Preliminary Hydrology & LID Study

4112-4136 DEL REY AVENUE

4112-4136 DEL REY AVENUE

Marina Del Rey, CA 90292

Prepared For:

MDR INVESTORS, LLC
1880 CENTURY PARK EAST, SUITE 1017
LOS ANGELES, CA 90067

Prepared By:

DAVID EVANS AND ASSOCIATES INC.

Jodi Mensen, P.E.

August 2022
LATDMDRI-0001

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DAVID EVANS AND ASSOCIATES INC.

TABLE OF CONTENTS

DAVID EVANS AND ASSOCIATES INC.

INTRODUCTION

1. PROJECT LOCATION, DESCRIPTION & SCOPE

The Project Site is located at 4112-4136 Del Rey Avenue in Marina Del Rey, California. It consists of 3 commercially developed parcels and currently occupied by several one- to two-story commercial buildings with asphalt parking. The proposed redevelopment will consist of building a multi-story residential building with above ground parking.

This report has been prepared to assess at the planning level for the Preliminary Drainage & LID Study of the Del Rey Apartments and redevelopment site.

The scope of the study includes:

1. Analysis of the pre-development and post-development hydrologic conditions on-site 25-year storm runoff for each sub-area.

2. Perform the stormwater quality analysis of the designed and management of capture stormwater runoff, LID Volume & BMP's practices of this re-development site.

3. Provided the on-site & off-site existing drainage system information.

4. Provided the Soil information & Percolation test Investigation information of the project site.

2. EXISTING SITE DESCRIPTION AND CONDITIONS

As previously stated, the project site consists of several one- to two-story commercial buildings with asphalt parking. There are no landscaped areas on the project site.

The existing site flow direction is from north to south. Per the research of the project drainage system, there are no existing storm drains in Del Rey avenue. The site runoff discharges directly onto the street.

According to the soil percolation test by the Twining Consulting on April 21, 2022, the Percolation rate is 0.12 inch/hr. It is less than 0.3 in/hr, per the City of Los Angeles minimum required design infiltration rate. There is also a potential risk of liquefaction-induced settlement and loss of soil bearing strength due to the presence of relatively shallow liquefiable soils and therefore infiltration is infeasible.

3. PROPOSED DEVELOPMENT

The proposed project consists of a 6-story residential building with on-grade and above grade parking.

The site drainage will mimic the existing drainage conditions with overflow discharging onto Del Rey Avenue through curb drains. Per the current storm water quality requirement of the City, the proposed redeveloped area will be required to have the stormwater treatment before draining to the existing storm drain system downstream.

To meet the City of Los Angeles LID & storm water quality requirements, the Permavoid devices and trench drains/area drains are proposed for mitigating the low flow and treatment for the required LID volumes. The proposed Permavoid devices are considered as the capture & reuse device which will be designed following the standards and requirements of the City of Los Angeles the Development Best Management Practices Book & LID manual. All on-site drains, storm drain pipes, permeable pavers, LID devices and BMP's will be privately maintained. The Operation and Maintenance Agreement will be done in the final engineering stage. For the Hydrology and the proposed renovation area location see the Preliminary Post-development Hydrology/LID/ SUSMP & BMP's Exhibit in Appendix B of this report.

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4. HYDROLOGY & METHODOLOGY

The hydrologic data and methodology used in this report is based on the Los Angeles County Department of Public Works, Hydrology Manual dated by 2006. The site doesn't fall within the Capital Flood Protection requirements and therefore the Urban Flood Protection only requires a 25-year frequency storm analysis. The site soil is class is # 016, the 50-year precipitation isohyetal is 5.4", and the 85th percentile precipitation is 1.1" (greater than 0.75"), is used for the Low Impact Design Volume calculations.

The Los County hydrologic calculator- HydroCalc was used to generate the 25-year peak discharge, time of concentration, LID Stormwater Quality Design Volume (Vd) calculations of this study. As the previously stated infiltration rate results show a percolation rate of 0.12 in/hr, which does not allow for efficient infiltration. The infiltration rate is below the required minimum design infiltration rate for design of stormwater infiltration improvements. Therefore, Permavoid capture & reuse treatment devices are the preferred method of stormwater mitigation per the City of Los Angeles LID Handbook.

Hydrology & LID rainfall values used in the study:

Storm Event & Duration	Rainfall (inches)
50-Year Storm, 24-Hour	5.4
85th Percentile 24-Hours	1.1

On-site hydrology calculation summary tables see below:

Pre-Development Hydrology Summary Table:

Drainage Area ID	Tributary Area (acre)	Impervious Ratio	Tc (min.)	Q_{25} (cfs)
1A	2.83	1.0	7	6.15
TOTAL	2.83			

Post-Development Hydrology Summary Table:

Drainage Area ID	Tributary Area (acre)	Impervious Ratio	Tc (min.)	Q_{25} (cfs)
1A	2.8	0.86	10	5.04
TOTAL	2.8			

Post-Development LID/SUSMP Summary Table:

Drainage Area ID	Tributary Area (acre)	Impervious Ratio	Tc (min.)	Required Treatment Peak Flow Qpm (cfs)	Required Treatment Volume SWQDv (ft^3)	Provided Treatment Volume:
1	1.86	1.0	22	0.55	6,630	6,630
2	0.94	0.60	37	0.14	2,159	2,159
TOTAL	2.8				8,788	8,788

5. CONCLUSION

In conclusion, this report demonstrates that the proposed redevelopment is designed to follow the City of Los Angeles drainage and LID requirements. The development will not increase runoff and will not cause flood risk to neighboring properties, or the public storm drain system. The owner will privately maintain the on-site drainage system, consisting of trench drains, permeable pavers, landscaping, and BMP's. The proposed Permavoid devices and drainage devices will be designed and comply with the flood protection and storm water quality requirements of the City of Los Angeles.

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Appendix A:

Vicinity Map & Hydrologic Map & Information

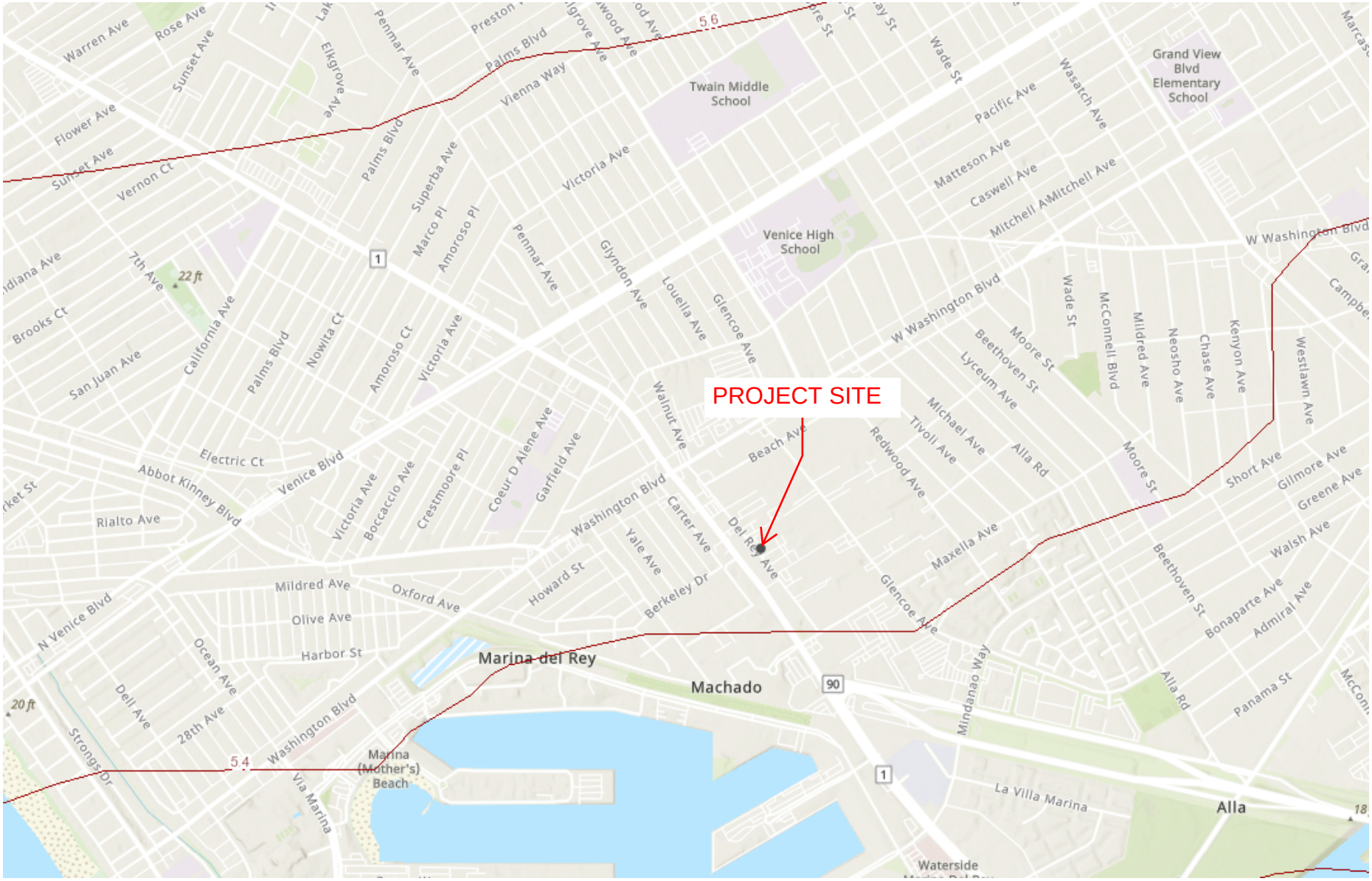
REFERENCE: USGS (2021)

SITE LOCATION MAP

LATERRA MARINA DEL REY
4112 DEL REY AVENUE
MARINA DEL REY, CA

PROJECT NO.	REPORT DATE	FIGURE 1


4230-005-001
4230-005-040
4230-005-069
4230-005-068
4230-002-014
4230-002-014
4230-002-015
4230-005-001
4230-005-045
4230-005-040
4230-002-012
4229-005-040
4229-005-096
4230-005-005
4230-005-047
016
4230-001-001
4230-005-047
4230-005-048
4229-005-097
4230-005-048
Lincoln Blvd
Del Rey Ave
Del Rey Ave
Carter Ave
Jefferson Way
Berkeley Dr
PROJECT SITE
4229-005-063
4229-005-064
4229-004-033
4230-005-153
4229-004-036
4229-004-037
4230-001-016


PROJECT SITE
Twain Middle School
Venice High School
Grand View Blvd Elementary School
Marina del Rey
Machado
Alla
Waterside
Marina (Mother's) Beach
La Villa Marina
Venice Blvd
Washington Blvd
W Washington Blvd
Abbot Kinney Blvd
Electric Ct
Rialto Ave
N Venice Blvd
Mildred Ave
Olive Ave
Harbor St
Oxford Ave
Howard St
Yale Ave
Berkeley Dr
Carter Ave
Del Rey Ave
Beach Ave
Glencoe Ave
Maxella Ave
Redwood Ave
Tivoli Ave
Michael Ave
Alla Rd
Moore St
Beethoven St
Lyceum Ave
Short Ave
Gilmore Ave
Greene Ave
Walsh Ave
Bonaparte Ave
Admiral Ave
Panama St
Mindanao Way
Pacific Ave
Wade St
Wasatch Ave
Matteson Ave
Caswell Ave
Mitchell AMitchell Ave
McConnell Blvd
Mildred Ave
Neosho Ave
Chase Ave
Kenyon Ave
Westlawn Ave
Victoria Ave
Palms Blvd
Vienna Way
Glyndon Ave
Louella Ave
Glencoe Ave
Penmar Ave
Superba Ave
Marco Pl
Amoroso Pl
Amoroso Ct
Nowita Ct
California Ave
Brooks Ct
San Juan Ave
Vernon Ct
Flower Ave
Sunset Ave
Warren Ave
Rose Ave
Sunset Ave
Elkgrove Ave
Penmar Ave
Preston
Palms Blvd
Boccaccio Ave
Crestmoore Pl
Coeur D Alene Ave
Garfield Ave
Walnut Ave
Ocean Ave
Dell Ave
28th Ave
Strongs Dr
Via Marina
7th Ave
22 ft
20 ft
18
5.6
5.4
1
90

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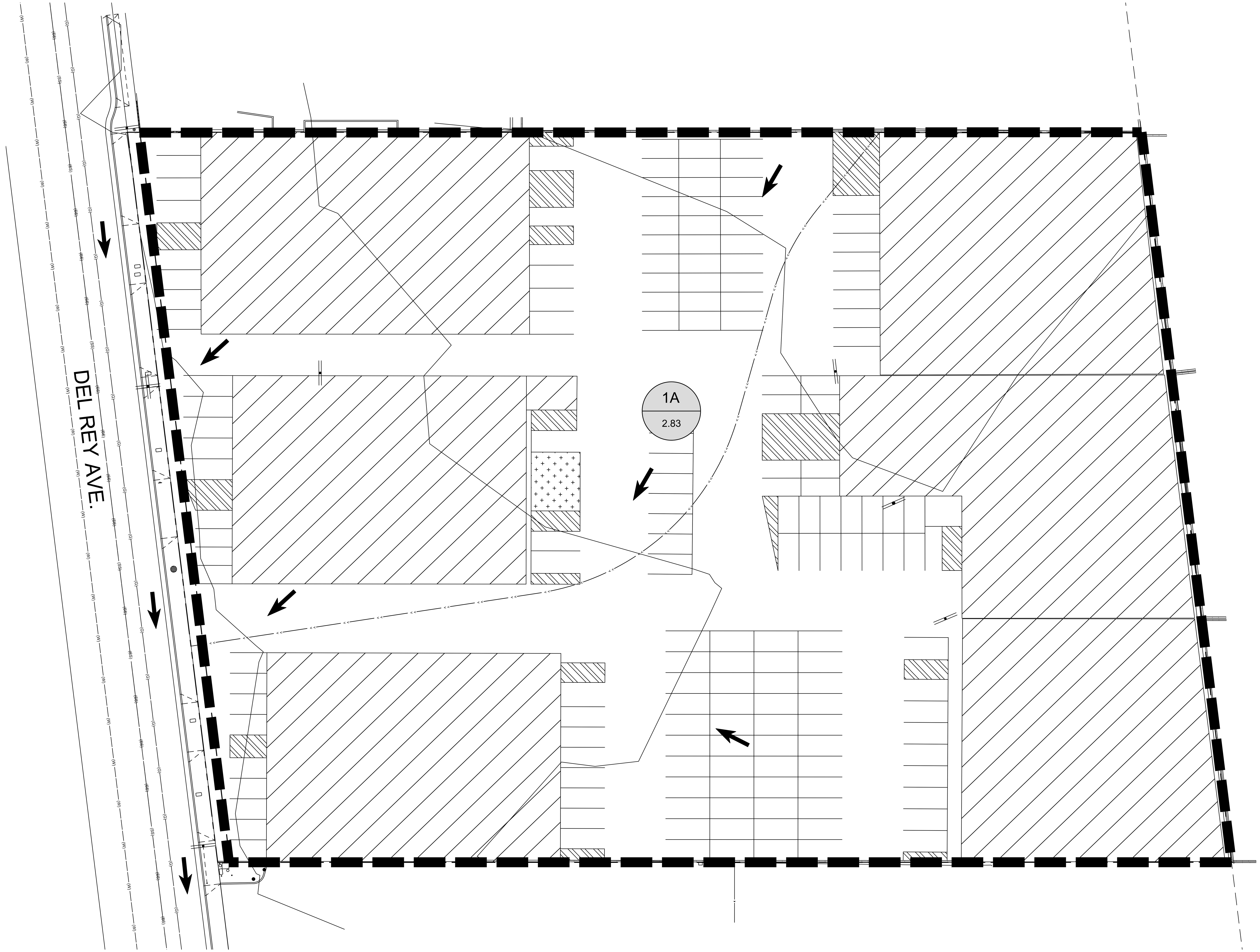
Appendix B: Hydrology Maps

- Pre-development Hydrology Exhibit

- Post-development Hydrology & LID Exhibit



LEGEND:

- PROJECT SITE AREA BOUNDARY
- FLOW LINE PATH
- EXIST. BUILDING
- FLOW DIRECTION ARROW
- 1A — SUB-DRAINAGE AREA ID
- 2.83 — AREA ACREAGE

HYDROLOGY INFORMATION

SITE AREA: 2.83 ACRE
SOIL NUMBER: 016
IMPERVIOUS: 100%
ISOHYETALS: 5.4" (50–YEAR)

SCALE
20 0 10 20 40
(FEET)
1 INCH = 20 FT.

Pre-Development Condition Hydrology Summary Table:

Subarea ID	Area (acre)	Length (ft)	Slope	Depth (in)	Imperviousness	Soil #	Design Frequency	Tc (min.)	Q25 (cfs)
1A	2.83	400	0.012	5.4	1	16	25-yr	7	6.15

PREPARED FOR:

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PREPARED BY:

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Phone: 213.337.3679

4112-4136 DEL REY AVENUE
MARINA DEL REY, CA

JOB NUMBER: LATDMDRI0001
DRAWN BY: R.K.
CHECKED BY: J.O.M.E.

PRE-DEVELOPMENT CONDITION
HYDROLOGY EXHIBIT

SCALE: 1"=20'
DATE: 07/21/2022
SHT NO.: 1 OF 2

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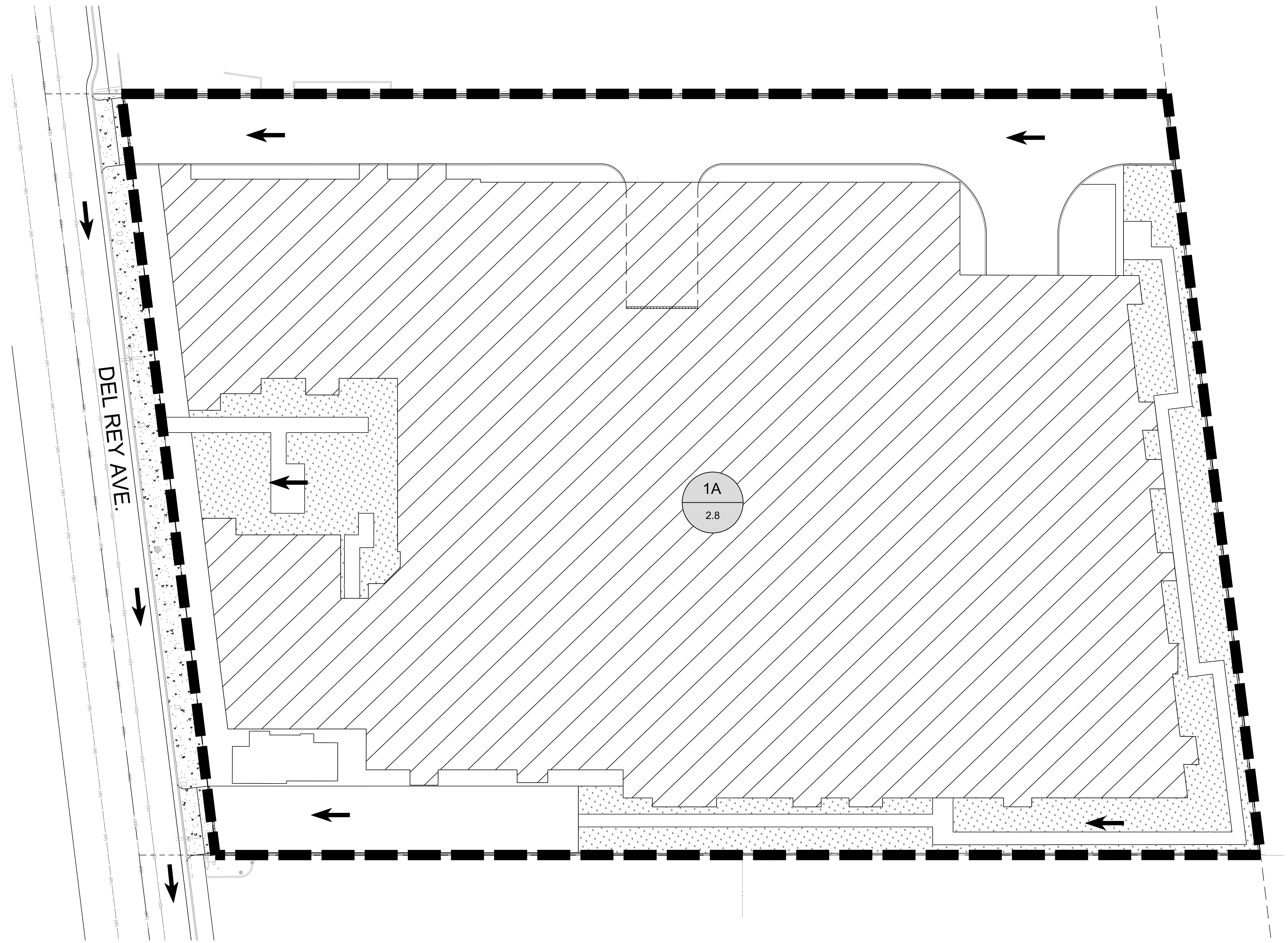
Last Opened: Aug 29, 2022 - 3:36pm By: Rxka



LEGEND:

- PROJECT SITE AREA BOUNDARY
- FLOW LINE PATH
- PROP. BUILDING
- LANDSCAPED AREA
- FLOW DIRECTION ARROW
- 1A — SUB-DRAINAGE AREA ID
- 2.8 — AREA ACREAGE

HYDROLOGY INFORMATION

SITE AREA: 2.8 ACRE
SOIL NUMBER: 016
IMPERVIOUS: 100%
ISOHYETALS: 5.4" (50-YEAR)

SCALE
20 0 10 20 40
(FEET)
1 INCH = 20 FT.

Pre-Development Condition Hydrology Summary Table:

Subarea ID	Area (acre)	Length (ft)	Slope	Depth (in)	Imperviousness	Soil #	Design Frequency	Tc (min.)	Q25 (cfs)
1A	2.83	400	0.012	5.4	1	16	25-yr	7	6.15

Post-Development Condition Hydrology Summary Table:

Subarea ID	Area (acre)	Length (ft)	Slope	Depth (in)	Imperviousness	Soil #	Design Frequency	Tc (min.)	Q25 (cfs)
1A	2.8	690	0.0085	5.4	0.86	16	25-yr	10	5.04

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Los Angeles, CA 90012
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4112-4136 DEL REY AVENUE
MARINA DEL REY, CA

JOB NUMBER: LATDMDRI0001
DRAWN BY: R.K.
CHECKED BY: J.O.M.E.

POST-DEVELOPMENT CONDITION
HYDROLOGY EXHIBIT

SCALE: 1"=20'
DATE: 07/21/2022
SHT NO.: 2 OF 2

LID PLAN

4112-4136 DEL REY AVE.
MARINA DEL REY, CA 90292

DAVID EVANS AND ASSOCIATES INC.
201 S. Figueroa Street, Suite 240
Los Angeles, CA 90012
Phone: 213.337.3679

LEGEND

- X / XX,XXX SF — SUBAREA DESIGNATION; SUBAREA'S AREA VALUE IN SQUARE FOOTAGE
- PROPERTY LINE
- ROOF AREA
- LANDSCAPE AREA (NON-LID)
- PERMAVOID PLANTER 7,091 FT²

Area = 2.8 acrea
Area Impervious = 2.4 acres

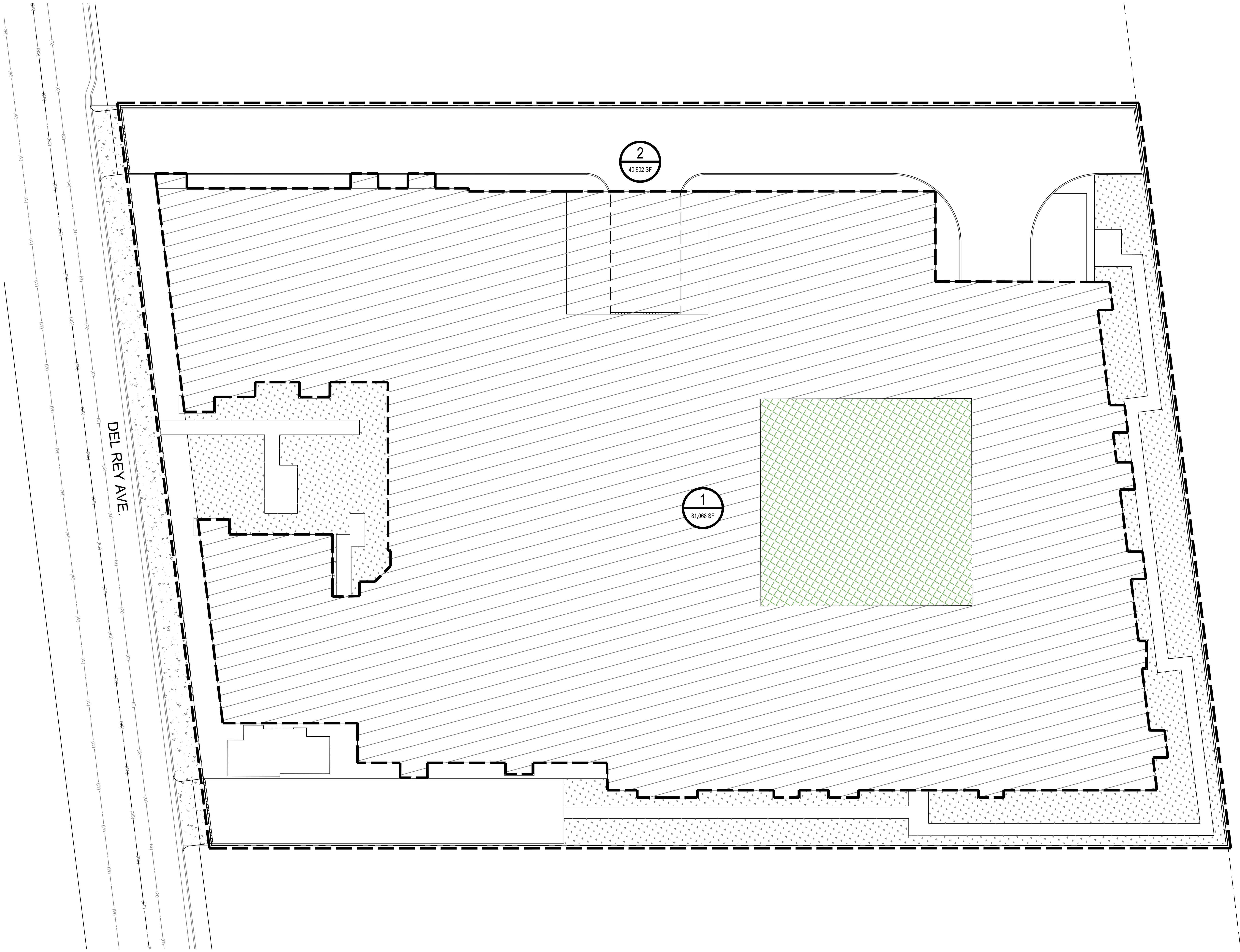
Vm = 8,788 CF

NOTE:

ALL TRASH BINS SHALL BE COVERED.

ANY CHANGES (TYPE, SIZE, LOCATION) TO APPROVED STORMWATER BEST MANAGEMENT PRACTICE(S) (BMPs) MUST OBTAIN WRITTEN APPROVAL FROM LOS ANGELES, DEPARTMENT OF PUBLIC WORKS, BUREAU OF SANITATION PRIOR TO CONSTRUCTION OF BMP(S).

DIRECT OVERFLOW DISCHARGE PER BUREAU OF ENGINEERING AND BUILDING AND SAFETY REQUIREMENTS.



THIS STENCIL TO BE INSTALLED ON ALL DRAINAGE INLETS, i.e.-CATCH BASINS PER CODE REQUIREMENTS.

STENCIL DETAIL
N.T.S.

AREA FLOW AND MITIGATED FLOW INFORMATION:

DRAINAGE SUBAREA	AREA (SQ. FT.)	AREA (ACRE)	ROOF AREA (SQ. FT.)	GROUND AREA (SQ. FT.)	IMPERVIOUS AREA (SQ. FT.)	PERVIOUS AREA (SQ. FT.)	BMP TYPE PROVIDED	MITIGATED VOLUME V_{DES}	STORED VOLUME V_S	REQUIRED MITIGATED VOLUME V_S
1	81,068	1.86	81,068	0	81,068	0	PERMAVOID	-	-	
2	40,902	0.94	0	40,902	24,176	16,726	FILTER INSERTS, LANDSCAPING, PERMEABLE PAVERS	-	-	
TOTAL:	121,970	2.80	81,068	40,902	105,244	16,726		-	-	-

SCALE
20 0 10 20 40
(FEET)
1 INCH = 20 FT.

DATE:	BY	CK
REVIEWED BY:		
NO.	DATE	REVISION

REGISTERED PROFESSIONAL ENGINEER
JODI LINDSEY MENSEN
No. 79693
CIVIL
STATE OF CALIFORNIA

CHECKED BY: JOME
DESIGNED BY: RAK
DRAWN BY: RAK

FIRST SUBMITTAL DATE:

PROJECT NO.
LATDMDRI0001

SHEET NO.
---- OF 5

Plot Date: 8/29/2022 4:26 PM By: Robyn Katherman
Save Date: 8/29/2022 4:17 PM By: Raka File: P:\LATDMDRI00010400CAD\SHEETS\EC\EC-001-LATDMDRI0001-LID.dwg

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Appendix C:

Pre-development Hydrology Calculations (Q_{25})

Peak Flow Hydrologic Analysis

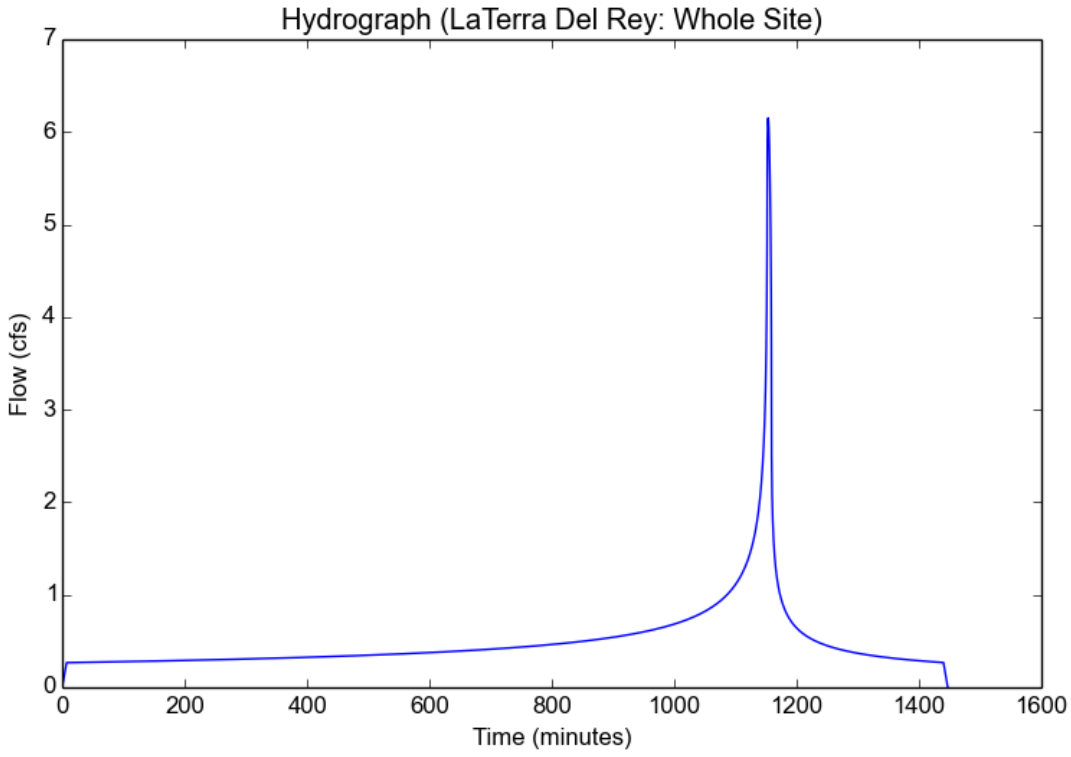
File location: C:/Users/Rxka/Desktop/LaTerra Del Rey - Existing Whole Site 25 yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LaTerra Del Rey
Subarea ID	Whole Site
Area (ac)	2.83
Flow Path Length (ft)	400.0
Flow Path Slope (vft/hft)	0.012
50-yr Rainfall Depth (in)	5.4
Percent Impervious	1.0
Soil Type	16
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	4.7412
Peak Intensity (in/hr)	2.415
Undeveloped Runoff Coefficient (Cu)	0.8017
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	6.1509
Burned Peak Flow Rate (cfs)	6.1509
24-Hr Clear Runoff Volume (ac-ft)	0.998
24-Hr Clear Runoff Volume (cu-ft)	43473.0378



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Appendix D:

Post-development Hydrology Calculations (Q_{25})

Peak Flow Hydrologic Analysis

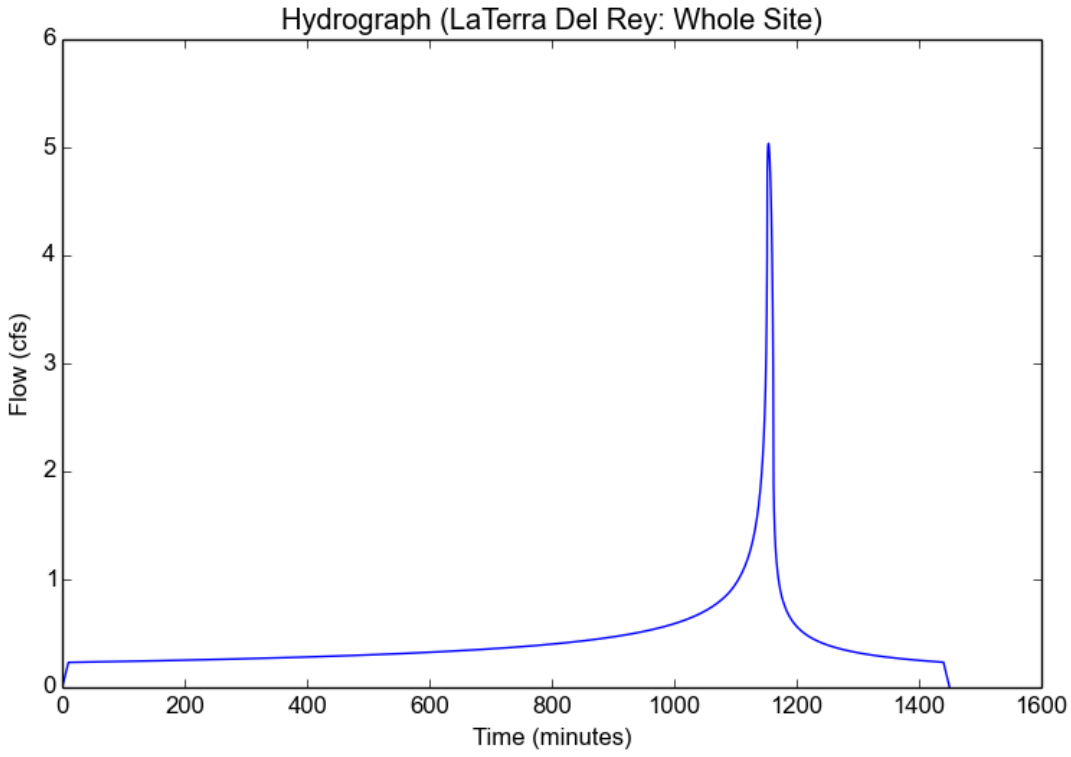
File location: C:/Users/Rxka/Desktop/LaTerra Del Rey - Whole Site.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LaTerra Del Rey
Subarea ID	Whole Site
Area (ac)	2.8
Flow Path Length (ft)	690.0
Flow Path Slope (vft/hft)	0.0085
50-yr Rainfall Depth (in)	5.4
Percent Impervious	0.86
Soil Type	16
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	4.7412
Peak Intensity (in/hr)	2.0422
Undeveloped Runoff Coefficient (Cu)	0.7619
Developed Runoff Coefficient (Cd)	0.8807
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	5.0359
Burned Peak Flow Rate (cfs)	5.0359
24-Hr Clear Runoff Volume (ac-ft)	0.876
24-Hr Clear Runoff Volume (cu-ft)	38159.379



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Appendix E:

Required Treatment Peak Flow Qpm &

LID-Stormwater Design Volume (SWQDv) Calculations

Peak Flow Hydrologic Analysis

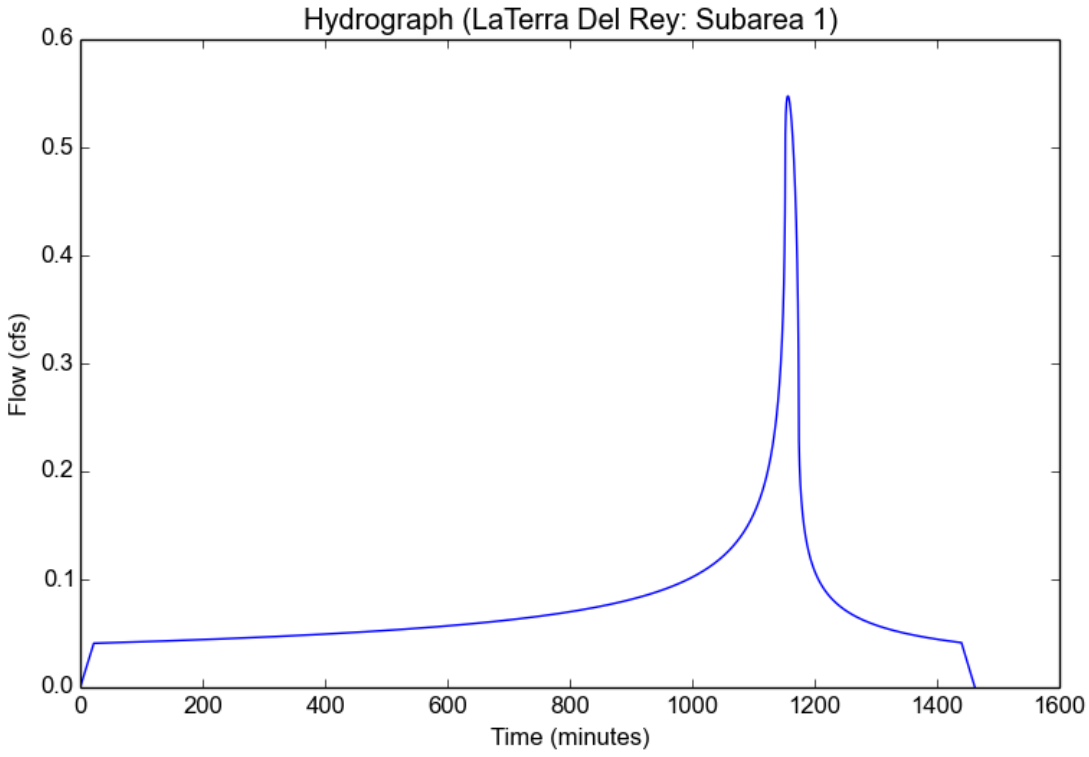
File location: C:/Users/Rxka/Desktop/LaTerra Del Rey - Subarea 1.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LaTerra Del Rey
Subarea ID	Subarea 1
Area (ac)	1.86
Flow Path Length (ft)	500.0
Flow Path Slope (vft/hft)	0.01
85th Percentile Rainfall Depth (in)	1.1
Percent Impervious	1.0
Soil Type	16
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.1
Peak Intensity (in/hr)	0.3271
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	22.0
Clear Peak Flow Rate (cfs)	0.5476
Burned Peak Flow Rate (cfs)	0.5476
24-Hr Clear Runoff Volume (ac-ft)	0.1522
24-Hr Clear Runoff Volume (cu-ft)	6629.0807



Peak Flow Hydrologic Analysis

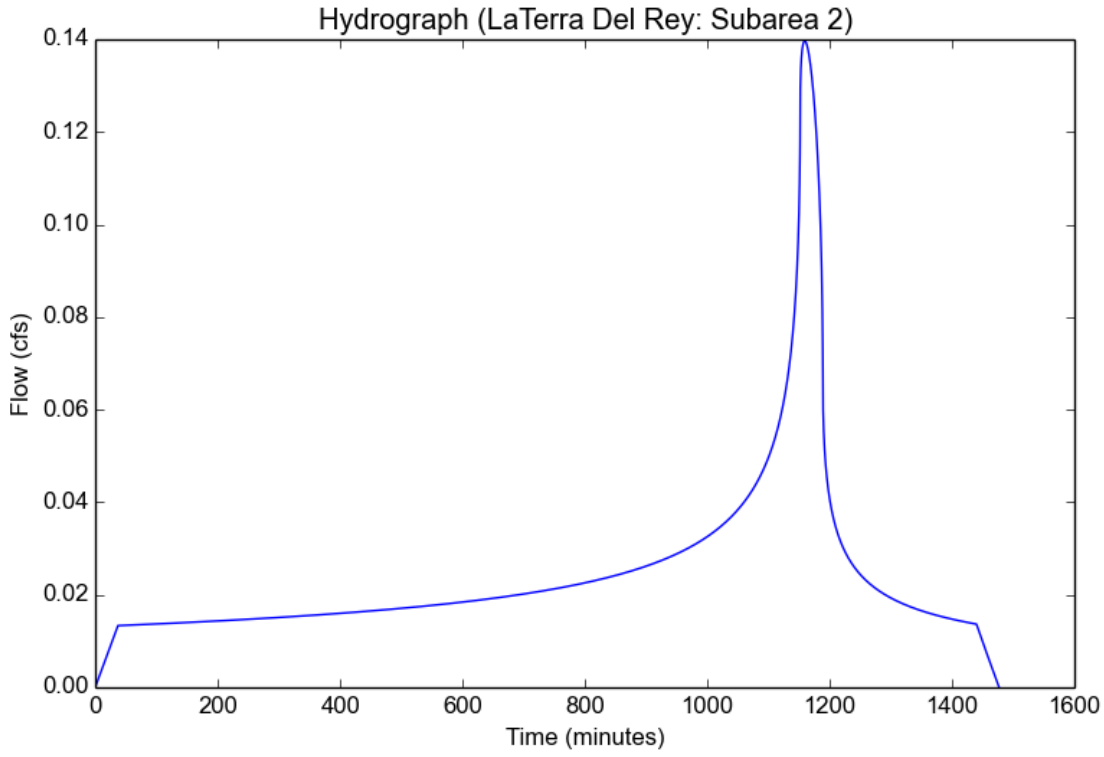
File location: C:/Users/Rxka/Desktop/LaTerra Del Rey - Subarea 2.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LaTerra Del Rey
Subarea ID	Subarea 2
Area (ac)	0.94
Flow Path Length (ft)	690.0
Flow Path Slope (vft/hft)	0.0085
85th Percentile Rainfall Depth (in)	1.1
Percent Impervious	0.6
Soil Type	16
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.1
Peak Intensity (in/hr)	0.2562
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.58
Time of Concentration (min)	37.0
Clear Peak Flow Rate (cfs)	0.1397
Burned Peak Flow Rate (cfs)	0.1397
24-Hr Clear Runoff Volume (ac-ft)	0.0496
24-Hr Clear Runoff Volume (cu-ft)	2159.0299



Appendix F:

Permavoid Device Details

ABT, INC.
WWW.ABTDRAINS.COM
PH: (800) 438 - 6057

permavoid

Los Angeles Low Impact Development
Capture & Use Planter Design Calculations

Project Name: Dey Rey **Date:** 8/9/2022
Project Number: PV323133 - "NOT FOR CONSTRUCTION - FOR YOUR REFERENCE ONLY"

Planter ID Number:	CU	2	
Catchment Area:	Acat	72,302	ft²
85th Percentile Storm Depth:	D85	0.0917	ft
Soil Depth:	D*soil*	18.0	in.
Soil Available Water:	Wa	0%	%
Ponding Depth:	D*pond*	0.0	Allowed
Soil Saturated Infiltration Rate:	Ksat	N/A	
Safety Factor:	SF	N/A	
Time To Fill:	Tf	N/A	
Permavoid System Depth:	150x2	11.8	in.
Permavoid Voids:	Vpv	95	%
7-Month Reference Evapotranspiration:	ETo7	21.7	in.
Permavoid Irrigation Efficiency:	IE	0.85	

Design Summary		
Planter Area:	**Ap**	**7091.4 ft²**
Capture & Use Volume:	**Vcu**	**6630.1 ft³**
Biofiltration Volume:	**Vbf**	**N/A**
Plant Factor (min.):	**PF**	**0.44**
Internal Planter Depth:	**D*ip***	**30 in.**

Material Requirements		
Permavoid Units:	**PV-150**	**5228 Units**
Capillary Cones:	**23/160 T**	**5228 Pairs**
Wicking Geotextile Length:	**Cap. Tex.**	**811 - 1183 ft**
Planting Media:	**By Others**	**433.4 CY**

*NOTES: Quantities are for estimation only. Fluctuations in material quatities will occur based on the precise configuration. Contact ABT-Permavoid for planting media recommendations based on soil depth.

Calculate the Design Capture Volume (Vcap):

Vcap = D85 · Acat
Vcap = 0.0917ft · 72302.4ft²
Vcap = 6630.1 ft³

Calculate the Permavoid Capture & Use Depth (Dcu):

Dcu = (150x2 · Vpv) + (Dsoil · Wa)
Dcu = (11.8in. · 95%) + (18in. · 0%)
Dcu = 11.22 in. = 0.935 ft

Calculate the Planter Area (Ap):

Ap = 7091.4 ft²

Calculate the Capture & Use Volume (Vcu):

Vcu = Ap · Dcu
Vcu = 7091.4 ft² · 0.935ft
Vcu = 6630.1 ft³

Calculate the Minimum Required Plant Factor (PF):

PF = (Vcu · IE) / (ETo7 · Ap)
PF = (6630.1 ft³ · 0.85) / [(21.7in. / 12ipf) · 7091.4 ft²]
PF = 0.44

Calculate the 7-Month Estimated Total Water Use (ETWU-7):

ETWU-7 = (ETo7 · PF · Ap) / IE
ETWU-7 = [(21.7in. / 12ipf) · 0.44 · 7091.4 ft²] / 0.85
ETWU-7 = 6630.1 ft³

Check the Capture & Use Volume (Vcu) vs. the 7-Month Estimated Total Water Usage (ETWU-7):

Vcu vs. ETWU-7
6630.1 ft³ vs. 6630.1 ft³
6630.1 ft³ = 6630.1 ft³
Vcu = ETWU-7 ✓ - CHECKED

DAVID EVANS AND ASSOCIATES INC.

Appendix G:

Soil Percolation Test Information

SCALE IN FEET

0 60 120

NOTE: ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE

LEGEND

B-1 TD=26.5'	APPROXIMATE LOCATION OF BORING BY TWINING TOTAL DEPTH IN FEET
P-1 TD=5'	APPROXIMATE LOCATION OF PERCOLATION TEST BY TWINING TOTAL DEPTH IN FEET
CPT-1 TD=27.8'	APPROXIMATE LOCATION OF CPT BY TWINING TOTAL DEPTH IN FEET
	APPROXIMATE PROJECT LIMITS

N

REFERENCE: GOOGLE EARTH (2022)

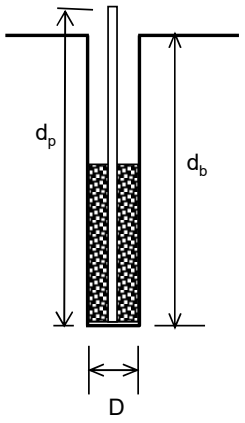
TWINING

SITE PLAN AND BORING LOCATION MAP

LATERRA MARINA DEL REY
4112 DEL REY AVENUE
MARINA DEL REY, CA

PROJECT No.	REPORT DATE	
220205.1	May 2022	FIGURE 2

BORING PERCOLATION FIELD Log



Project No.: 220205.1
Project Name: 4112 Del Rey Ave

Boring No.: P-1
Diameter of Boring (D): 8.0 inches
Depth of Boring (d_b): 5.0 feet = 60 inches
Diameter of Perc. Pipe : 3.0 inches
Length of Pipe (d_p) : 5.0 feet = 60 inches

PRE-SOAK

Date: 4/7/2022
Start Time: 8:05 AM
Elapsed Time: 60.00 minutes

REDUCTION FACTORS

Boring method:	RF_t =	2	
Site variability:	RF_v =	1	(1 ~ 3)
Long-term siltation:	RF_s =	1	(1 ~ 3)
Total Reduction Factor:	$RF = RF_t \times RF_v \times RF_s$ =	**2**	

PERCOLATION TEST **Test Date:** 4/7/2022 **Test Performer:** CD **Calculated by:** CD

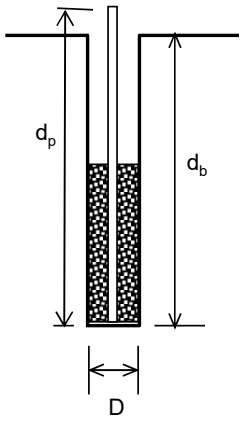
Reading Number	Initial Time T_i	Final Time T_f	Elapsed Time ΔT (min)	Initial depth to water surface dw_i (inches)	Final depth to water surface dw_f (inches)	Initial height of water column d_i (inches)	Drop of water column Δd (inches)	Water height drop rate $k_i = \Delta d / \Delta T$ (inch/hr)	Surface area factor S_f	Raw Percolation Rate $k = k_i / S_f$ (inch/hr)
1	9:05 AM	9:35 AM	30	0.0	5.25	60.0	5.3	10.50	29.7	0.35
2	9:40 AM	10:10 AM	30	0.0	4.88	60.0	4.9	9.75	29.8	0.33
3	10:12 AM	10:42 AM	30	0.0	4.08	60.0	4.1	8.16	30.0	0.27
4	10:48 AM	11:18 AM	30	0.0	3.75	60.0	3.8	7.50	30.1	0.25
5	11:20 AM	11:50 AM	30	0.0	3.75	60.0	3.8	7.50	30.1	0.25
6	11:51 AM	12:21 PM	30	0.0	3.75	60.0	3.8	7.50	30.1	0.25

Measured Percolation Rate $k_{measured}$ (inch/hr) = **0.25**

Design Infiltration rate (inch/hr) = $k_{measured}$/RF = **0.12**

County Guidelines For Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration, GS200.1, dated 06/30/21

BORING PERCOLATION FIELD Log



Project No.: 220205.1
Project Name: 4112 Del Rey Ave

Boring No.: P-2
Diameter of Boring (D): 8.0 inches
Depth of Boring (d_b): 5.0 feet = 60 inches
Diameter of Perc. Pipe : 3.0 inches
Length of Pipe (d_p) : 5.0 feet = 60 inches

PRE-SOAK

Date: 4/7/2022
Start Time: 8:35 AM
Elapsed Time: 60.00 minutes

REDUCTION FACTORS

Boring method:	RF_t =	2	
Site variability:	RF_v =	1	(1 ~ 3)
Long-term siltation:	RF_s =	1	(1 ~ 3)
Total Reduction Factor:	$RF = RF_t \times RF_v \times RF_s$ =	**2**	

PERCOLATION TEST **Test Date:** 4/7/2022 **Test Performer:** CD **Calculated by:** CD

Reading Number	Initial Time T_i	Final Time T_f	Elapsed Time ΔT (min)	Initial depth to water surface dw_i (inches)	Final depth to water surface dw_f (inches)	Initial height of water column d_i (inches)	Drop of water column Δd (inches)	Water height drop rate $k_i = \Delta d / \Delta T$ (inch/hr)	Surface area factor S_f	Raw Percolation Rate $k = k_i / S_f$ (inch/hr)
1	9:45 AM	10:15 AM	30	6.0	13.9	54.0	7.9	15.84	26.0	0.61
2	10:18 AM	10:48 AM	30	0.0	11.4	60.0	11.4	22.80	28.2	0.81
3	10:52 AM	11:22 AM	30	6.0	10.2	54.0	4.2	8.40	27.0	0.31
4	11:24 AM	11:54 AM	30	6.0	9.6	54.0	3.6	7.20	27.1	0.27
5	11:55 AM	12:25 PM	30	6.0	9.6	54.0	3.6	7.20	27.1	0.27
6	12:28 PM	12:58 PM	30	6.0	9.6	54.0	3.6	7.20	27.1	0.27

Measured Percolation Rate $k_{measured}$ (inch/hr) = **0.27**

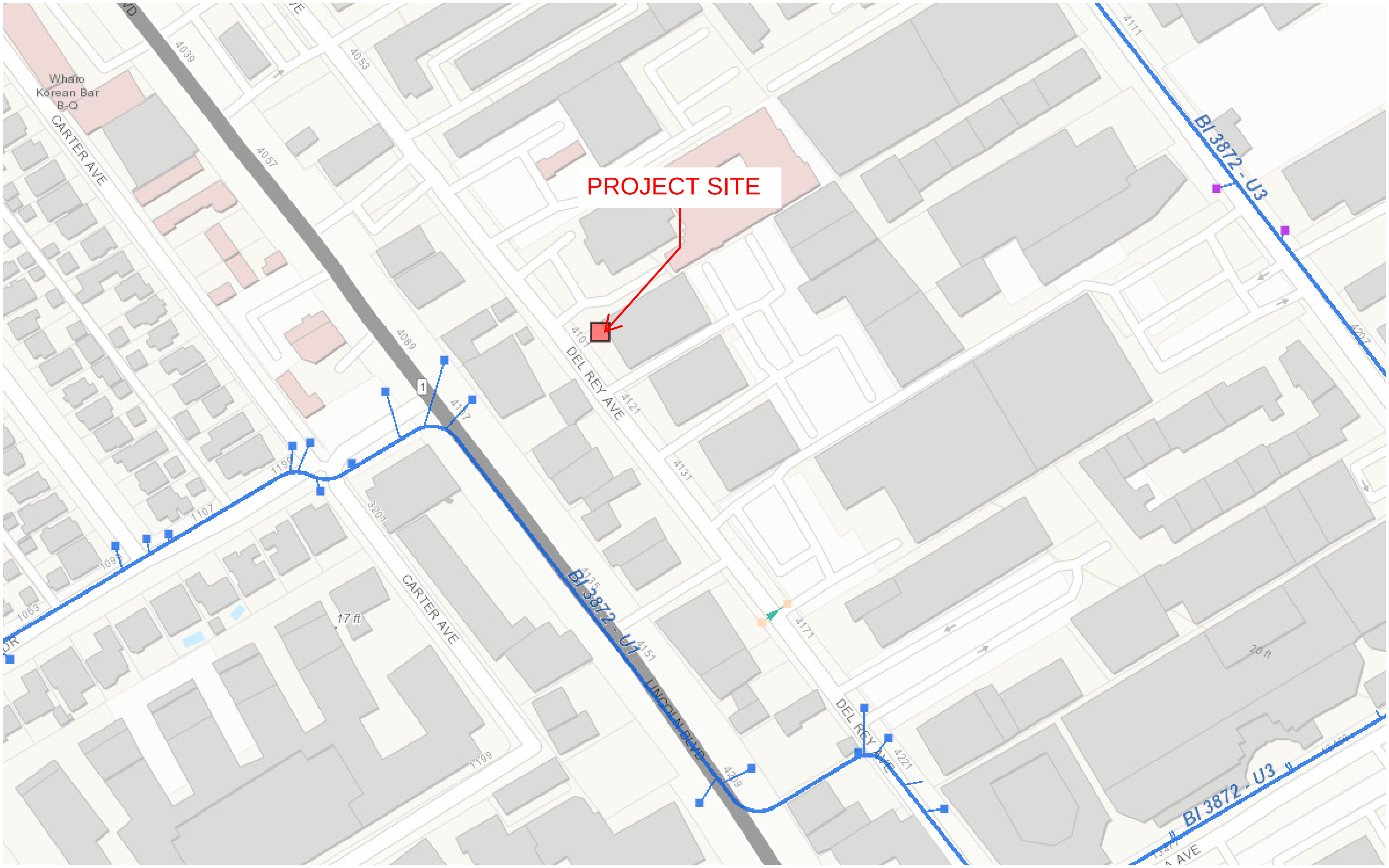
Design Infiltration rate (inch/hr) = $k_{measured}$/RF = **0.13**

County Guidelines For Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration, GS200.1, dated 06/30/21

DAVID EVANS AND ASSOCIATES INC.

Appendix H:

Existing Storm Drain Information


PROJECT SITE
Wharo Korean Bar B-Q
CARTER AVE
DEL REY AVE
LINCOLN BLVD
BI 3872 - U1
BI 3872 - U3
17 ft
20 ft

DAVID EVANS AND ASSOCIATES INC.

Appendix J:

BMP's Operate & Maintenance Agreement
(Will be done in final engineering)