ATTACHMENT 1B
PRELIMINARY
HYDROLOGY REPORT

ENGINEER OF WORK DECLARATION

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 PROFESSION CODE, AND THAT THE DESIGN IS CONSISTENT WITH THE PREVAILING STANDARDS OF THE ENGINEERING PROFESSION FOR SIMILAR WORK.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE SAN DIEGO COUNTY AUTHORITY IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR THE PROJECT
DESIGN.

ENGINEER OF WORK

DATE 12/16/2021

400 Oceangate, Suite 500
Long Beach, CA 90802
562.437.9100
kpff.com

SANTA MARGARITA RIVER BRIDGE
PRELIMINARY HYDROLOGY REPORT

1.0 Project Description

This report is a hydrologic analysis to support the design of the replacement bridge located near the Santa Margarita River Hiking Trail, located in the County of San Diego, California. The proposed bridge will be a three-span bridge that will join the existing Sandia Creek Road to the south and Rock Mountain Drive to the north and it will replace the existing fish passage. It is anticipated that the proposed bridge will be approximately 574' long and 40' wide.

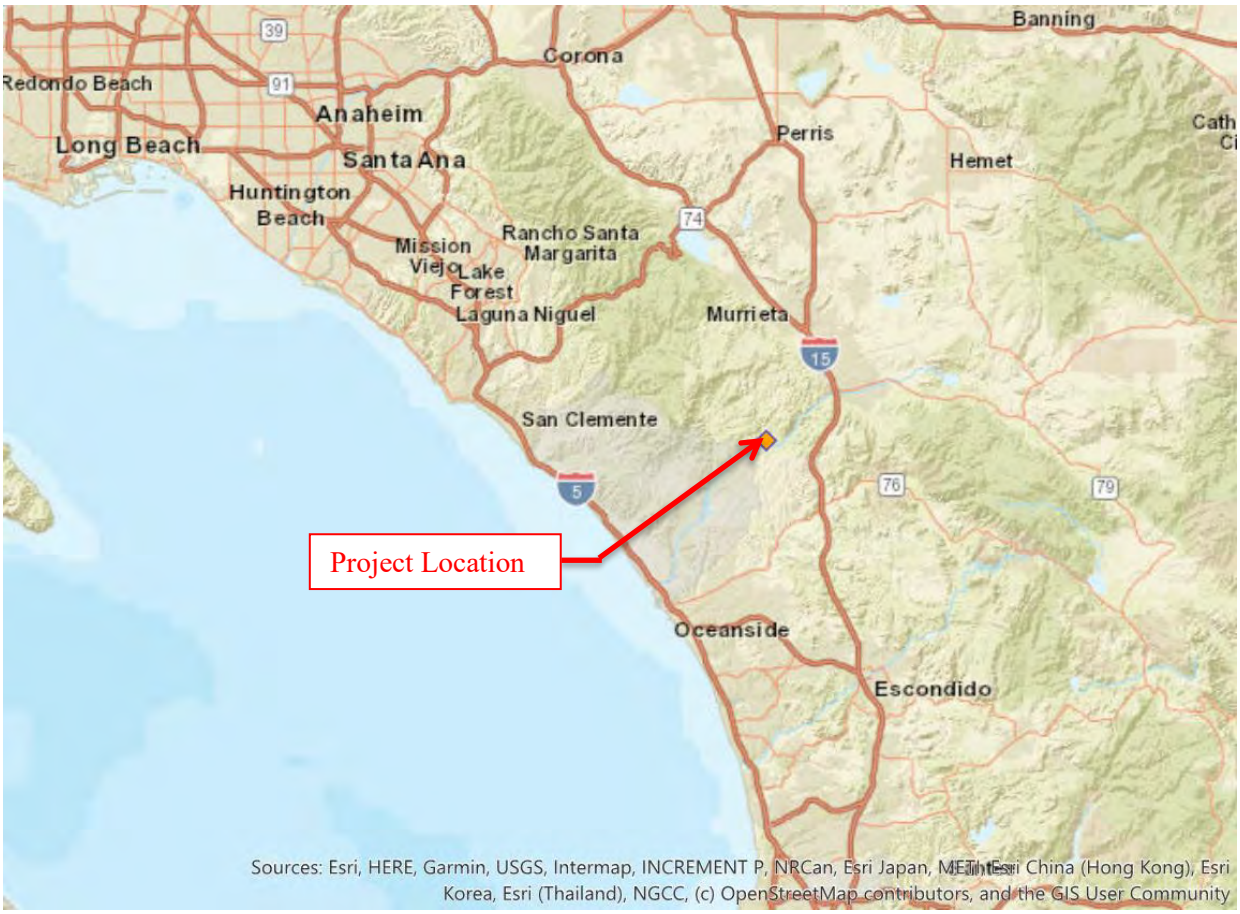


Figure 1 - Project Location

400 Oceangate, Suite 500
Long Beach, CA 90802
562.437.9100
kpff.com

The existing fish passage is located just north of Fallbrook near the intersection of Sandia Creek Road and De Luz road. The existing fish passage is not only an impediment for steelhead, but also a hazardous pedestrian and vehicular crossing during significant rain events. The proposed fish passage barrier removal and crossing replacement project will provide multiple benefits;

1. Provide juvenile and adult steelhead access to 12 miles of upstream habitat, including high quality habitat in the upper watershed near Temecula.
2. Provide improved habitat through riparian restoration at the project site. This will provide cover and resting areas for steelhead migrating upstream to spawning and rearing sites that are undergoing restoration in preparation for their passage.
3. Bridge modification of the existing fish passage can reduce adverse impacts of periodic overtopping of the existing culvert crossing during storms that block access to the homes of local residents.
4. The technical data developed by the hydraulic, sediment and scour studies will inform future improvements to the Santa Margarita River for ecosystem resilience to climate change.

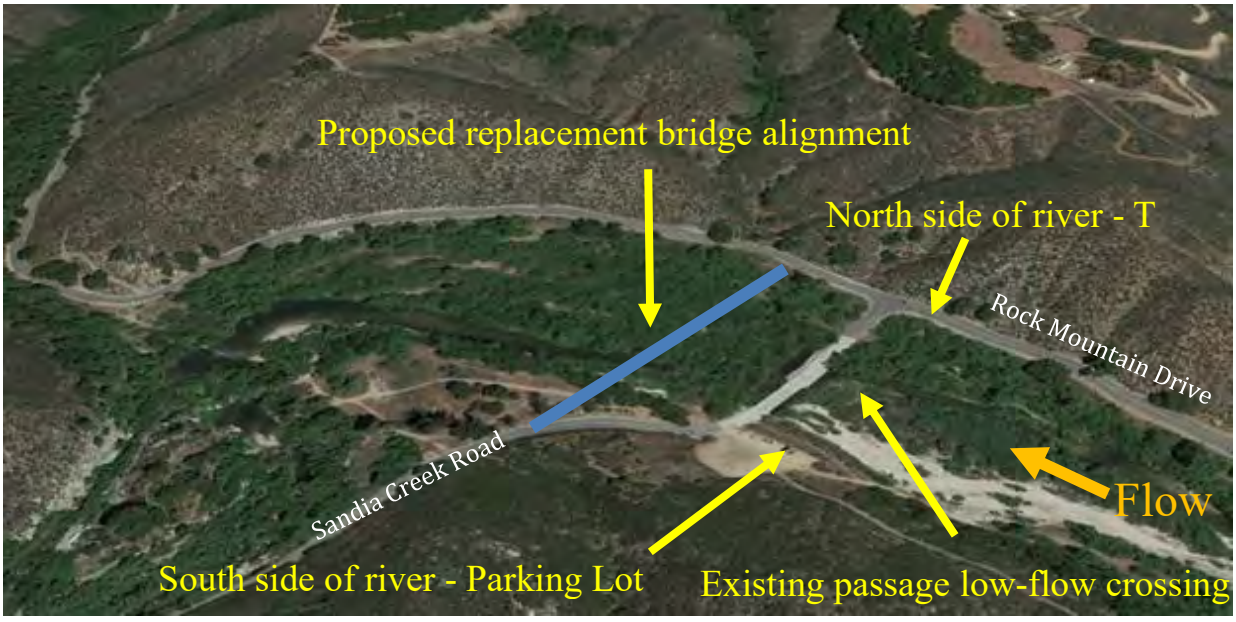


Figure 2 Santa Margarita River – Sandia Creek Existing Passage low-flow crossing

400 Oceangate, Suite 500
Long Beach, CA 90802
562.437.9100
kpff.com

2.0 Drainage Conditions Description

2.1 Existing Drainage Conditions

Onsite existing areas are shown on the drainage management area (DMA) map included in Attachment 1. These DMAs represent the existing conditions and topography of the site. Flow directions and discharge locations for each area are included in Attachment 1, Exhibit EX-1.

2.2 Proposed Drainage Conditions

Onsite proposed areas are shown on the drainage management area (DMA) map included in Attachment 2. These DMAs represent the improvements for the proposed bridge. Flow directions and discharge locations for each area are included in Attachment 2, Exhibit PR-1.

3.0 Methodology

The project has been evaluated using the Rational Method from the San Diego County Hydrology Manual (June 2003) and the San Diego County Hydraulic Design Manual (September 2014) to determine the 100 year Design Storm Event Peak Discharge Rates.

3.1 Rational Method Formula

The Rational Method (RM) formula estimates the peak rate of runoff at any location in a watershed as a function of the drainage area (A), runoff coefficient (C), and rainfall intensity (I) for a duration equal to the time of concentration (Tc), which is the time required for water to flow from the most remote point of the basin to the location being analyzed. The RM formula is expressed as follows:

$$Q=CIA$$

Where as: Q = peak discharge, in cubic feet per second (cfs). C = runoff coefficient, proportion of the rainfall that runs off the surface (no units). I = average rainfall intensity for a duration equal to the Tc for the area, in inches per hour (note: If the computed Tc is less than 5 minutes, use 5 minutes for computing the peak discharge, Q). A = drainage area contributing to the design location, in acres.

3.2 Runoff Coefficient

Figure 3-1 of the 2003 San Diego County Hydrology Manual lists the runoff coefficients for urban areas. The runoff coefficients are based on land use and soil type. An appropriate runoff coefficient (C) for each type of land use in the sub area should be selected from this table and multiplied by the percentage of the total area (A) included in that class. The sum of the products for all land uses is the weighted runoff coefficient (Σ[CA]). Good engineering judgment should be used when applying the values presented in Table 3-1 and adjustments may be made based on site characteristics. The runoff coefficient can also be calculated for an area based on soil type and impervious percentage using the following formula:

$$C = 0.90 \times (\%\ \text{Impervious}) + Cp \times (1 - \%\ \text{Impervious})$$

400 Oceangate, Suite 500
Long Beach, CA 90802
562.437.9100
kpff.com

Where as: Cp = Pervious Coefficient Runoff Value for the soil type (shown in Table 3-1 as Undisturbed Natural Terrain/Permanent Open Space, 0% Impervious). Soil type was determined from the soil hydrologic group map provided in Attachment 3.

3.3 Rainfall Intensity

The rainfall intensity (I) is the rainfall in inches per hour (in/hr) for a duration equal to the Tc for a selected storm frequency. Once a particular storm frequency has been selected for design and a Tc calculated for the drainage area, the rainfall intensities were be determined from the Intensity-Duration Design Chart and formulas provided in Figure 3-1 of the 2003 San Diego County Hydrology Manual. The 6-hour storm rainfall amount (P6) and the 24-hour storm rainfall amount (P24) for the selected storm frequency are also needed for calculation of I. P6 and P24 are shown on the isopluvial maps provided in Attachment 3.

3.4 Time of Concentration

The Time of Concentration (Tc) is the time required for runoff to flow from the most remote part of the drainage area to the point of interest. The Tc is composed of two components: initial time of concentration (Ti) and travel time (Tt).

The Ti is the time required for runoff to travel across the surface of the most remote sub area in the study, or "initial sub area." Guidelines for designating the initial sub area are provided within the discussion of computation of Ti. The Tt 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 sub area to the point of interest. For the RM, the Tc at any point within the drainage area is given by:

$$\mathbf{Tc = Ti + Tt}$$

400 Oceangate, Suite 500
Long Beach, CA 90802
562.437.9100
kpff.com

4.0 Hydrology Calculations Summary

Upon performing hydrologic analysis of the project site for both the existing and the proposed conditions, the following results were produced.

Table 1– Hydrology Calculations Summary Pre-Developed 100-yr Storm Event

DMA ID	Basin Area	Area	Impervious Area	Pervious Area	Percent Impervious	Percent Pervious	Runoff Coeff (C)	Tc=Ti+Tt	Intensity (100 year)	Q100 (cfs)
	(sf)	(ac)	(sf)	(sf)	%	%	(C)	(min)	(in/hr)	(cfs)
1	9,886	0.23	7,275	2,611	74%	26%	0.75	5.0	6.59	1.13
2	4,370	0.10	0	4,370	0%	100%	0.35	8.4	4.70	0.17
3	7,042	0.16	0	7,042	0%	100%	0.35	5.3	6.36	0.36
4	22,070	0.51	0	22,070	0%	100%	0.35	7.8	4.96	0.88
5	9,810	0.23	6,828	2,982	70%	30%	0.73	5.0	6.59	1.09
6	3,800	0.09	3,800	0	100%	0%	0.90	5.0	6.59	0.52
7	12,314	0.28	0	12,314	0%	100%	0.35	8.2	4.78	0.47
8	20,633	0.47	20,625	8	100%	0%	0.90	5.0	6.59	2.81
9	4,200	0.10	0	4,200	0%	100%	0.35	5.3	6.34	0.21
10	6,523	0.15	0	6,523	0%	100%	0.35	8.1	4.83	0.25
11	788	0.02	0	788	0%	100%	0.35	5.0	6.59	0.04
12	795	0.02	0	795	0%	100%	0.35	5.0	6.59	0.04
13	3,072	0.07	0	3,072	0%	100%	0.35	5.0	6.59	0.16
Total	105,303	2.42	38,528	66,775	37%	63%				8.13

400 Oceangate, Suite 500
Long Beach, CA 90802
562.437.9100
kpff.com

Table 2– Hydrology Calculations Summary Post-Developed 100-yr Storm Event

DMA ID	Basin Area	Area	Impervious Area	Pervious Area	Percent Impervious	Percent Pervious	Runoff Coeff (C)	Tc	Intensity (100 year)	Q100 (cfs)
	(sf)	(ac)	(sf)	(sf)	%	%	(C)		(in/hr)	(cfs)
1	9,147	0.21	9,147	0.00	100%	0%	0.90	2.05	6.59	1.24
2	3,303	0.08	3,303	0.00	100%	0%	0.90	2.06	6.59	0.45
3	6,604	0.15	6,604	0.00	100%	0%	0.90	2.70	6.59	0.90
4	6,447	0.15	6,447	0.00	100%	0%	0.90	2.91	6.59	0.88
5	7,700	0.18	7,700	0.00	100%	0%	0.90	2.67	6.59	1.05
6	7,666	0.18	7,666	0.00	100%	0%	0.90	2.72	6.59	1.04
7	3,510	0.08	3,510	0.00	100%	0%	0.90	2.23	6.59	0.48
8	2,988	0.07	2,988	0.00	100%	0%	0.90	2.29	6.59	0.41
9	12,314	0.28	0	12,314.00	0%	100%	0.35	8.44	4.70	0.46
10	3,788	0.09	3,788	0.00	100%	0%	0.90	2.12	6.59	0.52
11	20,625	0.47	0	20,625.00	0%	100%	0.35	8.74	4.59	0.76
12	2,509	0.06	2,194	315.00	87%	13%	0.83	3.07	6.59	0.32
13	3,324	0.08	0	3,324.00	0%	100%	0.35	5.27	6.36	0.17
14	4,200	0.10	0	4,200.00	0%	100%	0.35	4.99	6.59	0.22
15	6,523	0.15	0	6,523.00	0%	100%	0.35	8.66	4.62	0.24
16	788	0.02	0	788.00	0%	100%	0.35	4.90	6.59	0.04
17	795	0.02	0	795.00	0%	100%	0.35	4.62	6.59	0.04
18	3,072	0.07	0	3,072.00	0%	100%	0.35	4.16	6.59	0.16
Total	105,303	2.42	53,347	51,956	51%	49%				9.38

400 Oceangate, Suite 500
Long Beach, CA 90802
562.437.9100
kpff.com

5.0 Water Quality

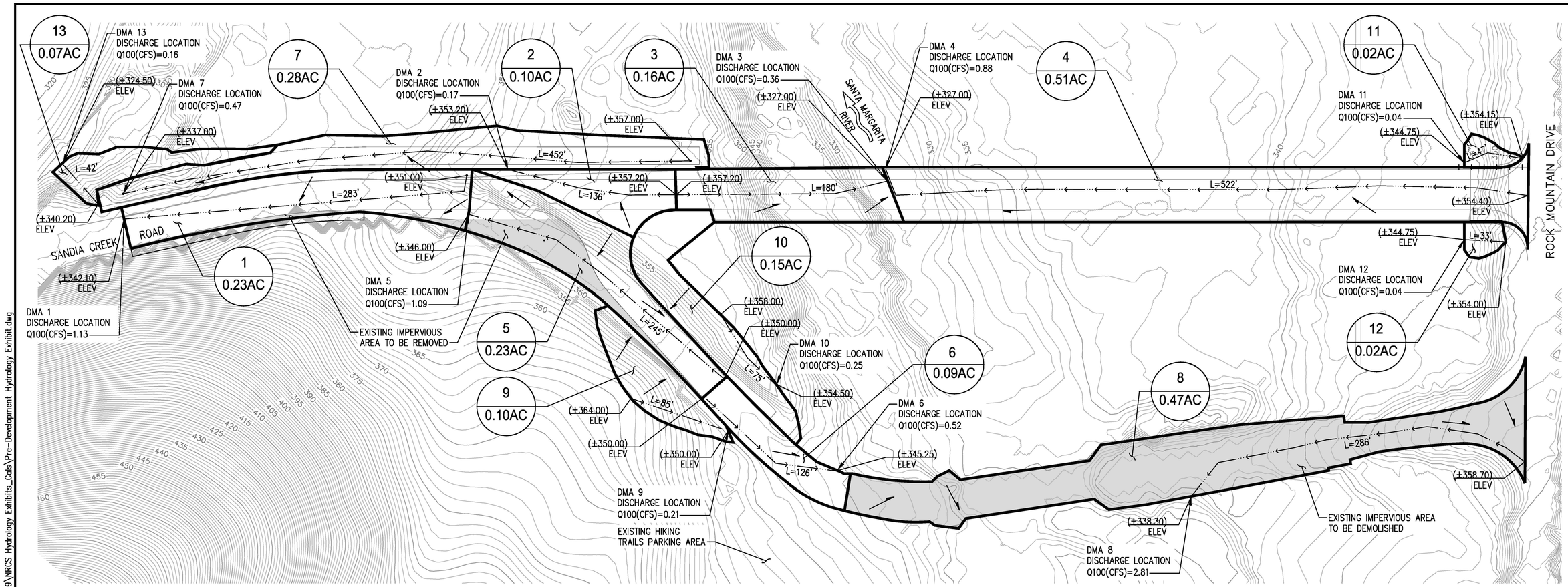
5.1 Storm Water Management Requirements

All drainage patterns, flow directions, and point of discharge are depicted in Exhibit PR-1, Attachment 2. Swales incorporated into the project will be constructed using the design criteria and guidelines listed in FT-1, Appendix E and Green Street Guidelines, and Appendix K of the San Diego County BMP Design Manual. Due to the soil site conditions (soil type D), the infiltration rate is assumed to be really low, therefore an underdrain is used to capture and convey water, discharging into the rip rap as shown in Exhibit PR-1. A catch basin is provided at the southern end of the vegetated swale to serve as an overflow device, overflow runoff will be conveyed with the underdrain flow to discharge into the proposed rip rap which will provide energy dissipation to reduce erosion. The discharge pipe (12" at 1% slope) and the rip rap have been sized to provide enough capacity and energy dissipation for the 100-yr storm. The top of grate for the catch basin is set above the minimum required ponding depth to capture flow from storm events larger than 85 percentile.

The sizing requirements included in Appendix K of the San Diego County BMP Design Manual (Guidance on Green Infrastructure) were followed and a total required water quality flow rate requiring flow-thru treatment was calculated. Results for calculation of Design capture volume is provided in Attachment 7.

400 Oceangate, Suite 500
Long Beach, CA 90802
562.437.9100
kpff.com

ATTACHMENT 1
PRE-DEVELOPED CONDITIONS
DRAINAGE MAP



PLAN
1"=40'

LEGEND:

- EXISTING CONTOUR
- FLOW LINE
- DMA BOUNDARY LIMIT
- 19 / 2.86 AC — DMA ID NUMBER / DMA AREA
- DRAINAGE FLOW ARROW
- EXISTING IMPERVIOUS AREA TO BE REMOVED

100-YEAR STORM SUMMARY:

BASIN NO.	AREA (AC)	AREA (SF)	IMPERVIOUS AREA (SF)	PERVIOUS AREA (SF)	FREQUENCY
E-1	0.23	9,886	7,275	2,611	100-YR
E-2	0.10	4,370	0	4,370	100-YR
E-3	0.16	7,042	0	7,042	100-YR
E-4	0.51	22,070	0	22,070	100-YR
E-5	0.23	9,810	6,828	2,982	100-YR
E-6	0.09	3,800	3,800	0	100-YR
E-7	0.28	12,314	0	12,314	100-YR
E-8	0.47	20,633	20,625	8	100-YR
E-9	0.10	4,200	0	4,200	100-YR
E-10	0.15	6,523	0	6,523	100-YR
E-11	0.02	788	0	788	100-YR
E-12	0.02	795	0	795	100-YR
E-13	0.07	3,072	0	3,072	100-YR
TOTALS	2.42	105,303	38,528	66,775	

GRAPHIC SCALE
50 0 25 50 100 200
(IN FEET)
1 inch = 50ft.

Full Size = 22" x 34", Half Size = 11" x 17"

kpff
400 Oceangate, Suite 500
Long Beach, California 90802
(562) 437-9100 Fax (562) 437-9200

NO.	DATE	BY	REVISION

SANDIA CREEK ROAD
COUNTY OF SAN DIEGO, CA

PRE-DEVELOPMENT HYDROLOGY MAP

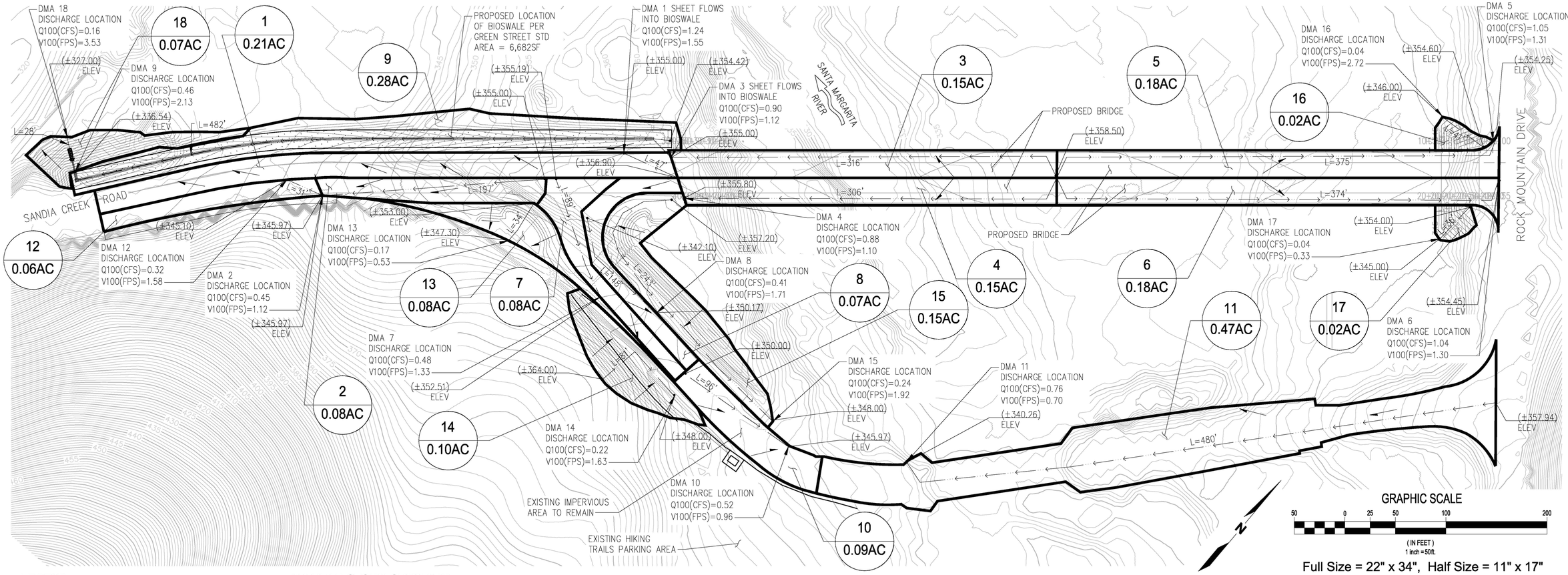
DRAWN: LT	PROJECT NO.: 2000118
DESIGN: LM	SCALE: AS SHOWN
CHECKED: TG	DATE: NOV 19, 2021
DRAWING NO.	EX-1
SHEET NO.	01 OF 02

NOT FOR CONSTRUCTION

Plotted: Dec 16, 2021 - 3:07am anunez Layout: A1
L:\2020\2000118 SMR Bridge Replacement (Rd 2 Grants)\2.09 Design\Hydrology\Hydrology Calculations and Report\20211209\NRCS Hydrology Exhibits_Cals\Pre-Development Hydrology Exhibit.dwg

400 Oceangate, Suite 500
Long Beach, CA 90802
562.437.9100
kpff.com

ATTACHMENT 2
POST-DEVELOPED CONDITIONS
DRAINAGE MAP



PLAN
1"=40'

LEGEND.

- EXISTING CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- FLOW LINE
- DMA BOUNDARY LIMIT
- 19 / 2.86 AC — DMA ID NUMBER / DMA AREA
- DRAINAGE FLOW ARROW
- PROPOSED BIOSWALE

100-YEAR STORM SUMMARY:

BASIN NO.	AREA (AC)	AREA (SF)	IMPERVIOUS AREA (SF)	PERVIOUS AREA (SF)	FREQUENCY
PR-1	0.21	9,147	9,147	0	100-YR
PR-2	0.08	3,303	3,303	0	100-YR
PR-3	0.15	6,604	6,604	0	100-YR
PR-4	0.15	6,447	6,447	0	100-YR
PR-5	0.18	7,700	7,700	0	100-YR
PR-6	0.18	7,666	7,666	0	100-YR
PR-7	0.08	3,510	3,510	0	100-YR
PR-8	0.07	2,988	2,988	0	100-YR
PR-9	0.28	12,314	0	12,314	100-YR
PR-10	0.09	3,788	3,788	0	100-YR
PR-11	0.47	20,625	0	20,625	100-YR
PR-12	0.06	2,509	2,194	315	100-YR
PR-13	0.08	3,324	0	3,324	100-YR
PR-14	0.10	4,200	0	4,200	100-YR
PR-15	0.15	6,523	0	6,523	100-YR
PR-16	0.02	788	0	788	100-YR
PR-17	0.02	795	0	795	100-YR
PR-18	0.07	3,072	0	3,072	100-YR
TOTAL	2.42	105,303	53,347	51,956	

NOT FOR CONSTRUCTION

kpff
400 Oceangate, Suite 500
Long Beach, California 90802
(562) 437-9100 Fax (562) 437-9200

NO.	DATE	BY	REVISION

SANDIA CREEK ROAD
COUNTY OF SAN DIEGO, CA

POST-DEVELOPMENT HYDROLOGY MAP

DRAWN: LT	PROJECT NO.: 2000118
DESIGN: LM	SCALE: AS SHOWN
CHECKED: TG	DATE: NOV 19, 2021
DRAWING NO.	PR-1
SHEET NO.	02 OF 02

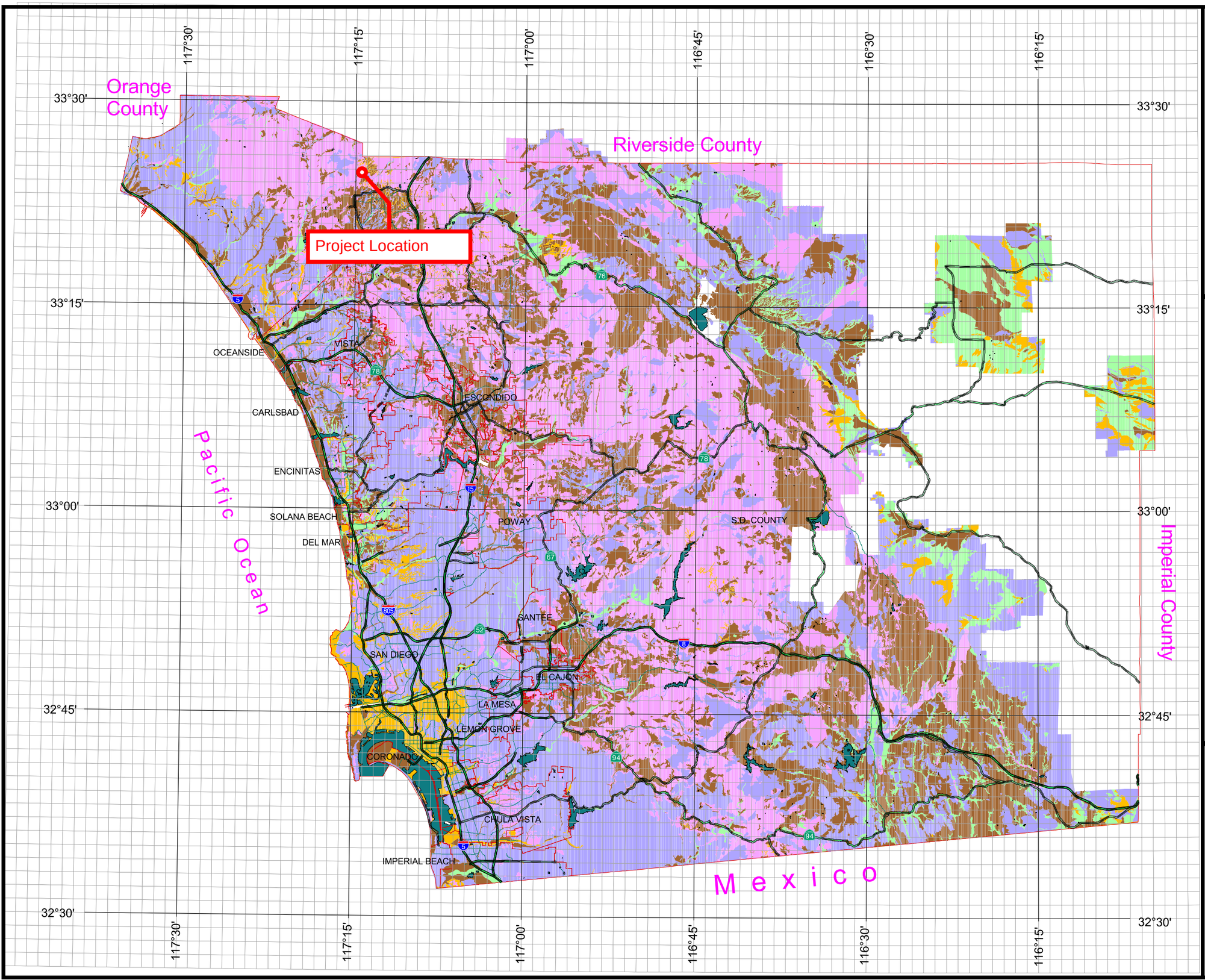
Plotted: Dec 16, 2021 - 1:48am anunez Layout: A2
L:\2020\2000118 SMR Bridge Replacement (Rd 2 Grants)\2.09 Design\Hydrology\Hydrology Calculations and Report\20211209\NRCS Hydrology Exhibits_Cals\Post-Development Hydrology Exhibit.dwg

400 Oceangate, Suite 500
Long Beach, CA 90802
562.437.9100
kpff.com

ATTACHMENT 3
COUNTY OF SAN DIEGO
ISOPLUVIAL MAPS

County of San Diego Hydrology Manual

Soil Hydrologic Groups



Legend

Soil Groups

- Group A
- Group B
- Group C
- Group D
- Undetermined
- Data Unavailable

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N
W E
S

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

2 Year Rainfall Event - 6 Hours

---------- Isopluvial (inches)

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

Project Location

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

N
W E
S

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

2 Year Rainfall Event - 24 Hours

---------- Isopluvial (inches)

Orange County

Riverside County

Project Location

Pacific Ocean

Imperial County

Mexico

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
CHULA VISTA
IMPERIAL BEACH
SD

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'

33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N
W E
S

3 0 3 Miles

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

County of San Diego Hydrology Manual

Rainfall Isopluvials

5 Year Rainfall Event - 6 Hours

Isopluvial (inches)

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

Project Location

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

N W E S

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

5 Year Rainfall Event - 24 Hours

Isopluvial (inches)

Project Location

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

N W E S

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

10 Year Rainfall Event - 6 Hours

Isopluvial (inches)

Orange County

Riverside County

Project Location

Pacific Ocean

Mexico

Imperial County

OCEANSIDE
VISTA
ESCONDIDO
CARLSBAD
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
CHULA VISTA
IMPERIAL BEACH
SD

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N W E S

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

10 Year Rainfall Event - 24 Hours

Isopluvial (inches)

Project Location

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N W E S

3 0 3 Miles

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

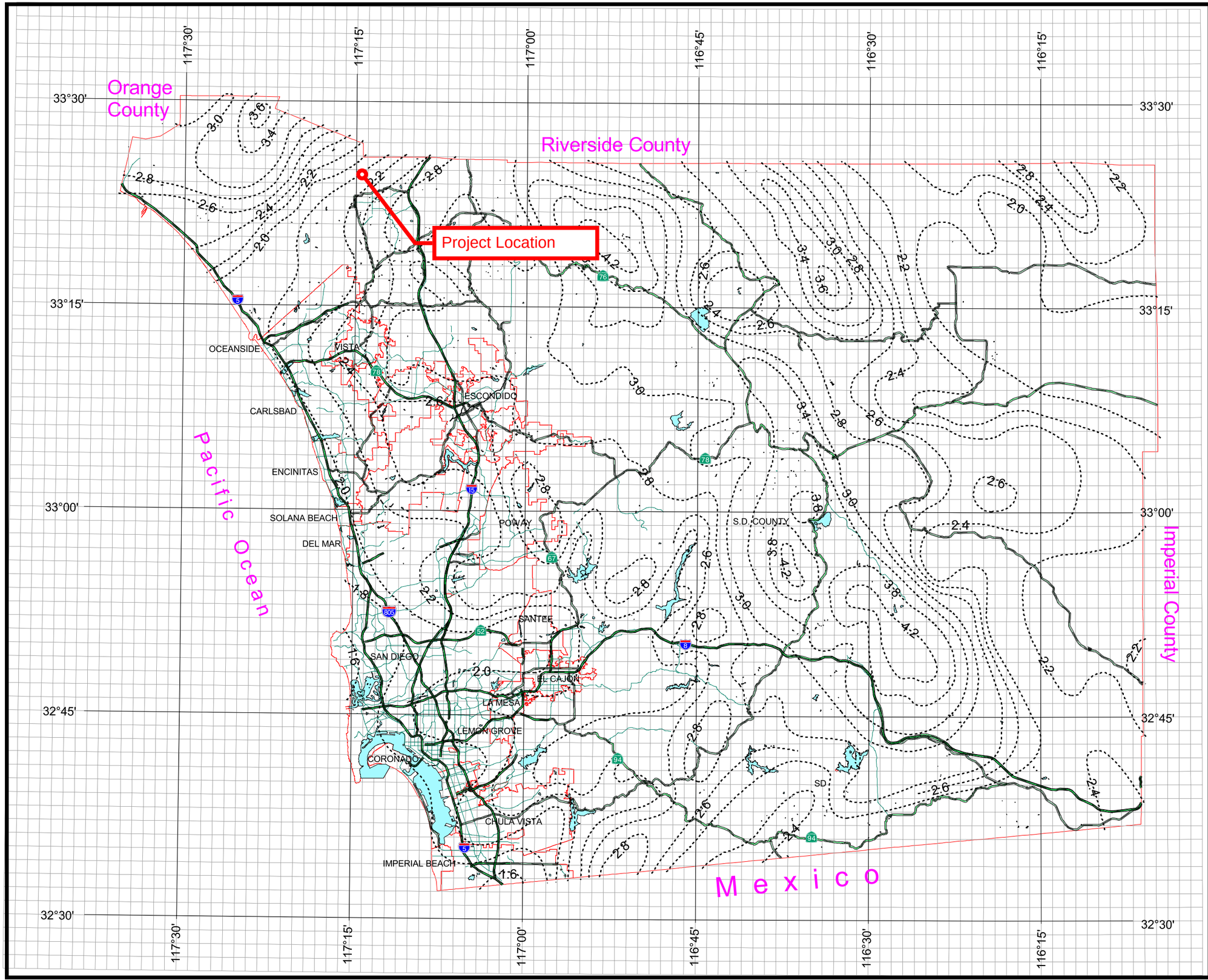
This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

County of San Diego Hydrology Manual

Rainfall Isopluvials

25 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

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

25 Year Rainfall Event - 24 Hours

Isopluvial (inches)

Orange County

Riverside County

Project Location

Pacific Ocean

Imperial County

Mexico

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
CHULA VISTA
IMPERIAL BEACH
SD

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N W E S

3 0 3 Miles

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

County of San Diego Hydrology Manual

Rainfall Isopluvials

50 Year Rainfall Event - 6 Hours

Isopluvial (inches)

Orange County

Riverside County

Project Location

Pacific Ocean

Imperial County

Mexico

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N W E S

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

50 Year Rainfall Event - 24 Hours

Isopluvial (inches)

Orange County

Riverside County

Project Location

Pacific Ocean

Imperial County

Mexico

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'

33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N W E S

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

Orange County

Riverside County

Project Location

Pacific Ocean

Imperial County

Mexico

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'

33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N W E S

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

Orange County

Riverside County

Imperial County

Mexico

Pacific Ocean

Project Location

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
POWAY
S.D. COUNTY
DEL MAR
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
CHULA VISTA
IMPERIAL BEACH
SD

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

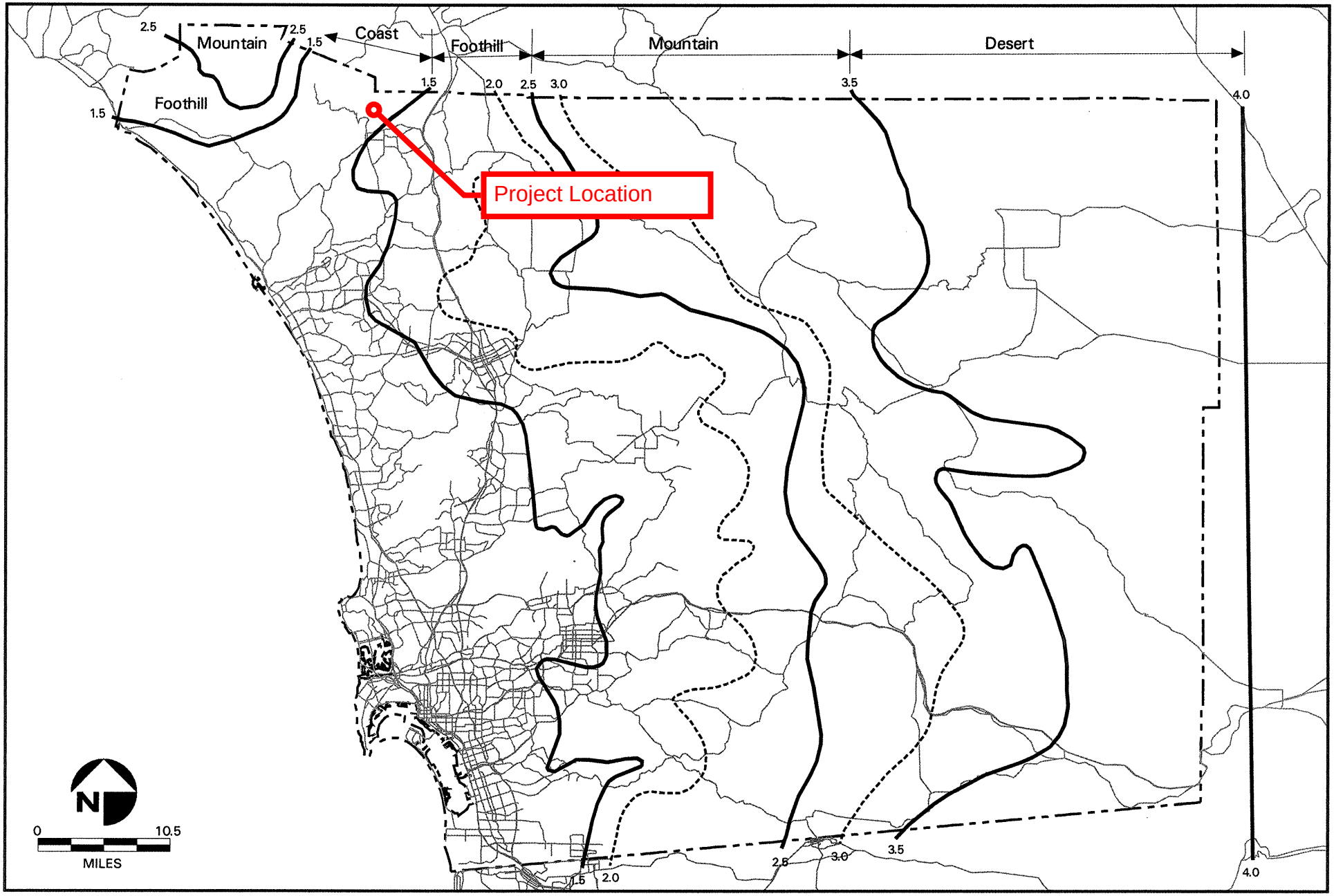
THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

N W E S

3 0 3 Miles



County of San Diego Hydrology Manual

Precipitation Zone Numbers (PZN)

FIGURE

C-1

400 Oceangate, Suite 500
Long Beach, CA 90802
562.437.9100
kpff.com

ATTACHMENT 4
PRE-DEVELOPED HYDROLOGY CALCULATIONS SUMMARY

Hydrology Calculations Summary Pre-Developed 100-yr Storm Event

DMA ID	Basin Area	Area	Impervious Area	Pervious Area	Percent Impervious	Percent Pervious	High Point	Low Point	Length	Slope (s)	slope %	Runoff Coeff (C)	Lm (or D) per Table 3-2	Tc	Tc=Ti+Tt	Adjusted P6	Intensity (100 year)	Q100 (cfs)
	(sf)	(ac)	(sf)	(sf)	%	%			(ft)			(C)	(ft)	(min)	(min)	(in)	(in/hr)	(cfs)
1	9,886	0.23	7,275	2,611	74%	26%	351	342.1	283	0.0314	3.14	0.75	80	3.79	5.0	2.5	6.59	1.13
2	4,370	0.10	0	4,370	0%	100%	357.2	353.2	136	0.0294	2.94	0.35	80	8.43	8.4	2.5	4.70	0.17
3	7,042	0.16	0	7,042	0%	100%	357.2	327	180	0.1678	16.78	0.35	100	5.27	5.3	2.5	6.36	0.36
4	22,070	0.51	0	22,070	0%	100%	354.4	327	522	0.0525	5.25	0.35	100	7.77	7.8	2.5	4.96	0.88
5	9,810	0.23	6,828	2,982	70%	30%	350	346	245	0.0163	1.63	0.73	60	4.35	5.0	2.5	6.59	1.09
6	3,800	0.09	3,800	0	100%	0%	350	345.25	126	0.0377	3.77	0.90	90	2.19	5.0	2.5	6.59	0.52
7	12,314	0.28	0	12,314	0%	100%	357	337	452	0.0442	4.42	0.35	100	8.22	8.2	2.5	4.78	0.47
8	20,633	0.47	20,625	8	100%	0%	358.7	338.3	286	0.0713	7.13	0.90	100	1.87	5.0	2.5	6.59	2.81
9	4,200	0.10	0	4,200	0%	100%	364	350	85	0.1647	16.47	0.35	100	5.31	5.3	2.5	6.34	0.21
10	6,523	0.15	0	6,523	0%	100%	358	354.5	75	0.0467	4.67	0.35	100	8.08	8.1	2.5	4.83	0.25
11	788	0.02	0	788	0%	100%	354.15	344.75	47	0.2000	20.00	0.35	100	4.97	5.0	2.5	6.59	0.04
12	795	0.02	0	795	0%	100%	354	344.75	33	0.2803	28.03	0.35	100	4.44	5.0	2.5	6.59	0.04
13	3,072	0.07	0	3,072	0%	100%	340.2	324.5	42	0.3738	37.38	0.35	100	4.04	5.0	2.5	6.59	0.16
Total	105,303	2.42	38,528	66,775	37%	63%	4,606	4,434	2,512	2	152							8.13

400 Oceangate, Suite 500
Long Beach, CA 90802
562.437.9100
kpff.com

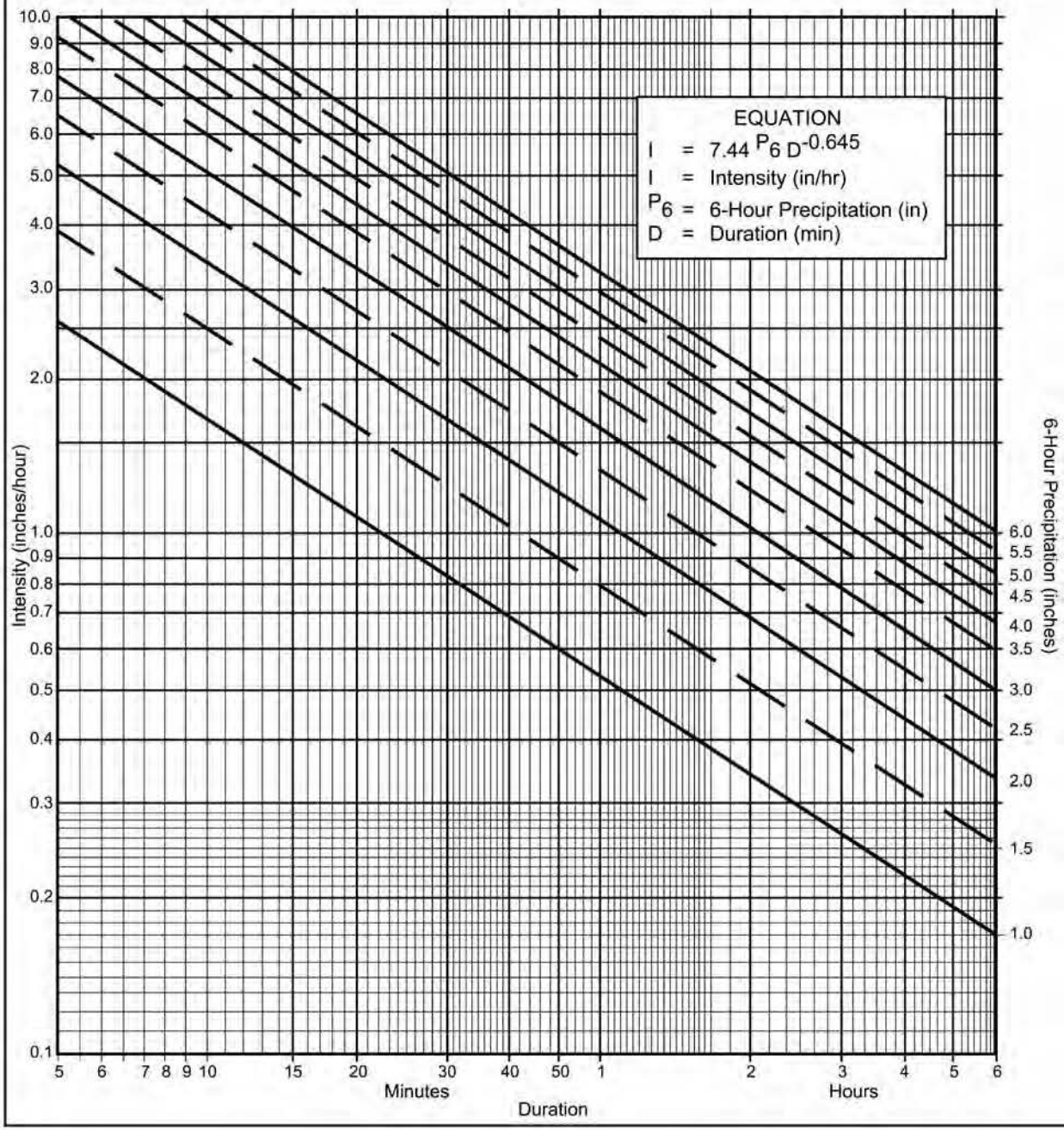
ATTACHMENT 5
POST-DEVELOPED HYDROLOGY CALCULATIONS SUMMARY

Hydrology Calculations Summary Post-Developed 100-yr Storm Event

DMA ID	Basin Area	Area	Impervious Area	Pervious Area	Percent Impervious	Percent Pervious	High Point	Low Point	Length ()	Slope (s)	slope %	Runoff Coeff (C)	Lm (or D) per Table 3-2	Tc	Tc=Ti+Tt	Adjusted P6	Intensity (100 year)	Q100 (cfs)
	(sf)	(ac)	(sf)	(sf)	%	%			(ft)			(C)	(ft)	(min)	(min)	(in)	(in/hr)	(cfs)
1	9,147	0.21	9,147	0.00	100%	0%	355.5	346.48	195	0.04625641	4.63	0.90	90	2.05	5.0	2.5	6.59	1.24
2	3,303	0.08	3,303	0.00	100%	0%	355	345.97	197	0.045837563	4.58	0.90	90	2.06	5.0	2.5	6.59	0.45
3	6,604	0.15	6,604	0.00	100%	0%	358.5	355	316	0.011075949	1.11	0.90	60	2.70	5.0	2.5	6.59	0.90
4	6,447	0.15	6,447	0.00	100%	0%	358.5	355.8	306	0.008823529	0.88	0.90	60	2.91	5.0	2.5	6.59	0.88
5	7,700	0.18	7,700	0.00	100%	0%	358.5	354.25	375	0.011333333	1.13	0.90	60	2.67	5.0	2.5	6.59	1.05
6	7,666	0.18	7,666	0.00	100%	0%	358.5	354.45	374	0.010828877	1.08	0.90	60	2.72	5.0	2.5	6.59	1.04
7	3,510	0.08	3,510	0.00	100%	0%	355.19	352.51	89	0.03011236	3.01	0.90	80	2.23	5.0	2.5	6.59	0.48
8	2,988	0.07	2,988	0.00	100%	0%	354.3	350.17	148	0.027905405	2.79	0.90	80	2.29	5.0	2.5	6.59	0.41
9	12,314	0.28	0	12,314.00	0%	100%	354.42	337.52	413	0.040920097	4.09	0.35	100	8.44	8.4	2.5	4.70	0.46
10	3,788	0.09	3,788	0.00	100%	0%	350	345.97	96	0.041979167	4.20	0.90	90	2.12	5.0	2.5	6.59	0.52
11	20,625	0.47	0	20,625.00	0%	100%	357.94	340.26	480	0.036833333	3.68	0.35	100	8.74	8.7	2.5	4.59	0.76
12	2,509	0.06	2,194	315.00	87%	13%	345.97	345.1	31	0.028064516	2.81	0.83	80	3.07	5.0	2.5	6.59	0.32
13	3,324	0.08	0	3,324.00	0%	100%	353	347.3	34	0.167647059	16.76	0.35	100	5.27	5.3	2.5	6.36	0.17
14	4,200	0.10	0	4,200.00	0%	100%	364	348	81	0.197530864	19.75	0.35	100	4.99	5.0	2.5	6.59	0.22
15	6,523	0.15	0	6,523.00	0%	100%	357.2	348	243	0.037860082	3.79	0.35	100	8.66	8.7	2.5	4.62	0.24
16	788	0.02	0	788.00	0%	100%	354.6	346	41	0.209756098	20.98	0.35	100	4.90	5.0	2.5	6.59	0.04
17	795	0.02	0	795.00	0%	100%	354	345	36	0.25	25.00	0.35	100	4.62	5.0	2.5	6.59	0.04
18	3,072	0.07	0	3,072.00	0%	100%	336.54	327	28	0.340714286	34.07	0.35	100	4.16	5.0	2.5	6.59	0.16
Total	105,303	2.42	53,347	51,956	51%	49%	4,596	4,487	2,094	1	142							9.38

400 Oceangate, Suite 500
Long Beach, CA 90802
562.437.9100
kpff.com

ATTACHMENT 6
SUPPORTING DOCUMENTS



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency _____ year

(b) P_6 = _____ in., P_{24} = _____, $\frac{P_6}{P_{24}}$ = _____ %(2)

(c) Adjusted P_6(2) = _____ in.

(d) t_x = _____ min.

(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

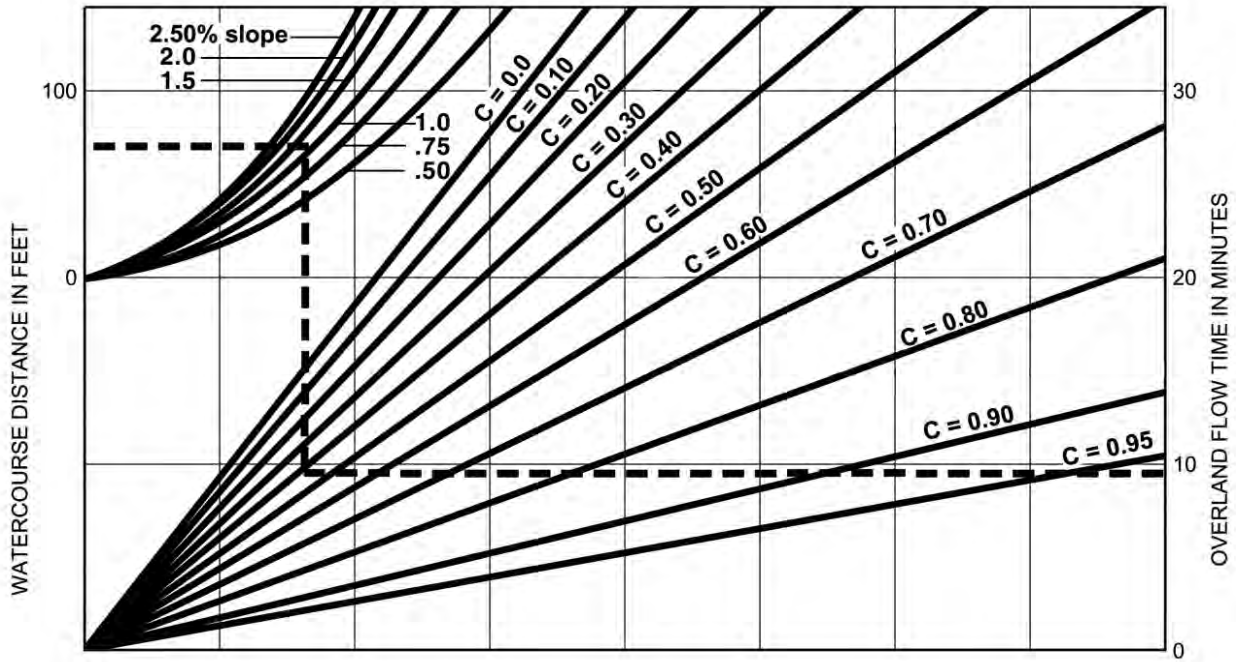
Intensity-Duration Design Chart - Template

FIGURE 3-1

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service



EXAMPLE:
Given: Watercourse Distance (D) = 70 Feet
Slope (s) = 1.3%
Runoff Coefficient (C) = 0.41
Overland Flow Time (T) = 9.5 Minutes

$$T = \frac{1.8\,(1.1-C)\sqrt{D}}{\sqrt[3]{s}}$$

SOURCE: Airport Drainage, Federal Aviation Administration, 1965

FIGURE 3-3

Rational Formula - Overland Time of Flow Nomograph

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

MAXIMUM OVERLAND FLOW LENGTH (L_M)
& INITIAL TIME OF CONCENTRATION (T_i)

Element*	DU/ Acre	.5%		1%		2%		3%		5%		10%	
		L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description

400 Oceangate, Suite 500
Long Beach, CA 90802
562.437.9100
kpff.com

ATTACHMENT 7
COUNTY OF SAN DIEGO
AUTOMATED STORMWATER POLLUTANT CONTROL WORKSHEETS RESULTS

Automated Worksheet B.6-1: Sizing Flow-Thru BMPs (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Flow-Thru BMP Inputs	0	Drainage Basin ID or Name	BMP-1	-	-	-	-	-	-	-	-	-	unitless
	1	Final Effective Tributary Area	23,036	-	-	-	-	-	-	-	-	-	sq-ft
	2	Final Adjusted Runoff Factor	0.68	-	-	-	-	-	-	-	-	-	unitless
	3	Final Design Capture Volume Tributary to BMP	1,728	-	-	-	-	-	-	-	-	-	cubic-feet
	4	Volume Effectively Retained and/or Biofiltered	0	-	-	-	-	-	-	-	-	-	cubic-feet
	5	Deficit of Effectively Treated Stormwater Requiring Flow-Thru Treatment	-1,728	-	-	-	-	-	-	-	-	-	cubic-feet
	6	Maximum Rated Water Quality Flow Rate of Proposed BMP	0.946										CFS
Flow Rate Calculations	7	Adjustment Factor	1.00	-	-	-	-	-	-	-	-	-	unitless
	8	Design Rainfall Intensity for Flow-Thru BMPs	0.20	-	-	-	-	-	-	-	-	-	in/hr
	9	Water Quality Flow Rate Requiring Flow-Thru Treatment	0.106	-	-	-	-	-	-	-	-	-	CFS
Result	10	Is Flow-Thru BMP Adequately Sized?	Yes	-	-	-	-	-	-	-	-	-	unitless

Worksheet B.6-1 General Notes:

A. Applicants may use this worksheet to size flow-thru BMPs (FT-1 through FT-5) for up to 10 basins. Note that applicants proposing flow-thru BMPs must provide supplemental documentation to support the maximum water quality flow rate referenced above, demonstrate medium to high pollutant removal efficiency for project's most significant pollutants of concern, and must also implement an offsite alternative compliance project to offset the deficit of effectively treated stormwater volume. User input must be provided for yellow shaded cells, values for blue cells are automatically populated based on user inputs from previous worksheets, values for all other cells will be automatically generated, errors/notifications will be highlighted in red/orange and summarized below.