Appendix E
Drainage Study

Preliminary Drainage Study
for
Pacific

Prepared: January 24, 2023

PREPARED FOR

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Lundstrom
Engineering and Surveying, Inc.

Declaration of Responsible Charge

I hereby declare that I am the engineer of work for this project. That I have exercised responsible charge over the design of the project as defined in Section 6703 of the business and professions code, and that the design is consistent with current standards.

I understand that the check of project drawings and specifications by the City of San Marcos is confined to a review only and does not relieve me, as engineer of work, of my responsibilities for project design.

William Lundstrom
Registered Civil Engineer 61630
Exp. Date: 06/30/23

01/24/2023
Date

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Introduction

Purpose and Scope

The City's application process requires a hydrology/ drainage study on all properties at the time of application. This study provides the needed information to ensure that any drainage facilities proposed in the future are sized and located appropriately and will accommodate any future development.

The study reviews storm runoff under existing conditions (100 year event) and identifies existing drainage problems that may be caused, or aggravated, by future development. The study is further used to determine impacts that might be caused downstream (erosion) and to identify proposed mitigation measures.

Section 1. Property Information

1.1.Property Description

1.1.1 Property Location

The subject property is located at the northwestern corner of Linda Vista Drive and Las Posas Road in the city of San Marcos, CA. The property is bounded to the southwest by Linda Vista Rd, to the southeast by Las Posas Rd., to the northeast by La Mirada Dr., and to the northwest by Pacific St. **Exhibit A** provides a location map for the site.

1.1.2 Property Activities Description

The project is the development of Pacific, located at the northwest corner of Las Posas Road and Linda Vista Drive, comprised of APN's 219-222-01, 219-222-02, 219-222-03, and 219-222-04. the project proposed the development of approximately 449 residential units, including a mix of five story podium apartments, three story rowhomes, three story villas, and four story affordable flats on approximately 17.9 acres within the 33.2 acre project site. The project proposes a general plan amendment, rezone, specific plan, tentative map, and multi-family site development plan.

1.2.Hydrologic Setting

This section summarizes the project’s size and location in the context of the larger watershed perspective, topography, soil and vegetation conditions, percent impervious area, natural and infrastructure drainage features, and other relevant hydrologic and environmental factors to be protected specific to the project area’s watershed.

1.2.1 Topography

The topography slopes southeasterly toward Las Posas Rd and Linda Vista Dr. Elevations on site range from 557.1 Mean Sea Level to 524.7 Mean Sea Level.

1.2.2 FEMA Flood Insurance Rate Map

The site is located in Zone X of the Flood Insurance Rate Map (FIRM) Panel 06073C0789H. Zone X is designated to be areas determined to be outside the 500-year floodplain. **Exhibit B** illustrates the project site within Flood Zone X.

1.2.3 Current and Adjacent Land Use

The 33.2 acre property is currently undeveloped. Adjacent land use is varied with shopping centers, light industrial, and recreation.

1.2.4 Soil and Vegetation Conditions

The majority of the property contains type D soils per USDA soils site. See Appendix A

1.2.5 Existing Drainage Patterns and Facilities (Narrative)

The majority of the site flows southeasterly toward the northwest corner of Linda Vista Drive and Las Posas Road. This drainage is collected in a CMP (corrugated meatal pipe) riser which drains to an 11'x7' RCB (reinforced concrete box) in Las Posas Rd. The remainder of the site surface drains to the surrounding streets. All surrounding streets drain via gutter flow to the same corner (Las Posas and Linda Vista) where runoff is collected by a pair of curb inlets which drain into the same 11'x7' RCB in Las Posas Rd. It is noted that some on-site run-off occurs from the property onto adjacent streets. The run-off is carried via the streets to the same RCB in Las Posas Road. There is no offsite run-on to the property.

1.2.6 Downstream Conditions

All site runoff leads to the RCB in Las Posas Rd.

1.3.Proposed Runoff Management Facilities

Any future development facilities for managing runoff from the site will include one or more of the following (examples listed below or equal):

- Biofiltration basins.
- Underground Storage

Per the preliminary geotechnical evaluation by GeoTek, Inc. No. 3649-SD dated January 2022, infiltration rates are 0.07 inches per hour so infiltration is not recommended. Treated runoff will follow the same drainage pattern as currently existing.

Section 2. Design Criteria and Methodology

This section summarizes the design criteria and methodology applied during drainage analysis of the property. The design criteria and methodology follow the County of San Diego County Hydrology Manual (June 2003), San Diego County Hydraulic Drainage Design Manual (September 2014), and Storm Water Standards as appropriate for the property location.

2.1.Hydrologic Design Methodology

2.1.1 Rational Method: Peak Flow

Runoff calculations for this study were accomplished using the Rational Method. The Rational Method is a physically-based numerical method where runoff is assumed to be directly proportional to rainfall and area, less losses for infiltration and depression storage. Flows were computed based on the Rational formula:

$$Q = C\,i\,A$$

where ... Q = Peak discharge (cfs);
C = runoff coefficient, based on land use and soil type;
i = rainfall intensity (in/hr);
A = watershed area (acre)

The runoff coefficient represents the ratio of rainfall that runs off the watershed versus the portion that infiltrates to the soil or is held in depression storage. The runoff coefficient is dependent on the land use coverage and soil type.

For a typical drainage study, rainfall intensity varies with the watershed time of concentration. The watershed time of concentration at any given point is defined as the time it would theoretically take runoff to travel from the most upstream point in the watershed to a concentration point, as calculated by equations in the San Diego County Hydrology Manual.

Table 2-1 Rational Method Runoff Coefficients.

		RUNOFF COEFFICIENT			
	(%)	Hydrologic Soil Type			
LAND USE (County Elements)	**Imperv.**	**A**	**B**	**C**	**D**
Permanent Open Space		0.20	0.25	0.30	0.35
Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Neighborhood Commercial	80	0.76	0.77	0.78	0.79
General Commercial	85	0.80	0.80	0.81	0.82
Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Limited Industrial	90	0.83	0.84	0.84	0.85
General Industrial	95	0.87	0.87	0.87	0.87

Rational Method calculations were accomplished using the Advanced Engineering Software Rational Method Analysis (Southern California County Methods) (AES-RATSCx) computer software packages. Peak discharges were computed for 100-year and 50-year storm return frequencies.

2.1.2 Time of Concentration

The Time of Concentration (T_c) is the time required for runoff to flow from the most remote part of the drainage area to the point of interest. The T_c is composed of two components: initial time of concentration (T_i) and the travel time (T_t). The T_i is the time required for runoff to travel across the surface of the most remote subarea in the study, or “initial subarea”. Guidelines for designation the initial subarea are provided within the discussion of computation of T_i. The T_i is the time required for the runoff to flow in a watercourse (e.g., swale, channel, gutter, pipe) or series of watercourses from the initial subarea to the point of interest. For the Rational Method, the T_c at any point within the drainage area is given by:

$$T_c = T_i + T_t$$

Methods of calculation differ for natural watersheds (nonurbanized) and for urban drainage systems. When analyzing storm drain systems, the designer must consider the possibility that an existing natural watershed may become urbanized during the useful life of the storm drain system. Future land uses must be used for T_c and runoff calculations, and can be determined from the local Community General Plan.

2.1.3 Initial Time of Concentration

The initial time of concentration is typically based on sheet flow at the upstream end of a drainage basin. The Overland Time of Flow is approximated by an equation developed by the Federal Aviation Agency (FAA) for analyzing flow on runways (FAA, 1970). The usual runway configuration consists of a crown, like most freeways, with sloping pavement that directs flow to either side of the runway. This type of flow is uniform in the direction perpendicular to the velocity and is very shallow. Since these depths are ¼ of an inch in magnitude, the relative roughness is high. Some higher relative roughness values for overland flow are presented in the *HEC-1 Flood Hydrograph Package User's Manual* (USACE, 1990).

The sheet flow that is predicted by the FAA equation is limited to conditions that are similar to runway topography. Some considerations that limit the extent to which the FAA equation applies are identified below:

- Urban Areas – This "runway type" runoff includes:
  - Flat roofs, sloping at 1% +/-
  - Parking lots at the extreme upstream drainage basin boundary (at the "ridge" of a catchment area.) Even a parking lot is limited in the amounts of sheet flow. Parked or moving vehicles would "break-up" the sheet flow, concentrating runoff into streams that are not characteristic of sheet flow.
  - Driveways are constructed at the upstream end of catchment areas in some developments. However, if flow from a roof is directed to a driveway through a downspout or other conveyance mechanism, flow would be concentrated.
  - Flat slopes are prone to meandering flow that tends to be disrupted by minor irregularities and obstructions. Maximum Overland Flow lengths are shorter for the flatter slopes.
- Rural or Natural Areas –The FAA equation is applicable to these conditions since (0.5% to 10%) slopes that are uniform in width of flow have slow velocities consistent with the equation. Irregularities in terrain limit the length of application.
  - Most hills and ridge lines have a relatively flat area near the drainage divide. However, with flat slopes of 0.5% +/-, minor irregularities would cause flow to concentrate into streams.
  - Parks, lawns and other vegetated areas would have slow velocities that are consistent with the FAA Equation.

The Initial Time of Concentration is reflective of the general land-use at the upstream end of a drainage basin.

2.1.4 Travel Time

The T_t is the time required for the runoff to flow in a watercourse or series of watercourses from the initial subarea to the point of interest. The T_t is computed by dividing the length of the flow path by the computed flow velocity. Since the velocity normally changes as a result of each change in flow rate or slope, such as at an inlet or grade break, the total T_t must be computed as the sum of the T_t's for each section of the flow path.

2.1.5 Rational Method: Runoff Volume

For designs that are dependent on the total storm volume, a hydrograph must be generated to account for the entire volume of runoff from the 6-hour storm event. The hydrograph for the entire 6-hour storm event is generated by creating a rainfall distribution consisting of blocks of rain, creating an incremental hydrograph for each block of rain, and adding the hydrographs from each block of rain. This process creates a hydrograph that contains runoff from all the blocks of rain and accounts for the entire volume of runoff from the 6-hour storm event. The total volume under the resulting hydrograph is equal to the following equation:

$$VOL = CP_6A$$

Where: VOL = volume of runoff (acres-inches)

P_6 = 6-hour rainfall (inches)

C = runoff coefficient

A = area of the watershed (acres)

Section 3. Characterization of Project Runoff

3.1.Hydrologic Effects of Project

Any future development will be designed such that it will not significantly alter drainage patterns on the site. Table 3-1 summarizes the hydrologic effects of the existing site.

Table 3-1 Summary of Hydrology Analysis.

EXISTING

NODE	TC (MIN.)	AREA (ACRES)	C	I100 (in/hr)	Q100 RUN-OFF (CFS)
DMA1	18.7	0.33	0.35	3.71	0.43
DMA2	18.7	0.70	0.35	3.71	0.91
DMA3	18.7	0.78	0.35	3.71	1.01
DMA4	18.7	4.32	0.35	3.71	5.61
DMA5	18.7	2.43	0.35	3.71	3.20
DMA6	18.7	24.05	0.35	3.71	31.36
DMA7	18.7	0.53	0.35	3.71	0.70
		TOTAL=33.1			TOTAL @ POC #1= 43.2 CFS

PROPOSED

NODE	TC (MIN.)	AREA (ACRES)	C	I100 (in/hr)	Q100 RUN-OFF (CFS)
DMA 1-3	10.7	13.3	0.79	5.74	60.3 (7.5 mitigated)
DMA 4	6.4	1.8	0.79	7.41	10.5 (0.9 mitigated)
DMA 6	18.7	17.9	0.35	3.71	23.3
		TOTAL=33.0			

TOTAL @ POC #1= 31.7 CFS

Section 4. Summary and Conclusions

This hydrology and hydraulic study has evaluated the potential effects of rainfall, runoff, and drainage on the property. In addition, the report has addressed the methodology used to analyze the pre-construction and to the parameters for post-construction condition, which was based on the San Diego County Hydrology and Design Manual. This section provides a summary discussion that evaluates the potential effects of any future proposed project.

- The proposed project will not substantially alter the existing drainage patterns on the site or area, including through the alteration of the existing drainage course, in which would not result in substantial erosion or siltation on- or off-site and not exceed the capacity of downstream storm drain.
- The proposed project does not place housing or structures within 100-year flood area in which would impede or redirect flows.
- The project will add new impervious area to the site, increasing unmitigated storm water runoff rates and volume from the existing condition. Proposed biofiltration basins and detention storage are sized to mitigate peak 100 year runoff rates.
- In my professional opinion, the proposed work and improvements, as they relate to this project, will not increase the flow rates or velocity of surface flows to the detriment of downstream landowners and/or facilities.

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TABLE OF EXHIBITS

Exhibit A Vicinity Map

Exhibit B FEMA FIRM Panel.

Exhibit C Existing Condition Hydrology Map

Exhibit D Proposed Condition Hydrology Map

E X H I B I T S

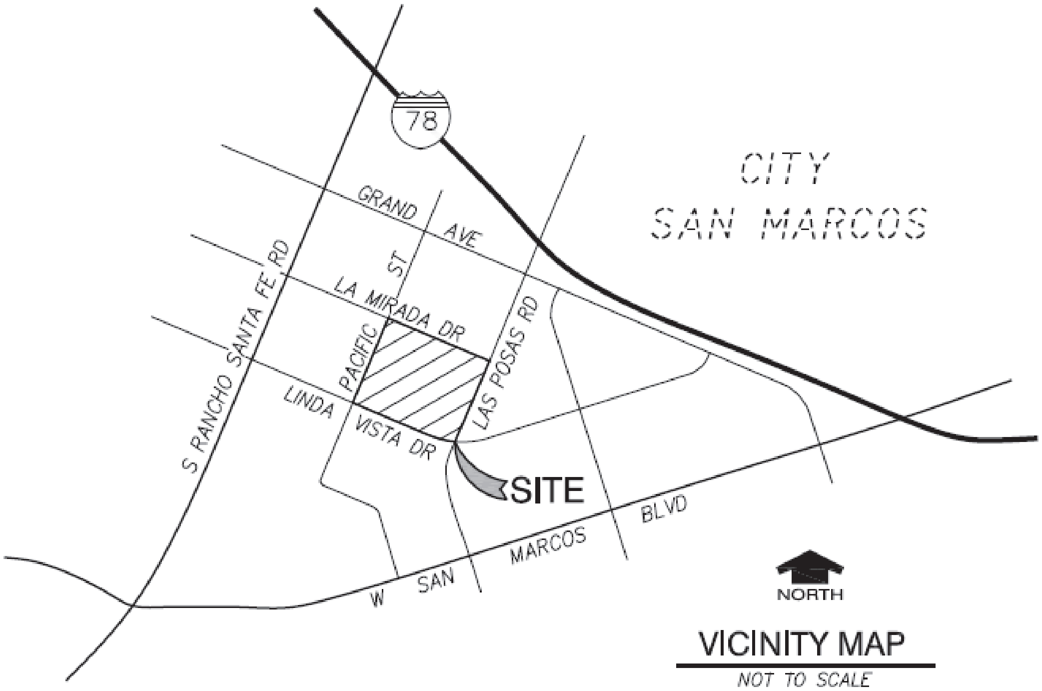

78
CITY
SAN MARCOS
GRAND AVE
ST
LA MIRADA DR
PACIFIC
LAS POSAS RD
S RANCHO SANTA FE RD
LINDA VISTA DR
SITE
BLVD
MARCOS
W SAN
NORTH
VICINITY MAP
NOT TO SCALE

Exhibit A

Exhibit B

FEMA FIRM Panel

National Flood Hazard Layer FIRMette

FEMA

117°12'6"W 33°8'37"N

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

1:6,000

117°11'28"W 33°8'7"N

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 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 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.

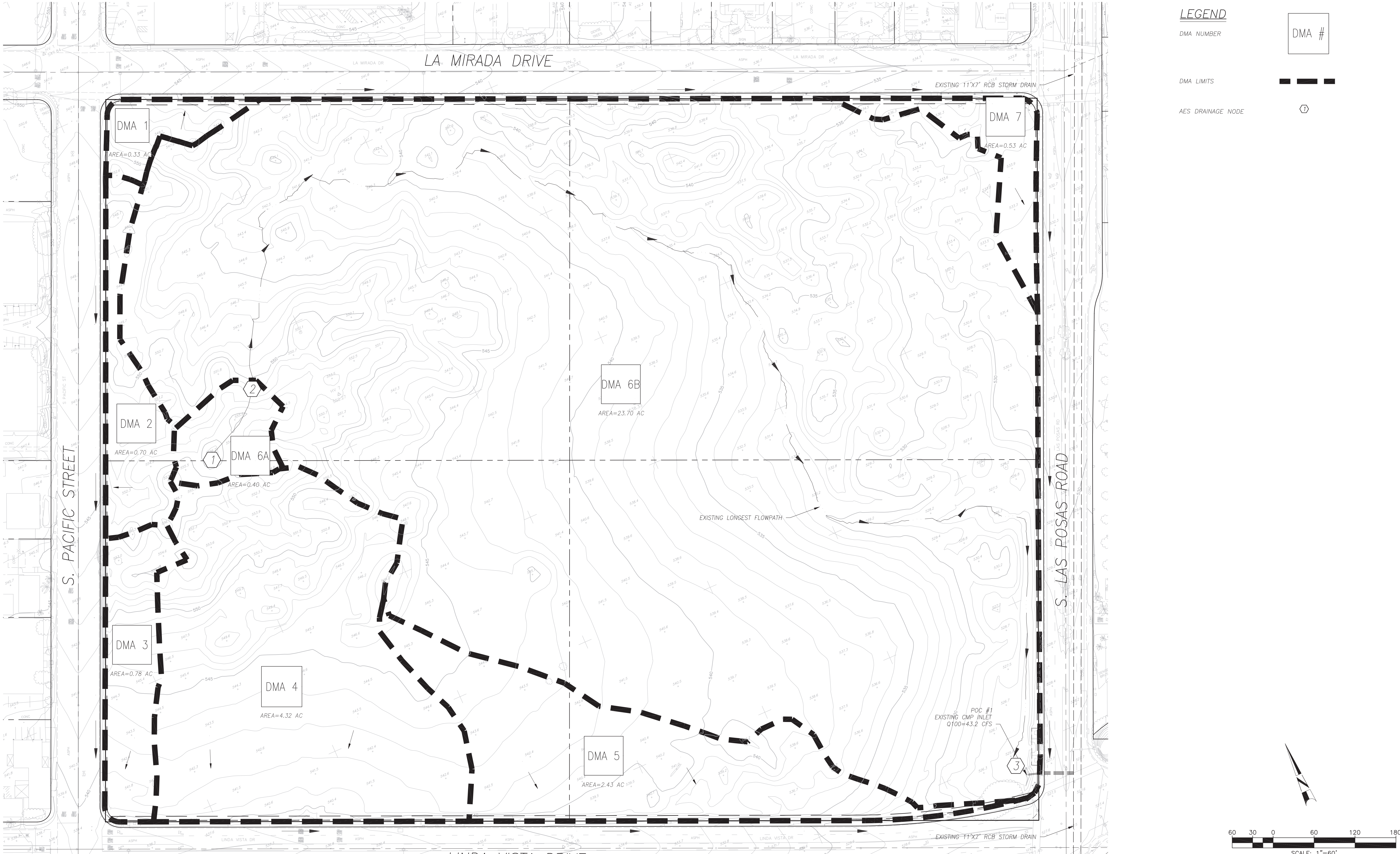
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/24/2020 at 5:19 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.

<u>Exhibit C</u>

Existing Condition Hydrology Map



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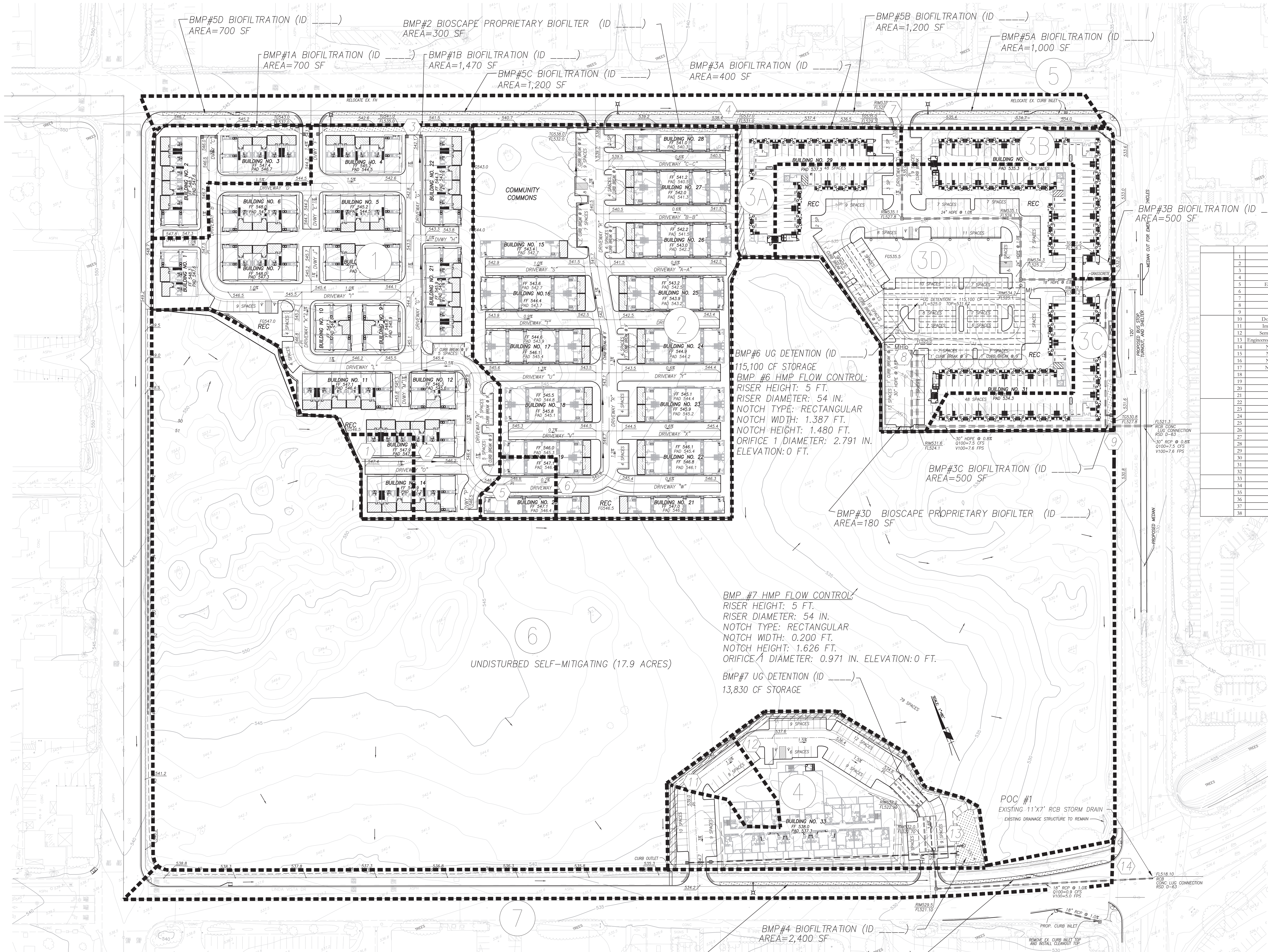
PACIFIC PROPERTY
EXISTING DMA PLAN
APN: 219-222-01, 02, 03, & 04

JOB NO.: L300-14 TMHC	DATE: 8-31-2020	SHEET: 1 OF 1

Exhibit D



LEGEND

(1)	DMA NUMBER
■ ■ ■ ■	DRAINAGE MANAGEMENT AREA (DMA)
	TREE WELL PER SD-A (PROJECT TOTAL = 63 EA)
	STORMWATER VAULT WITH HMP FLOW CONTROL (PROJECT TOTAL = 128,930 CF)
	BIOFILTRATION BASIN (PROJECT TOTAL = 9,940 SF)
⟨1⟩	AES DRAINAGE NODE

TOTAL AREA = 33.2 ACRES
DISTURBED AREA = 16.5 ACRES

HYDROLOGIC SOIL GROUP D
DEPTH TO GROUNDWATER > 15 FEET
NO EXISTING NATURAL HYDROLOGIC FEATURES
NO CRITICAL COARSE SEDIMENT YIELD AREAS (CCSYA) EXISTS ON SITE.

#		DMA 1A	DMA 1B	DMA 2	DMA 3A	DMA 3B	DMA 3C	DMA 3D	DMA 4	DMA 5	DMA 7	
1	Drainage Basin ID or Name	DMA 1A	DMA 1B	DMA 2	DMA 3A	DMA 3B	DMA 3C	DMA 3D	DMA 4	DMA 5	DMA 7	unitless
2	85th Percentile 24-hr Storm Depth	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	inches
3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	19,800	125,875	190,940	12,930	16,500	15,600	80,534	40,000	51,250	57,200	sq-ft
4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)	4,900	41,960	56,400	6,370	8,100	7,600	39,666	38,600			sq-ft
6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	Yes	Yes	Yes	No	No	No	Yes	No	No	No	yes/no
11	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
12	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
13	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
14	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
15	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
16	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
17	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
18	Number of Tree Wells Proposed per SD-A		5	15				6				#
19	Average Mature Tree Canopy Diameter		20	20				20				ft
20	Number of Rain Barrels Proposed per SD-E											#
21	Average Rain Barrel Size											gal
22	Total Tributary Area	24,700	167,835	247,340	19,300	24,600	23,200	120,200	78,600	51,250	57,200	sq-ft
23	Initial Runoff Factor for Standard Drainage Areas	0.74	0.70	0.72	0.64	0.64	0.64	0.64	0.51	0.90	0.90	unitless
24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
25	Initial Weighted Runoff Factor	0.74	0.70	0.72	0.64	0.64	0.64	0.64	0.51	0.90	0.90	unitless
26	Initial Design Capture Volume	1,142	7,343	11,130	772	984	928	4,808	2,505	2,883	3,218	cubic-feet
27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
31	Runoff Factor After Dispersion Techniques	0.74	0.70	0.72	0.64	0.64	0.64	0.64	0.51	0.90	0.90	unitless
32	Design Capture Volume After Dispersion Techniques	1,142	7,343	11,130	772	984	928	4,808	2,505	2,883	3,218	cubic-feet
33	Total Tree Well Volume Reduction	0	900	2,700	0	0	0	1,080	0	0	0	cubic-feet
34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
35	Final Adjusted Runoff Factor	0.74	0.61	0.55	0.64	0.64	0.64	0.50	0.51	0.90	0.90	unitless
36	Final Effective Tributary Area	18,278	102,379	136,037	12,352	15,744	14,848	60,100	40,086	46,125	51,480	sq-ft
37	Initial Design Capture Volume Retained by Site Design Elements	0	900	2,700	0	0	0	1,080	0	0	0	cubic-feet
38	Final Design Capture Volume Tributary to BMP	1,142	6,443	8,430	772	984	928	3,728	2,505	2,883	3,218	cubic-feet

SOURCE CONTROL BMPs

SOURCE CONTROL BMPS	PROJECT IMPLEMENTATION
⟨1⟩ 4.2.1 & 4.2.2 STORM DRAIN INLETS	MARK ALL INLETS WITH THE WORDS "NO DUMPING! DRAINS TO WATERWAYS" IN ENGLISH AND "NO CONTAMINE" IN SPANISH. MAINTAIN AND PERIODICALLY REPLACE INLET MARKINGS. SEE APPLICABLE OPERATIONAL BMPS IN CASQA FACT SHEET SC-44, "DRAINAGE SYSTEM MAINTENANCE."
⟨2⟩ 4.2.6.E LANDSCAPE/OUTDOOR PESTICIDE USE	LANDSCAPE HAS BEEN DESIGNED PER CITY OF SAN SAN DIEGO LANDSCAPE STANDARDS TO MINIMIZE IRRIGATION AND RUNOFF, AND TO MINIMIZE THE USE OF FERTILIZERS AND PESTICIDES THAT CAN CONTRIBUTE TO STORMWATER POLLUTION. SEE APPLICABLE BMPS IN CASQA FACT SHEETS SC-41, "BUILDING AND GROUNDS MAINTENANCE."
⟨3⟩ 4.2.5 TRASH BINS	TRASH BIN FOR EACH UNIT SHALL HAVE LIDS AND BE STORED IN GARAGE. SEE CASQA FACT SHEET SC-34, "WASTE HANDLING AND DISPOSAL."
⟨4⟩ 4.2.6.Q PLAZAS, SIDEWALKS, AND PARKING LOTS	PLAZAS, SIDEWALKS, AND PARKING LOTS SHALL BE SWEPT REGULARLY AND ONCE PRIOR TO OCTOBER 1ST TO PREVENT THE ACCUMULATION OF LITTER AND DEBRIS. SEE CASQA FACT SHEET SC-41, "BUILDING AND GROUNDS MAINTENANCE."

SITE DESIGN BMPS

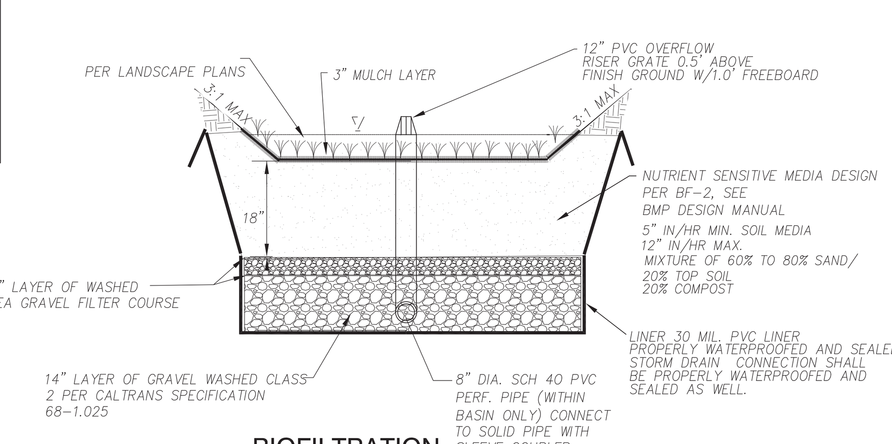
4.3.3 MINIMIZE IMPERVIOUS AREA: RESIDENTIAL STREETS ARE AT THE MINIMUM REQUIRED WIDTH PER COUNTY STANDARDS.

4.3.4 MINIMIZE SOIL COMPACTION: RE-TILL SOILS COMPACTED BY CONSTRUCTION VEHICLES. COLLECT AND RE-USE UPPER SOIL LAYERS DEVELOPMENT SITE CONTAINING ORGANIC MATERIALS.

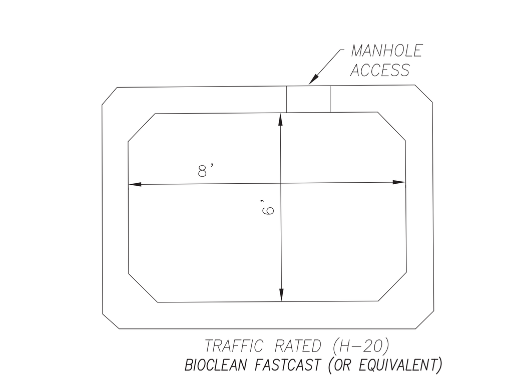
4.3.5 RUNOFF FROM WALKS AND ROOF DRAIN DOWNSPOUTS SHALL DISCHARGE ONTO SPLASH BLOCKS AND FLOW THROUGH ADJACENT LANDSCAPE AREA BEFORE ENTERING BIORETENTION BASINS

4.3.7 LANDSCAPING WITH DROUGHT TOLERANT SPECIES

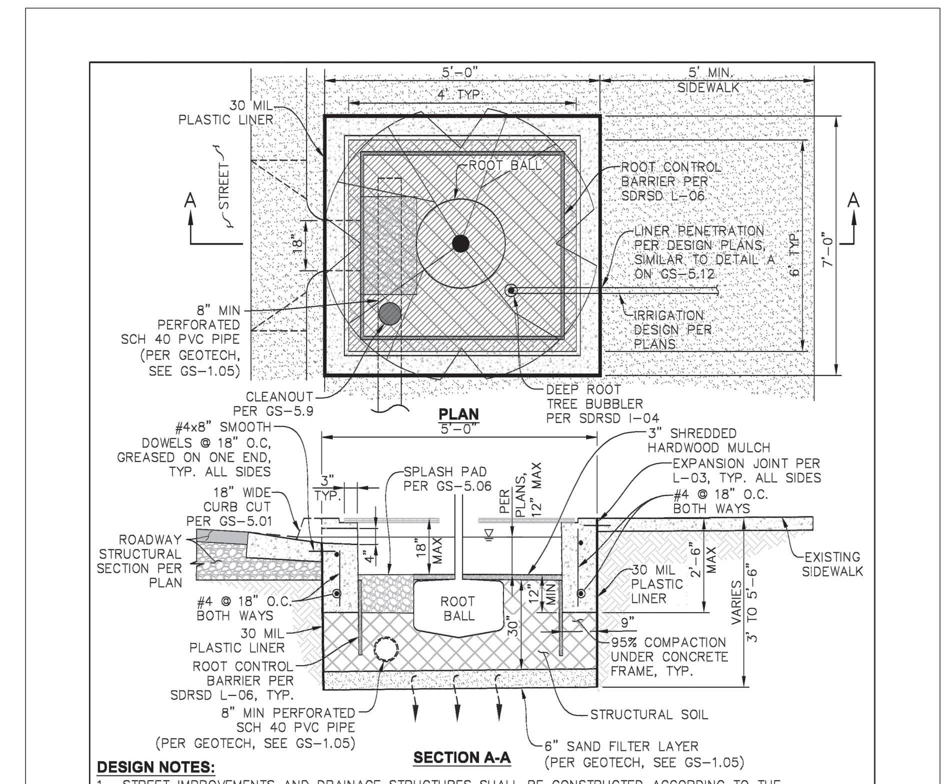
60 30 0 60 120 180
SCALE: 1"=60'



BIOFILTRATION
NOT TO SCALE



PROPOSED PRECAST DETENTION STORAGE
NOT TO SCALE



DESIGN NOTES:

1. STREET IMPROVEMENTS AND DRAINAGE STRUCTURES SHALL BE CONSTRUCTED ACCORDING TO THE LATEST SAN DIEGO REGIONAL STANDARD DRAWINGS AND CALTRANS STANDARD PLANS.
2. CONCRETE SHALL BE 520-C-2500 UNLESS OTHERWISE SPECIFIED.
3. SEE SDRSD DWG L-01 THROUGH L-06 FOR LANDSCAPING DETAILS NOT SPECIFIED HEREIN. (TREE GRATE PER SDRSD L-04).
4. MINIMUM OPEN TREE PLANTING SPACE DIMENSION 4'x6'.
5. PROVIDE 30 MIL PLASTIC LINER WHERE CONCRETE WILL BE POURED ON TOP OF STRUCTURAL SOIL.
6. SEAL PLASTIC LINER TO ADJACENT IMPROVEMENTS AND EDGE RESTRAINTS PER GS-5.15.
7. WHEN SAND FILTER LAYER IS OMITTED, PROVIDE GEOTEXTILE BENEATH THE STRUCTURAL SOIL LAYER PER PROJECT-SPECIFIC GEOTECHNICAL RECOMMENDATIONS.
8. PROPOSED SIDEWALK LOCATIONS & INTENDED ADA ROUTES PER PROJECT-SPECIFIC DESIGN PLANS.
9. FOR TREE WELL SUBSURFACE DRAINAGE TYPES, SEE DWG GS-1.05.
10. ALL STRUCTURAL SOILS ARE COMPACTED TO 95% RELATIVE COMPACTION.

DRAWING NOT TO SCALE

DRAWN BY: NWB / CHECKED BY: KBK	SAN DIEGO COUNTY DESIGN STANDARD	REVISIONS	APPROVED	DATE
RECOMMENDED BY: CHARLES MOHRLOCK, P.E.		ORIGINAL		10-01-2019
APPROVED BY COUNTY ENGINEER DATE: 3/15/21 WILLIAM P. MORGAN, P.E. R.C.E. NO. 49452, EXP 9/30/2022	TREE WELL GENERAL DESIGN GUIDANCE	REVISED		03-08-2021
		DRAWING NUMBER		GS-1.00

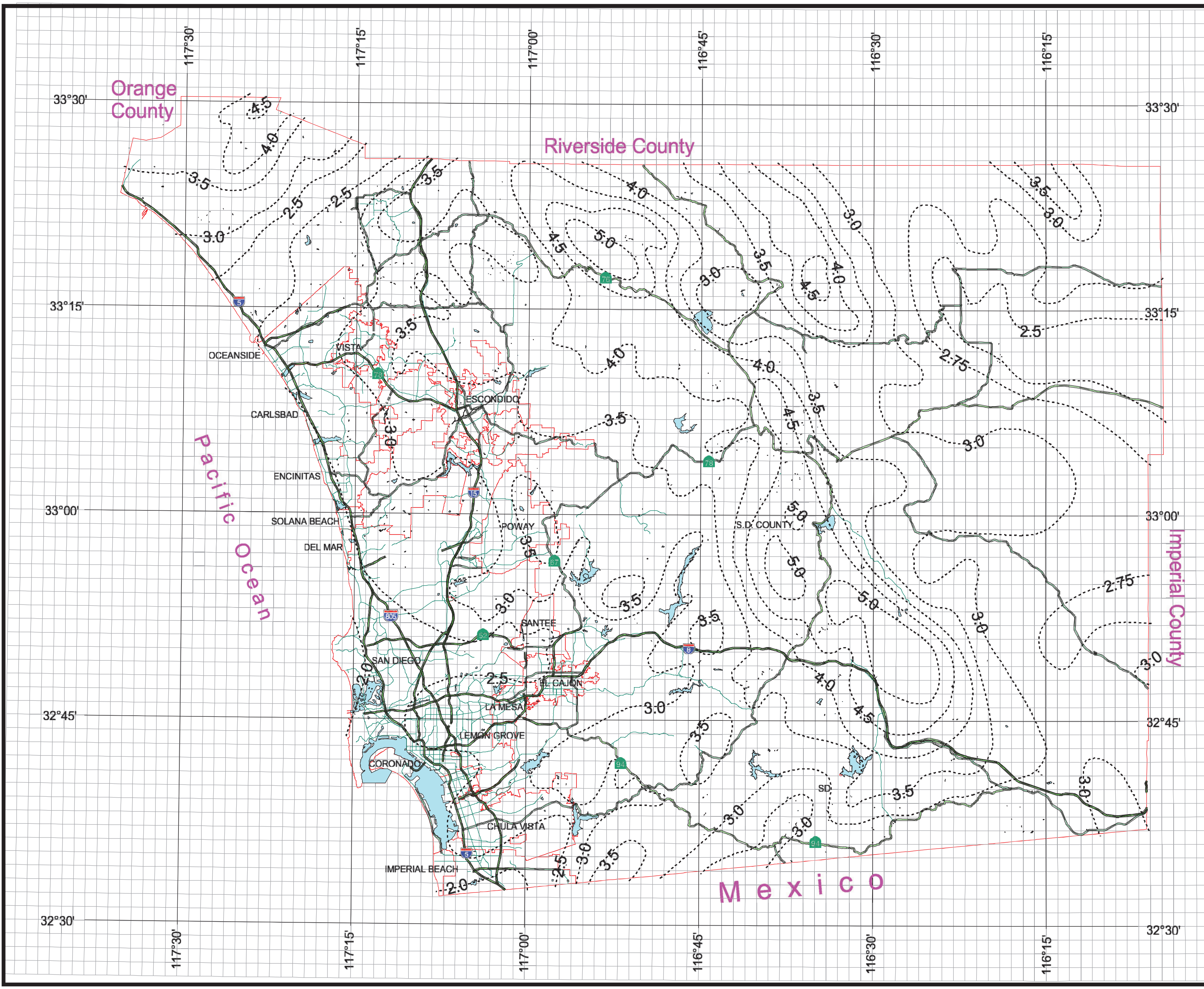
Lundstrom
Engineering and Surveying, Inc.
5333 Mission Center Road, #115 • San Diego, CA 92108
Phone (619) 814-1220 • Fax (619) 641-5910

PACIFIC
PROPOSED DMA/HMP SITE MAP
APN: 219-222-01, 02, 03, & 04
JOB NO.: L300-14 | DATE: 08-15-22 | SHEET: 1 OF 1

APPENDIX A
Hydrologic Information

This Section Contains:

- Precipitation Analysis



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

DPW GIS

Department of Public Works Geographic Information Services

SanGIS

We Have San Diego Covered!

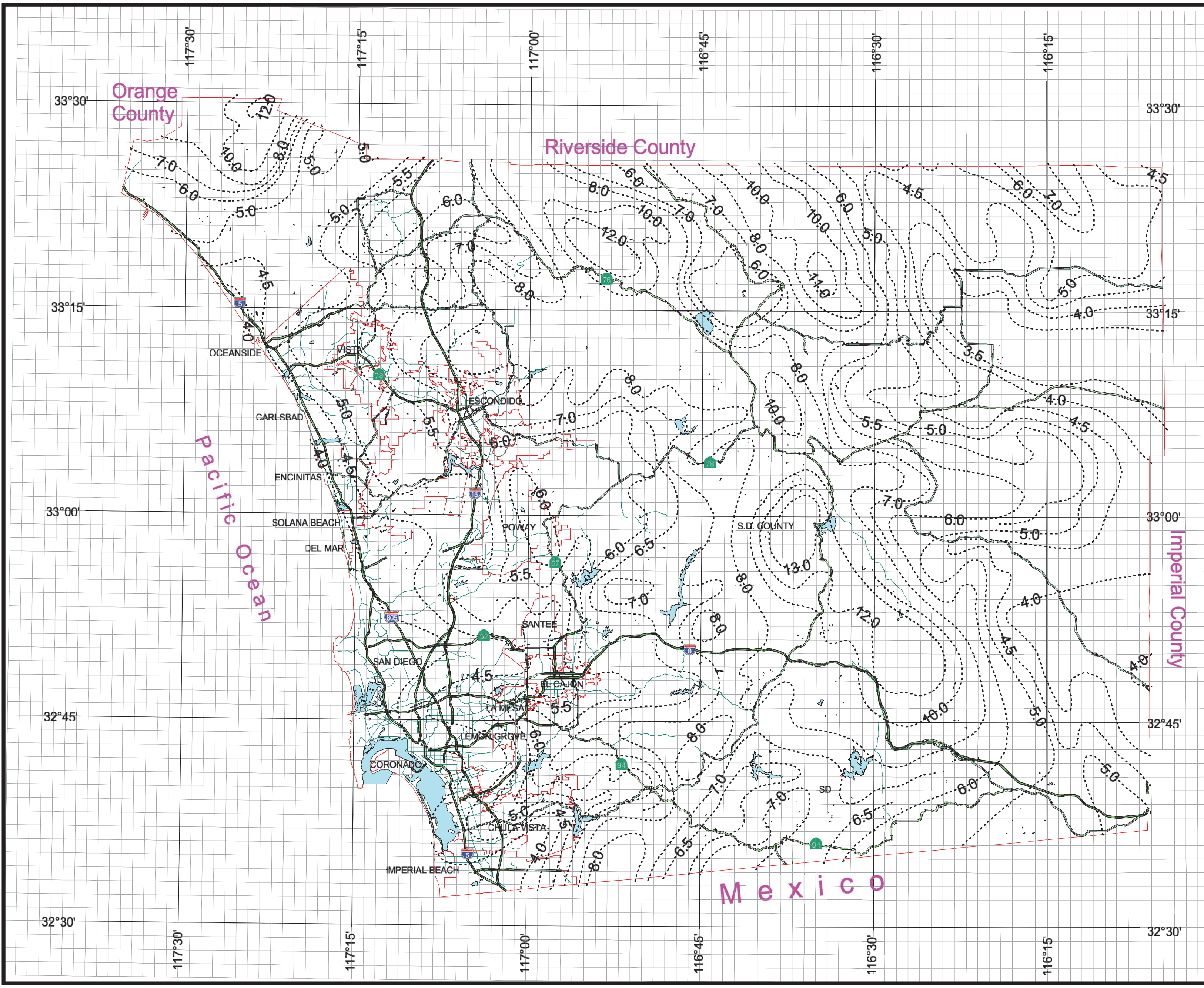
N
W E
S

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours



Department of Public Works Geographic Information Services

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