTING					DEVELPED			
AREA	Q_2	Q_{10}	Q_{25}	Q_{100}	% PERVS	Q_2	Q_{10}	Q_{100}	% PERV
1.6 ac	2.3	5.1	6.5	8.8	85%	4.7	8.1	12.7	20%
PEAK Q100 AFTER DETENTION								5.8	

UNIT HYDRPGRAPH

2 Yr Pre UH	2 Yr Post UH
V=0.1059	V=0.4855
Delta V= 0.3796 16,535 Cf	

STORM VOLUME CALCULATIONS

Synthetic Unit Hydrograph Method is used to calculate storm volume for respective return period and duration. Time of concentration (TC) from rational method is used to calculate lag time as 0.8 times TC.

Hydromod calculations compare pre and post development unit hydrographs, showing a volume of 0.3796 ac-ft or 16,535 cf additional volume after development. The on site detention/infiltration basins have a total volume of 16,586 cf. (Please see WQMP report)

As required by the county, the 100 yr storm peak for post development condition after flood routing thru the basin is calculated and is shown to be less than 90% of the pre development 25 yr storm peak.
Pre Development 25 yr storm Peak Q = 6.5 cfs (90% = 5.85 cfs)
Post Development 100 yr storm Peak Q = 12.7 cfs (After detention basin routing 5.7 cfs),

FLOOD ROUTING THRU STORM TECH

Flood routing calculations are used to show the result of routing 100 yr post development hydrograph thru flow thru detention basin.

SOIL

The hydrological soil group for this region of study was identified as type "A" on the GIS info for the site.

RAIN FALL

Rainfall precipitation are derived from NOAA Atlas 14 for Devore area.

METHODOLOGY

Rational Method hydrology analysis was prepared in accordance with San Bernardino County Hydrology Manual criteria 1986.

SOFTWARE

CivilCADD/CivilDesign software was used for Rational Method hydrology.

Rational Method

Pre-Development

for

2Year Storm
10Year Storm
25Year Storm
100Year Storm

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-1999 Version 6.2
Rational Hydrology Study Date: 06/11/22

Sake Consulting Engineers, inc., Corona, CA - S/N 4084

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.928 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 1

++
Process from Point/Station 1.000 to Point/Station 2.000
**** 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 = 450.000(Ft.)
Top (of initial area) elevation = 45.000(Ft.)
Bottom (of initial area) elevation = 31.000(Ft.)
Difference in elevation = 14.000(Ft.)
Slope = 0.03111 s(%)= 3.11
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.102 min.
Rainfall intensity = 2.425(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.588
Subarea runoff = 2.283(CFS)
Total initial stream area = 1.600(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.840(In/Hr)
End of computations, Total Study Area = 1.60 (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) 1989-1999 Version 6.2
Rational Hydrology Study Date: 06/11/22

Sake Consulting Engineers, inc., Corona, CA - S/N 4084

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 1.580 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 1.000 to Point/Station 2.000
**** 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
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 450.000(Ft.)
Top (of initial area) elevation = 45.000(Ft.)
Bottom (of initial area) elevation = 31.000(Ft.)
Difference in elevation = 14.000(Ft.)
Slope = 0.03111 s(%)= 3.11
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.102 min.
Rainfall intensity = 4.129(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.774
Subarea runoff = 5.113(CFS)
Total initial stream area = 1.600(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.578(In/Hr)
End of computations, Total Study Area = 1.60 (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) 1989-1999 Version 6.2
      Rational Hydrology Study        Date: 06/20/22
--------------------------------------------------------------------------
Sake Consulting Engineers, inc., Corona, CA     - S/N  4084
--------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

--------------------------------------------------------------------------
Rational hydrology study storm event year is    25.0
Computed rainfall intensity:
Storm year =    25.00   1 hour rainfall =     1.940 (In.)
Slope used for rainfall intensity curve b =  0.6000
Soil antecedent moisture condition (AMC) = 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** 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
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Initial subarea data:
Initial area flow distance =   450.000(Ft.)
Top (of initial area) elevation =    45.000(Ft.)
Bottom (of initial area) elevation =    31.000(Ft.)
Difference in elevation =    14.000(Ft.)
Slope =    0.03111  s(%)=       3.11
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.102 min.
Rainfall intensity =      5.070(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.797
Subarea runoff =      6.467(CFS)
Total initial stream area =        1.600(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)
End of computations, Total Study Area =            1.60 (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) 1989-1999 Version 6.2
Rational Hydrology Study Date: 06/11/22

Sake Consulting Engineers, inc., Corona, CA - S/N 4084

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 2.450 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++
Process from Point/Station 1.000 to Point/Station 2.000
**** 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 3 = 84.60
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.290(In/Hr)
Initial subarea data:
Initial area flow distance = 450.000(Ft.)
Top (of initial area) elevation = 45.000(Ft.)
Bottom (of initial area) elevation = 31.000(Ft.)
Difference in elevation = 14.000(Ft.)
Slope = 0.03111 s(%)= 3.11
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.102 min.
Rainfall intensity = 6.402(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.859
Subarea runoff = 8.802(CFS)
Total initial stream area = 1.600(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.290(In/Hr)
End of computations, Total Study Area = 1.60 (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

Rational Method

Post-Development

for

2Year Storm
10Year Storm
100Year Storm

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-1999 Version 6.2
Rational Hydrology Study Date: 06/11/22

Sake Consulting Engineers, inc., Corona, CA - S/N 4084

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.928 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 1

++
Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
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) = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.100(In/Hr)
Initial subarea data:
Initial area flow distance = 450.000(Ft.)
Top (of initial area) elevation = 45.000(Ft.)
Bottom (of initial area) elevation = 31.000(Ft.)
Difference in elevation = 14.000(Ft.)
Slope = 0.03111 s(%)= 3.11
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.008 min.
Rainfall intensity = 3.366(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.873
Subarea runoff = 4.703(CFS)
Total initial stream area = 1.600(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.100(In/Hr)
End of computations, Total Study Area = 1.60 (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) = 0.100
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-1999 Version 6.2
Rational Hydrology Study Date: 06/11/22

Sake Consulting Engineers, inc., Corona, CA - S/N 4084

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 1.580 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
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) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 450.000(Ft.)
Top (of initial area) elevation = 45.000(Ft.)
Bottom (of initial area) elevation = 31.000(Ft.)
Difference in elevation = 14.000(Ft.)
Slope = 0.03111 s(%)= 3.11
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.008 min.
Rainfall intensity = 5.731(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.885
Subarea runoff = 8.111(CFS)
Total initial stream area = 1.600(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)
End of computations, Total Study Area = 1.60 (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) = 0.100
Area averaged SCS curve number = 32.0

```
            San Bernardino County Rational Hydrology Program

                 (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-1999 Version 6.2
      Rational Hydrology Study        Date: 06/11/22
--------------------------------------------------------------------------
Sake Consulting Engineers, inc., Corona, CA     - S/N  4084
--------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

--------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
Computed rainfall intensity:
Storm year =   100.00   1 hour rainfall =     2.450 (In.)
Slope used for rainfall intensity curve b =  0.6000
Soil antecedent moisture condition (AMC) = 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** INITIAL AREA EVALUATION ****
__________________________________________________________________________
COMMERCIAL subarea type
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)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   450.000(Ft.)
Top (of initial area) elevation =    45.000(Ft.)
Bottom (of initial area) elevation =    31.000(Ft.)
Difference in elevation =    14.000(Ft.)
Slope =    0.03111  s(%)=       3.11
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.008 min.
Rainfall intensity =      8.886(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.892
Subarea runoff =     12.683(CFS)
Total initial stream area =        1.600(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)
End of computations, Total Study Area =            1.60 (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) = 0.100
Area averaged SCS curve number =  32.0
```

EXHIBITS:

SOIL MAP GIS

RAIN FALL NOAA ATLAS 14

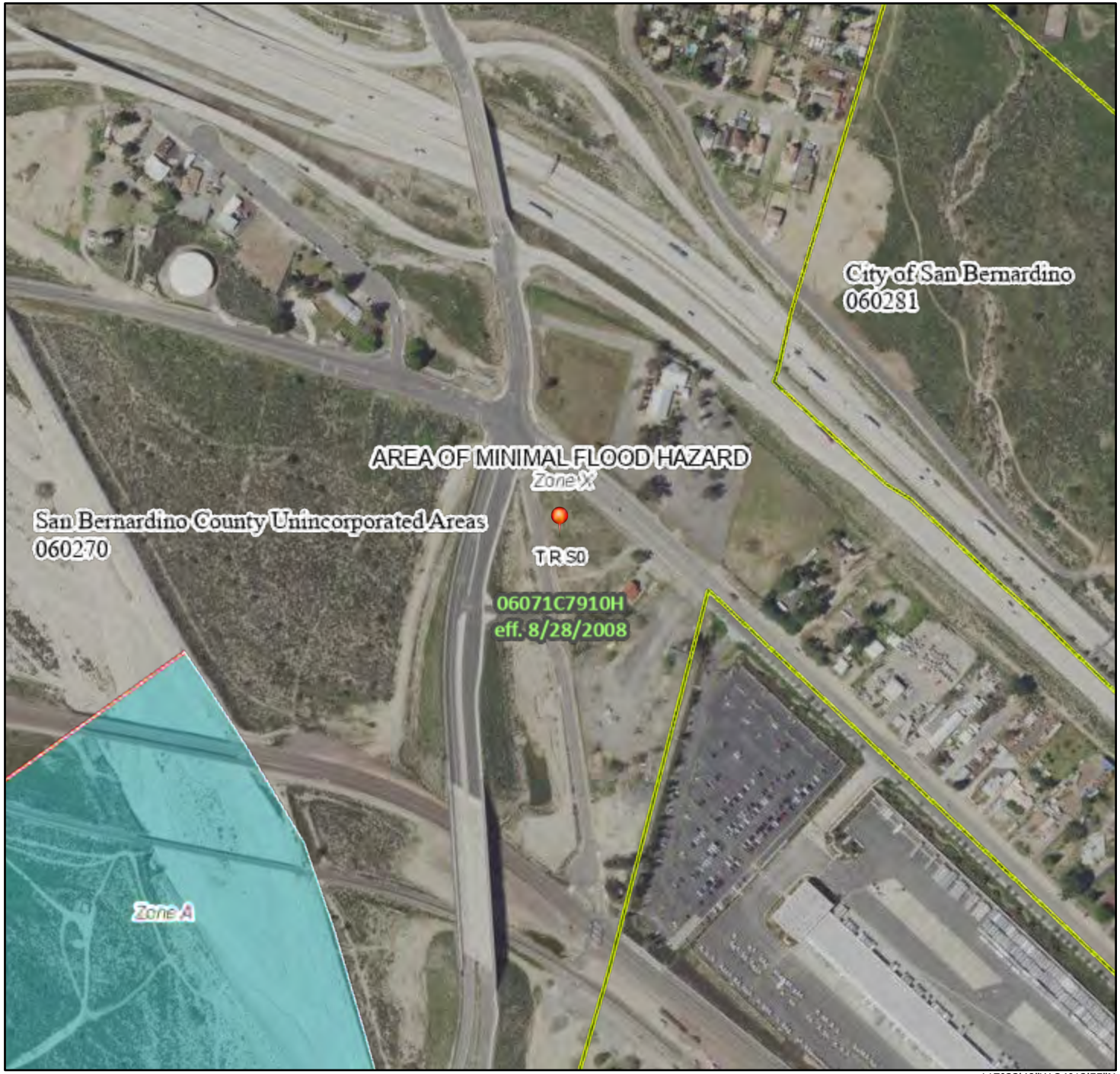
Hydrology Map for Pre Developed Condition

Hydrology Map for Post Developed Condition

National Flood Hazard Layer FIRMette

FEMA

117°24'26"W 34°13'25"N



0 250 500 1,000 1,500 2,000 Feet

1:6,000

117°23'48"W 34°12'55"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/16/2023 at 6:53 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Soil Map—San Bernardino County Southwestern Part, California

Map Scale: 1:727 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 35 70 140 210

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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 Southwestern Part, California
Survey Area Data: Version 15, Aug 30, 2023

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
SpC	Soboba stony loamy sand, 2 to 9 percent slopes	1.4	100.0%
Totals for Area of Interest		**1.4**	**100.0%**

CALIFORNIA DEPARTMENT OF
WATER RESOURCES

Floodplain Information

Latitude: 34.21918, Longitude: -117.40214

County: San Bernardino (34.21918, -117.40214)

Floodplain Layer	100-YR	200-YR	500-YR
FEMA Effective	N	N/A	N
DWR Awareness	N	N/A	N/A
Regional/Special Studies	N	N/A	N
USACE Comp. Study	N	N	N

Y: The location is within the floodplain
N: The location is not within the floodplain
N/A: Data not available
✓ = Active Layer(s)

Floodplains are displayed using semi transparent colors. When viewing overlapping floodplains, the combination of multiple semi transparent colors will not match the legend colors. For accurate color representation, view floodplains individually.

No legend

WQMP Project Report

County of San Bernardino Stormwater Program

Santa Ana River Watershed Geodatabase

Thursday, May 12, 2022

Note: The information provided in this report and on the Stormwater Geodatabase for the County of San Bernardino Stormwater Program is intended to provide basic guidance in the preparation of the applicant's Water Quality Management Plan (WQMP) and should not be relied upon without independent verification.

Project Site Parcel Number(s):	034918206
Project Site Acreage:	1.397
HCOC Exempt Area:	No
Closest Receiving Waters: (Applicant to verify based on local drainage facilities and topography.)	**System Number** - 208 **Facility Name** - Lower Devore Levee, COE **Owner** - SBCFCD
Closest channel segment's susceptibility to Hydromodification:	EHM
Highest downstream hydromodification susceptibility:	High
Is this drainage segment subject to TMDLs?	No
Are there downstream drainage segments subject to TMDLs?	No
Is this drainage segment a 303d listed stream?	No
Are there 303d listed streams downstream?	Yes
Are there unlined downstream waterbodies?	No
Project Site Onsite Soil Group(s):	A
Environmentally Sensitive Areas within 200':	SAN BERNARDINO KANGAROO RAT,Riversidian Alluvial Sage Scru
Groundwater Depth (FT):	-148
Parcels with potential septic tanks within 1000':	No
Known Groundwater Contamination Plumes within 1000':	No
Studies and Reports Related to Project Site:	Devore Drainage Tokay Hill to Blue Cut Preliminary Report on Proposed North SBFCP

NOAA Atlas 14, Volume 6, Version 2
Location name: San Bernardino, California, USA*
Latitude: 34.2194°, Longitude: -117.4017°
Elevation: 2040.01 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	0.157 (0.130-0.191)	0.232 (0.192-0.282)	0.324 (0.268-0.395)	0.394 (0.323-0.485)	0.484 (0.384-0.617)	0.549 (0.427-0.715)	0.613 (0.464-0.817)	0.675 (0.497-0.926)	0.754 (0.532-1.08)	0.813 (0.554-1.21)
10-min	0.225 (0.187-0.273)	0.332 (0.276-0.404)	0.464 (0.384-0.566)	0.565 (0.464-0.695)	0.694 (0.550-0.884)	0.788 (0.611-1.02)	0.878 (0.665-1.17)	0.967 (0.712-1.33)	1.08 (0.763-1.55)	1.17 (0.794-1.73)
15-min	0.272 (0.226-0.330)	0.402 (0.333-0.489)	0.561 (0.464-0.684)	0.683 (0.561-0.841)	0.839 (0.666-1.07)	0.952 (0.739-1.24)	1.06 (0.804-1.42)	1.17 (0.861-1.61)	1.31 (0.922-1.87)	1.41 (0.960-2.09)
30-min	0.410 (0.341-0.498)	0.606 (0.503-0.738)	0.846 (0.700-1.03)	1.03 (0.846-1.27)	1.27 (1.00-1.61)	1.44 (1.12-1.87)	1.60 (1.21-2.14)	1.77 (1.30-2.42)	1.97 (1.39-2.83)	2.13 (1.45-3.16)
60-min	0.628 (0.522-0.763)	0.928 (0.770-1.13)	1.30 (1.07-1.58)	1.58 (1.30-1.94)	1.94 (1.54-2.47)	2.20 (1.71-2.86)	2.45 (1.86-3.27)	2.70 (1.99-3.71)	3.02 (2.13-4.33)	3.26 (2.22-4.83)
2-hr	0.991 (0.823-1.20)	1.36 (1.13-1.65)	1.81 (1.50-2.21)	2.15 (1.77-2.65)	2.60 (2.06-3.31)	2.92 (2.27-3.81)	3.24 (2.45-4.32)	3.55 (2.61-4.87)	3.94 (2.78-5.65)	4.23 (2.88-6.28)
3-hr	1.30 (1.08-1.57)	1.72 (1.43-2.10)	2.25 (1.86-2.75)	2.66 (2.18-3.27)	3.18 (2.53-4.05)	3.57 (2.77-4.64)	3.94 (2.98-5.25)	4.30 (3.16-5.90)	4.77 (3.36-6.83)	5.11 (3.48-7.58)
6-hr	1.96 (1.63-2.38)	2.53 (2.10-3.08)	3.25 (2.69-3.96)	3.80 (3.12-4.68)	4.52 (3.58-5.75)	5.04 (3.91-6.55)	5.54 (4.20-7.39)	6.04 (4.44-8.29)	6.68 (4.71-9.56)	7.14 (4.86-10.6)
12-hr	2.65 (2.21-3.23)	3.44 (2.85-4.18)	4.41 (3.65-5.38)	5.16 (4.24-6.35)	6.14 (4.87-7.82)	6.85 (5.32-8.91)	7.54 (5.71-10.1)	8.22 (6.05-11.3)	9.09 (6.41-13.0)	9.73 (6.62-14.4)
24-hr	3.55 (3.14-4.09)	4.68 (4.14-5.40)	6.09 (5.38-7.04)	7.19 (6.30-8.39)	8.62 (7.30-10.4)	9.66 (8.02-11.9)	10.7 (8.65-13.5)	11.7 (9.21-15.1)	13.0 (9.82-17.5)	13.9 (10.2-19.5)
2-day	4.34 (3.84-4.99)	5.87 (5.20-6.78)	7.82 (6.90-9.04)	9.35 (8.19-10.9)	11.4 (9.63-13.7)	12.9 (10.7-15.8)	14.3 (11.6-18.1)	15.8 (12.5-20.5)	17.7 (13.4-23.9)	19.2 (14.0-26.8)
3-day	4.62 (4.09-5.32)	6.39 (5.65-7.37)	8.65 (7.63-10.0)	10.4 (9.15-12.2)	12.8 (10.9-15.5)	14.6 (12.1-18.0)	16.4 (13.3-20.7)	18.2 (14.4-23.6)	20.6 (15.6-27.8)	22.4 (16.4-31.3)
4-day	4.94 (4.38-5.69)	6.94 (6.14-8.00)	9.50 (8.39-11.0)	11.6 (10.1-13.5)	14.3 (12.1-17.2)	16.4 (13.6-20.2)	18.5 (15.0-23.3)	20.6 (16.2-26.7)	23.5 (17.7-31.6)	25.6 (18.7-35.8)
7-day	5.37 (4.76-6.19)	7.78 (6.88-8.97)	10.9 (9.63-12.6)	13.5 (11.8-15.7)	16.9 (14.3-20.3)	19.5 (16.2-24.0)	22.2 (18.0-28.0)	24.9 (19.6-32.3)	28.6 (21.7-38.6)	31.5 (23.0-43.9)
10-day	5.85 (5.18-6.74)	8.61 (7.62-9.93)	12.2 (10.8-14.1)	15.2 (13.3-17.7)	19.3 (16.3-23.2)	22.4 (18.6-27.5)	25.6 (20.7-32.2)	28.9 (22.8-37.5)	33.5 (25.3-45.1)	37.0 (27.0-51.6)
20-day	6.97 (6.18-8.03)	10.5 (9.25-12.1)	15.1 (13.4-17.5)	19.1 (16.7-22.2)	24.6 (20.8-29.6)	28.9 (24.0-35.6)	33.5 (27.1-42.2)	38.3 (30.2-49.6)	45.0 (34.0-60.7)	50.4 (36.8-70.3)
30-day	8.20 (7.26-9.45)	12.2 (10.8-14.1)	17.8 (15.7-20.6)	22.5 (19.7-26.3)	29.3 (24.8-35.2)	34.7 (28.8-42.6)	40.4 (32.7-50.9)	46.6 (36.7-60.3)	55.3 (41.8-74.6)	62.4 (45.6-87.1)
45-day	10.1 (8.93-11.6)	14.7 (13.0-17.0)	21.3 (18.8-24.6)	27.0 (23.6-31.4)	35.2 (29.8-42.4)	42.0 (34.8-51.6)	49.2 (39.9-62.0)	57.2 (45.1-74.0)	68.7 (51.9-92.7)	78.2 (57.2-109)
60-day	12.0 (10.6-13.8)	17.1 (15.1-19.7)	24.4 (21.5-28.2)	30.8 (26.9-35.9)	40.2 (34.1-48.5)	48.1 (39.9-59.2)	56.7 (46.0-71.5)	66.2 (52.2-85.8)	80.2 (60.7-108)	92.0 (67.3-128)

[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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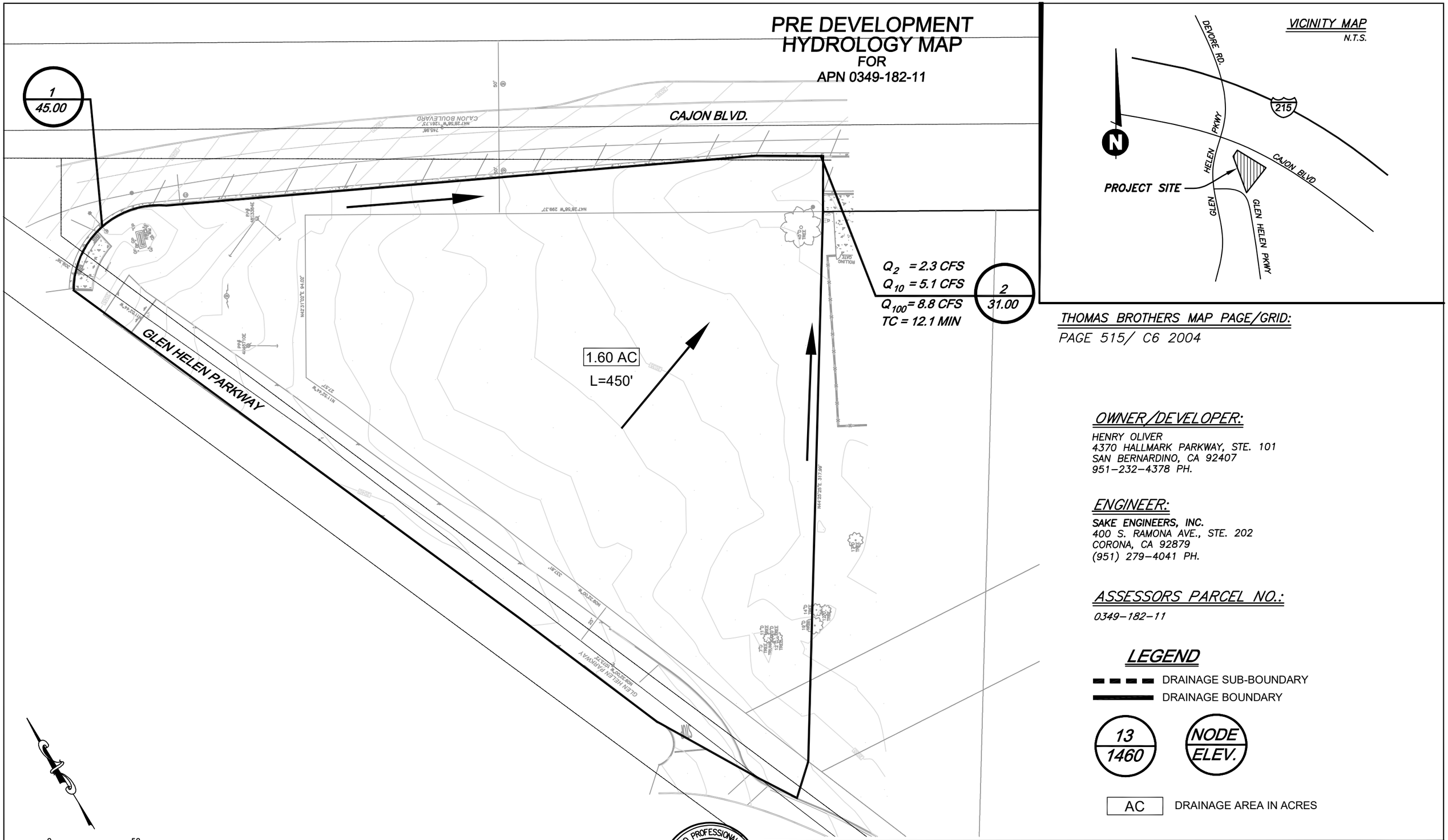
PF graphical

PRE DEVELOPMENT HYDROLOGY MAP
FOR
APN 0349-182-11



THOMAS BROTHERS MAP PAGE/GRID:
PAGE 515/ C6 2004

OWNER/DEVELOPER:
HENRY OLIVER
4370 HALLMARK PARKWAY, STE. 101
SAN BERNARDINO, CA 92407
951-232-4378 PH.

ENGINEER:
SAKE ENGINEERS, INC.
400 S. RAMONA AVE., STE. 202
CORONA, CA 92879
(951) 279-4041 PH.

ASSESSORS PARCEL NO.:
0349-182-11

LEGEND
- DRAINAGE SUB-BOUNDARY
- DRAINAGE BOUNDARY
- 13 / 1460 — NODE / ELEV.
- AC — DRAINAGE AREA IN ACRES

REGISTERED PROFESSIONAL ENGINEER
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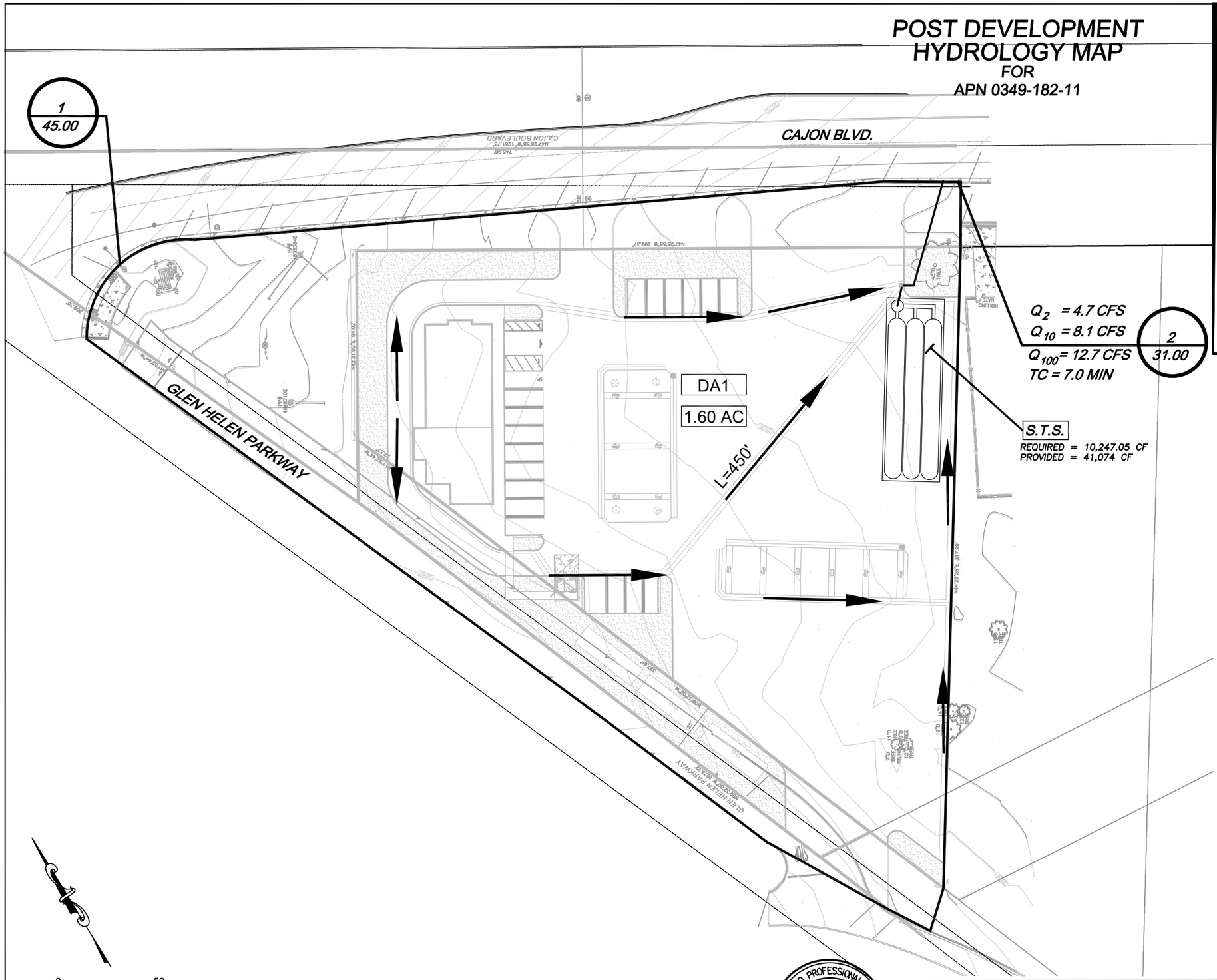
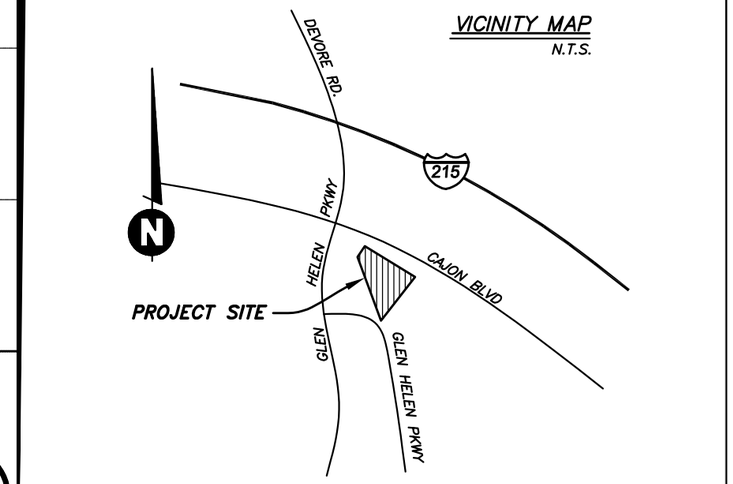
COUNTY OF SAN BERNARDINO
PRE DEVELOPMENT
HYDROLOGY MAP
FOR
APN 0349-182-11

DWG. NO.
XX-XXXX

Sh 1 of 1

POST DEVELOPMENT HYDROLOGY MAP
FOR
APN 0349-182-11





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COUNTY OF SAN BERNARDINO
POST DEVELOPMENT
HYDROLOGY MAP
FOR
APN 0349-182-11

DWG. NO. XX-XXXX

Sh 1 of 1

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