Appendix H WQMP

Appendices

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PRELIMINARY
WATER QUALITY MANAGEMENT PLAN (WQMP)

MERCURY AND BERRY

Brea, California
APN 296-141-05

Prepared For

Manley Fanticola Holdings, LLC
330 West Birch Street
Brea, CA 92821
714.990.2405

Prepared By

Fuscoe Engineering, Inc.
16795 Von Karman, Suite 100
Irvine, California 92606
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Project Manager:
Soojin Shim, PE

Date Prepared: June 6, 2018
Job Number: 1743.001.01

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PRELIMINARY WATER QUALITY MANAGEMENT PLAN (WQMP)

MERCURY AND BERRY

June 6, 2018

1743.001.01

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PRELIMINARY
WATER QUALITY MANAGEMENT PLAN (WQMP)

MERCURY AND BERRY

Brea, County of Orange

APN 296-141-05

Prepared for:

MANLEY FANTICOLA HOLDINGS, LLC
330 West Birch Street
Brea, CA 92821
714.990.2405

Prepared by:

FUSCOE ENGINEERING, INC.
16795 Von Karman, Suite 100
Irvine, CA 92618
949.474.1960
Soojin Shim, PE

Date Prepared: June 6, 2018

PROJECT OWNER'S CERTIFICATION			
Permit/Application No.:	Pending	**Grading Permit No.:**	Pending
Tract/Parcel Map and Lot(s)No.:	APN 296-141-05, Parcel 3	**Building Permit No.:**	Pending
Address of Project Site and APN:	Mercury Lane and Berry Street APN 296-141-05		

This Water Quality Management Plan (WQMP) has been prepared for MANLEY FANTICOLA HOLDINGS, LLC by FUSCOE ENGINEERING, INC. The WQMP is intended to comply with the requirements of the County of Orange NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan , including the ongoing operation and maintenance of all best management practices (BMPs), and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP) and the intent of the non-point source NPDES Permit for Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. An appropriate number of approved and signed copies of this document shall be available on the subject site in perpetuity.

CITY OF BREA
PUBLIC WORKS DEPT.
APPROVED RE-SUBMIT
7/18/18

OWNER:			
Name:	Dwight Manley		
Title:			
Company:	Manley Fanticola Holdings, LLC		
Address:	330 West Birch Street, Brea CA 92821		
Email:	dmanleyinc@aol.com		
Telephone #:	714.990.2405		
I understand my responsibility to implement the provisions of this WQMP including the ongoing operation and maintenance of the best management practices (BMPs) described herein.			
Owner Signature:		**Date:**	July 17th, 2018

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- Household Tips
- Proper Disposal of Household Hazardous Waste
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- Tips for Landscaping and Gardening
- Tips for Pet Care
- Tips for Pool Maintenance
- Tips for Protecting Your Watershed
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- R-6 Disposal of Green Waste
- R-8 Water Conservation
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- SD-12 Efficient Irrigation

SECTION I DISCRETIONARY PERMITS AND WATER QUALITY CONDITIONS

PROJECT INFORMATION			
Permit/Application No.:	Pending	**Grading or Building Permit No.:**	Pending
Address of Project Site (or Tract Map and Lot Number if no address) and APN:	Mercury Lane and Berry Street APN 296-141-05, Parcel 3		
WATER QUALITY CONDITIONS OF APPROVAL OR ISSUANCE			
Discretionary Permit(s):	Pending		
Water Quality Conditions of Approval or Issuance applied to this project: **(Please list verbatim.)**	Pending – to be provided in Final WQMP		
CONCEPTUAL WQMP			
Was a Conceptual Water Quality Management Plan previously approved for this project?	Not applicable		
WATERSHED-BASED PLAN CONDITIONS			

Applicable conditions from watershed - based plans including WIHMPs and TMDLs:	The Los Angeles RWQCB has adopted TMDLs for the San Gabriel River that apply to the portions of Orange County that drain to Coyote Creek: ▪ Metals (Copper, Lead, Zinc) Section XII.D5 of the Santa Ana Region MS4 Permit (Order No. R8-2009-0030) requires Watershed Infiltration and Hydromodification Master Plan (WIHMPs) to be developed by the County of Orange for San Diego Creek and other watersheds within the North Orange County permit area. Each WIHMP must include maps to identify areas susceptible to hydromodification, and a hydromodification tool. A Model WIHMP has been developed for the San Gabriel River / Coyote Creek Watershed, and was submitted to the Santa Ana RWQCB on May 23, 2011 (currently under review). The WIHMP includes information related to infiltration feasibility and hydromodification susceptibility at the watershed and sub-watershed scale to aid in BMP selection and design for priority projects. The information provided in the WIHMP was referenced as part of the feasibility analyses conducted for this project, and are discussed further in Section IV.3 of this WQMP.

SECTION II PROJECT DESCRIPTION

II.1 PROJECT DESCRIPTION

The proposed Mercury and Berry project site encompasses approximately 1.01 acres in the City of Brea. The project site is bounded by Mercury Lane to the north, industrial buildings along the Brea trail to the east, industrial buildings and Imperial Highway to the south, and Berry Street to the west. A Vicinity Map is included in Section VI.

Under existing conditions, the project site is an undeveloped dirt lot. Adjacent land uses include industrial buildings to the north, east, west, and south of the project site.

The table below summarizes the proposed project.

DESCRIPTION OF PROPOSED PROJECT				
Development Category (Model WQMP, Table 7.11-2; or 7.11-3):	Category 1 New development projects that create 10,000 square feet or more of impervious surface. This category includes commercial, industrial, residential housing subdivisions, mixed-use, and public projects on private or public property that falls under the planning and building authority or the Permittees.			
Project Area (ft^2):	44,038 ft^2 (1.01 acres)			
# of Dwelling Units:	120			
SIC Code:	N/A			
Narrative Project Description:	The proposed project site is a 5-story building to accommodate 120 residential units, with a parking structure occupying the first 2 levels in addition to an underground parking level. A total of 208 parking spots are proposed for the site.			
Project Area:	**Pervious Area**	**Pervious Area Percentage**	**Impervious Area**	**Impervious Area Percentage**
Pre-Project Conditions:	1.01 ac	100%	0 ac	0
Post-Project Conditions:	0.16 ac	16%	0.85 ac	84%

DESCRIPTION OF PROPOSED PROJECT	
Drainage Patterns/ Connections:	Under existing conditions, the western portion of the project site sheet flows in a southerly direction towards the adjacent southern property, while the eastern portion of the site drains in a southeasterly direction towards the southeastern corner of the project site that discharges flows off site. All flows from the project site eventually connect into storm drain lines that converge into the Brea Canyon Channel located about 500 feet due east of the project site, and ultimately drain out to the Pacific Ocean. Under proposed conditions, flows will be conveyed in a manner similar to existing conditions, though flows will converge at one discharge point at the southeastern corner of the site prior to draining into the Brea Canyon Channel. Runoff flows from the rooftop and podium level will drain into raised planter boxes for biotreatment prior to outlet discharge at-grade, with treated flows leaving the project site at the southeastern corner. High flows will be diverted and will sheet flow west onto Berry Street or exit at the discharge point in the southeast corner of the project site. Any flows not naturally infiltrated along the at-grade sidewalk landscaping will flow southeast along an existing v-ditch and connect to the southeastern corner discharge point and converge into the Brea Canyon Channel.

PROJECT FEATURES					
Building Summary:	# BR	Unit SF	Qty.	%	Total SF
	Studio	458	108	90%	49,464
	1BR	675	8	7%	5,400
	2BR	1,107	4	3%	4,428
	TOTAL	Avg. 494	120	100%	59,292
Amenities:	Amenities within the proposed project site will include a leasing office and lobby, fitness room, mail room, and a courtyard located on the podium on the building's third floor for communal activities. Landscaping will be provided throughout the project site.				
Landscaped Areas:	Landscaping will be located in the courtyard common area and perimeter of the buildings. Landscaping will consist of a mix of turf areas for recreational activities as well as planters and setbacks for passive uses. At this preliminary stage of development, approximately 16% of the project site will be landscaped, subject to change upon finalization of the project site.				
Parking Facilities:	A 2-level, at-grate parking structure within the building, and an additional underground level will provide approximately 208 parking spaces. A bicycle locker with 120 stalls is also provided within the first floor.				

PROJECT FEATURES	
Other Project Features:	The property will include one trash room on the northwestern side of the first floor. Trash will be properly disposed of on a weekly schedule. The site will not have any outdoor storage areas, loading dock, vehicle/ community car wash racks, vehicle/equipment wash areas, or commercial kitchens/food preparation areas.
Outdoor Activities:	Outdoor areas throughout the site will be used for recreational and open space purposes. The recreation areas will include a bocce ball court and landscaped/hardscaped areas for communal activities. All other outdoor areas will be used for walkways, common areas and landscaping, and other recreational purposes.
Materials Stored:	Materials anticipated to be stored on-site include those associated with residential, commercial retail, and pool maintenance (i.e. cleaning products, storage, etc.); however, no hazardous wastes will be stored on-site. No outdoor storage of materials is anticipated (materials will be stored indoors).
Wastes Generated:	The project is not anticipated to generate any wastes other than landscape clippings, typical trash, debris and refuse from the tenants. Outdoor trash receptacles will be provided throughout the common areas of the site for the tenants to dispose of their refuse in a proper manner, and property maintenance will provide trash and waste material removal to maintain a trash-free property. All wastes shall be collected and properly disposed of off-site.

II.2 POTENTIAL STORM WATER POLLUTANTS

The table below, derived from Table 2 of the Countywide Model WQMP Technical Guidance Document (May 2011), summarizes the categories of land use or project features of concern and the general pollutant categories associated with them.

Priority Project Categories and/or Features: Attached Residential Development

POLLUTANTS OF CONCERN		
Pollutant	**E = Expected to be of concern N =Not Expected to be of concern**	**Additional Information and Comments**
Suspended Solid/ Sediment	E	
Nutrients	E	303(d) listed impairment for downstream receiving waters
Heavy Metals	N	

POLLUTANTS OF CONCERN		
Pollutant	**E = Expected to be of concern N =Not Expected to be of concern**	**Additional Information and Comments**
Pathogens (Bacteria/Virus)	E	303(d) listed impairment for downstream receiving waters
Pesticides	E	303(d) listed impairment for downstream receiving waters
Oil & Grease	E	
Toxic Organic Compounds	N	
Trash & Debris	E	

II.3 HYDROLOGIC CONDITIONS OF CONCERN

The purpose of this section is to identify any hydrologic conditions of concern (HCOC) with respect to downstream flooding, erosion potential of natural channels downstream, impacts of increased flows on natural habitat, etc. As specified in Section 2.3.3 of the 2011 Model WQMP, projects must identify and mitigate any HCOCs. A HCOC is a combination of upland hydrologic conditions and stream biological and physical conditions that presents a condition of concern for physical and/or biological degradation of streams.

In the North Orange County permit area, HCOCs are considered to exist if any streams located downstream from the project are determined to be potentially susceptible to hydromodification impacts and either of the following conditions exists:

- Post-development runoff volume for the 2-yr, 24-hr storm exceeds the pre-development runoff volume for the 2-yr, 24-hr storm by more than 5 percent

or

- Time of concentration (Tc) of post-development runoff for the 2-yr, 24-hr storm event exceeds the time of concentration of the pre-development condition for the 2-yr, 24-hr storm event by more than 5 percent.

If these conditions do not exist or streams are not potentially susceptible to hydromodification impacts, an HCOC does not exist and hydromodification does not need to be considered further. In the North Orange County permit area, downstream channels are considered not susceptible to hydromodification, and therefore do not have the potential for a HCOC, if all downstream conveyance channels that will receive runoff from the project are engineered, hardened, and regularly maintained to ensure design flow capacity, and no sensitive habitat areas will be affected.

Is the proposed project potentially susceptible to hydromodification impacts?

☒ Yes ☐ No (show map)

2-YEAR, 24-HOUR STORM SUMMARY				
Condition	**Acreage**	**Tc**	**Peak Runoff**	**Volume**
Pre-development	1.01 ac	10.28 min	1.02 cfs	0.05 ac-ft
Proposed	1.01 ac	7.40 min	1.58 cfs	0.12 ac-ft
Difference	**0**	**-2.88 min**	**+0.56 cfs**	**+0.07 ac-ft**
% Change		**-28%**	**+55%**	**+114%**

Because the proposed project is on undeveloped land, the imperviousness will significantly increase compared to existing conditions. As a result, 2-year volumes will increase by 114% compared to existing conditions. The results indicate the 2-year time of concentration (Tc) shortens by 28% compared to existing conditions.

Due to low infiltration rates and proximity of the project site to a former LUST (see Section III.2), infiltration of project runoff is not feasible, and reuse demands are not sufficient to draw down the volume within 48 hours (see Section IV.3.3). Therefore, as stated in the TGD, "In cases where the excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow." (Section XII.D.4) The 2-year peak flow rate increases by 55% compared to existing conditions, which is greater than 110% of the pre-development 2-year peak flow. Therefore, the project is subject to hydromodification BMPs to reduce proposed peak flow rates to within 110% of the existing 2-year peak flows and will be treated via detention pipes located at the southern and eastern boundary of the project site (refer to Section IV.3.5 for further information).

Note that though the table above summarizes hydromodification calculations as a total acreage of the project site, additional calculations for peak flows and Tc were performed for each existing condition sub-drainage area. As mentioned in the proposed drainage patterns, the project site will converge flows to one discharge point at the southeastern corner of the project site. The proposed condition flows will be mitigated to be within 110% of the southeastern corner's existing 2-year, 24-hour peak flows, i.e., the existing eastern sub-drainage area. See below for the breakdown of existing condition drainage areas and Appendix G for the hydrology exhibit.

EXISTING CONDITION 2-YEAR, 24-HOUR STORM BREAKDOWN SUMMARY			
Drainage Area	**Acreage**	**Tc**	**Peak Runoff**
Western Portion	0.34 ac	10.28 min	0.37 cfs
Eastern Portion	0.67 ac	11.87 min	0.68 cfs

II.4 POST DEVELOPMENT DRAINAGE CHARACTERISTICS

Under proposed conditions, flows will be conveyed in a manner similar to existing conditions, though flows will converge at one discharge point at the southeastern corner of the site prior to draining into the Brea Canyon Channel. Runoff flows from the rooftop and podium level will drain into raised planter boxes for biotreatment prior to outlet discharge at-grade, with treated flows leaving the project site at the southeastern corner. High flows will be diverted and will sheet flow west onto Berry Street or exit at the discharge point in the southeast corner of the project site. Any flows not naturally infiltrated along the at-grade sidewalk landscaping will flow southeast along an existing v-ditch and connect to the southeastern corner discharge point and converge into the Brea Canyon Channel.

II.5 PROPERTY OWNERSHIP/MANAGEMENT

PROPERTY OWNERSHIP/MANAGEMENT	
Private Streets:	Manley Fanticola Holdings, LLC
Landscaped Areas:	Manley Fanticola Holdings, LLC
Open Space:	Manley Fanticola Holdings, LLC
Buildings:	Manley Fanticola Holdings, LLC
Structural BMPs:	Manley Fanticola Holdings, LLC

The Owner, Manley Fanticola Holdings, LLC, shall assume all BMP maintenance and inspection responsibilities for the proposed project. Inspection and maintenance responsibilities are outlined in Section V of this report.

SECTION III SITE DESCRIPTION

III.1 PHYSICAL SETTING

Planning Area/ Community Name:	Mercury and Berry
Address:	Mercury Lane and Berry Street
Project Area Description:	The project site is bounded by Mercury Lane to the north, industrial buildings along the Brea trail to the east, industrial buildings and Imperial Highway to the south, and Berry Street to the west.
Land Use:	Light Industrial
Zoning:	C-M: Commercial Industrial Zone
Acreage:	1.01
Predominant Soil Type:	HSG Type D (see TGD Figure XVI-2a in Appendix A)
Impervious Conditions:	Existing Impervious: 0% (100% Pervious) Proposed Impervious: 84% (16% Pervious)

III.2 SITE CHARACTERISTICS

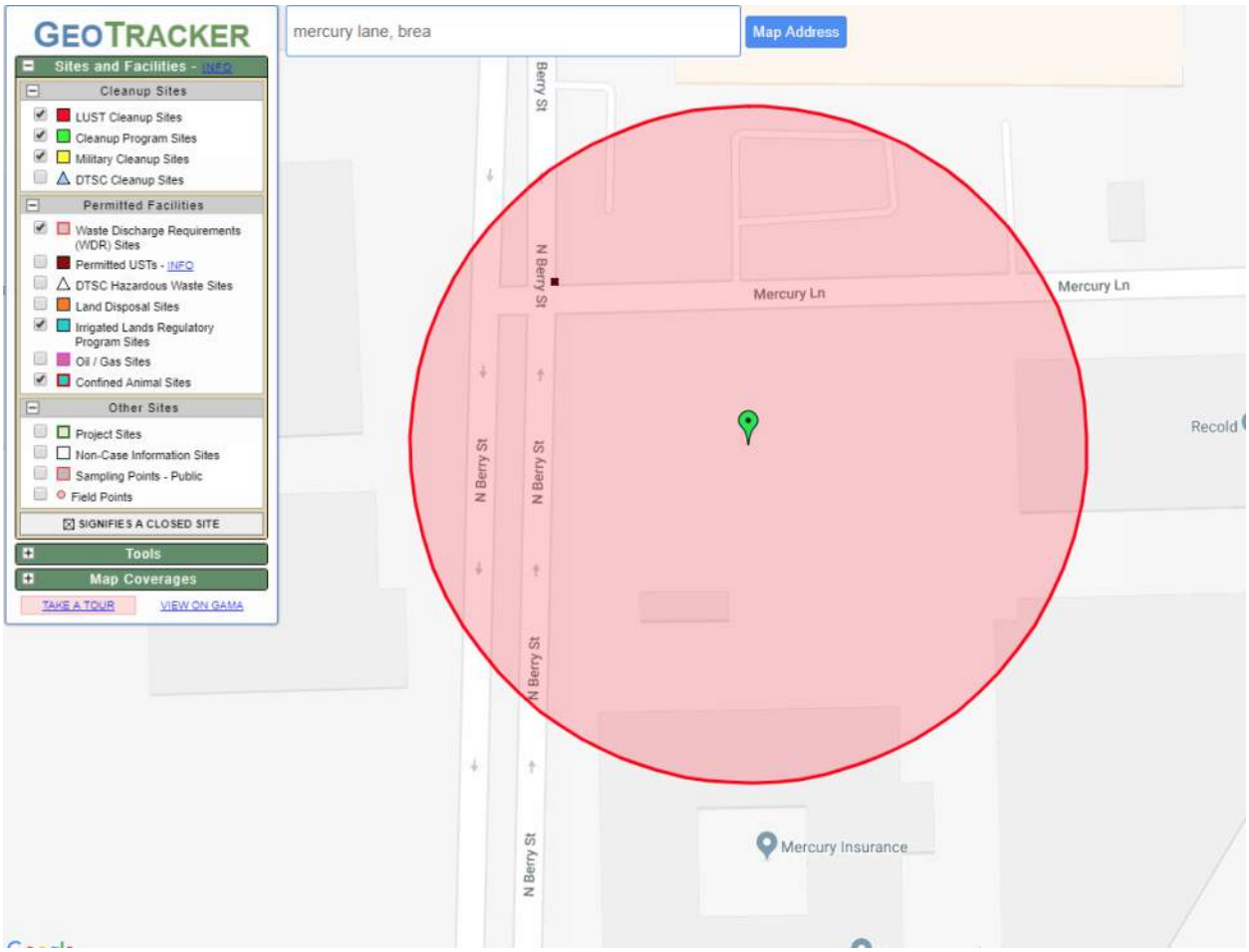
Precipitation Zone:	0.9 inches (see TGD Figure XVI01 in Appendix A)
Topography:	The project site is relatively flat (approx. 0.5% grade), and generally drains an existing low point at the southeastern corner of the project site.
Existing Drainage Patterns/ Connections:	Under existing conditions, the western portion of the project site sheet flows in a southerly direction towards the adjacent southern property, while the eastern portion of the site drains in a southeasterly direction towards the southeastern corner of the project site that discharges flows off site. All flows from the project site eventually connect into storm drain lines that converge into the Brea Canyon Channel located about 500 feet due east of the project site, and ultimately drain out to the Pacific Ocean.

Proposed Drainage Patterns/ Connections:	Under proposed conditions, flows will be conveyed in a manner similar to existing conditions, though flows will converge at one discharge point at the southeastern corner of the site prior to draining into the Brea Canyon Channel. Runoff flows from the rooftop and podium level will drain into raised planter boxes for biotreatment prior to outlet discharge at-grade, with treated flows leaving the project site at the southeastern corner. High flows will be diverted and will sheet flow west onto Berry Street or exit at the discharge point in the southeast corner of the project site. Any flows not naturally infiltrated along the at-grade sidewalk landscaping will flow southeast along an existing v-ditch and connect to the southeastern corner discharge point and converge into the Brea Canyon Channel.
Soil Type, Geology, and Infiltration Properties:	Based on a geotechnical report prepared by Southern California Geotechnical on May 22, 2018, the upper 2 to 4 feet below ground surface (bgs) of the project site consisted of fill soils below the existing site grade and consisted of loose to medium dense silty fine to coarse sands with varying amounts of clay and fine to coarse gravel. Native alluvium was encountered below the fill soils to a depth of 75 feet bgs. The native alluvial soils, extending to depths of 8 to 12± feet, generally consisted of stiff to very stiff fine sandy clays with occasional layers of loose to medium dense silty fine sands. Beneath these soils, the native alluvium generally consisted of medium dense fine to coarse sands, silty fine sands, and clayey sands extending to depths of 27 to 33½± feet. Beneath these soils, the native alluvium generally consisted of stiff to hard sandy clays and silty clays and dense to very dense clayey sands and fine to coarse sands and occasional layers of medium dense fine to coarse sands and clayey sands extending to the maximum depth explored of 75± feet.
Hydrogeologic (Groundwater) Conditions:	Groundwater levels were found at depths of 25 to 27 feet bgs during testing, while the historic high groundwater table was found to be at a depth of 10 feet bgs.
Geotechnical Conditions (relevant to infiltration):	Based on infiltration tests conducted by Southern California Geotechnical at 4 boring holes between 5 to 15 feet bgs, infiltration rates were found to be between 0.1-0.2 in/hr. Additionally, a former Leaking Underground Storage Tank (LUST) was identified within 250 feet of the project site at the northeastern corner of Mercury Lane and Berry Street (refer to Geotracker map below for more detail). Due to the location of the LUST, soils may be contaminated and would require further geotechnical soils testing that have not yet been conducted to determine whether infiltrating waters would further disturb any contamination present within the soils. Based on the low infiltration rates, presence of clay soils, and the project site's proximity to an LUST, infiltration is deemed infeasible for the project site.
Off-Site Drainage:	The project site does not receive any off-site storm water flows onto the property.

Utility and Infrastructure Information:	Dry and wet utilities will be incorporated into the proposed project and will tie into existing facilities associated with the existing development.

III.3 WATERSHED DESCRIPTION

Receiving Waters:	Brea Canyon Channel, Brea Creek Channel, Carbon Canyon Creek, Coyote Creek, San Gabriel River Reach 1, San Gabriel River Estuary, Alamitos Bay, San Pedro Bay
303(d) Listed Impairments:	▪ **Brea Canyon Channel:** None ▪ **Break Creek Channel:** None ▪ **Carbon Canyon Creek:** None ▪ **Coyote Creek**: Ammonia, Dissolved Copper, Diazinon, Indicator Bacteria, Lead, Toxicity, pH ▪ **San Gabriel River Reach 1:** Coliform Bacteria, pH ▪ **San Gabriel River Estuary:** Copper, Dioxin, Nickel, Dissolved Oxygen ▪ **Alamitos Bay:** Indicator Bacteria ▪ **San Pedro Bay Near/Offshore Zones:** Chlordane, DDT (tissue & sediment), PCBs, Sediment Toxicity
Applicable TMDLs:	**San Gabriel River & Coyote Creek Watersheds (Region 4):** Metals (Copper, Lead & Zinc)
Pollutants of Concern for the Project:	Per Section II.2 with respect to receiving water impairments: ▪ Nutrients ▪ Pathogens (Bacteria/Virus) ▪ Pesticides
Hydrologic Conditions of Concern (HCOCs):	The project site is located in an area identified as "potential areas of erosion, habitat, & physical structure susceptibility" and therefore is susceptible to hydromodification.
Environmentally Sensitive and Special Biological Significant Areas:	There are no Environmentally Sensitive Areas (ESAs) or Areas of Special Biological Significance (ASBS) within the project site or within the project's vicinity.
Existing Water Quality Conditions:	One former Leaking Underground Storage Tank (LUST) site has been identified within 250 feet of the project site. See location of LUST in map below.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mercury lane, brea
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DTSC Cleanup Sites
Permitted Facilities
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Oil / Gas Sites
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Project Sites
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Tools
Map Coverages
TAKE A TOUR
VIEW ON GAMA
Berry St
N Berry St
Mercury Ln
Mercury Ln
Recold
Mercury Insurance

SECTION IV BEST MANAGEMENT PRACTICES (BMPs)

IV.1 PROJECT PERFORMANCE CRITERIA

Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implementing LID on regional or sub-regional basis?

☐ Yes ☒ No

PROJECT PERFORMANCE CRITERIA	
Hydromodification Control Performance Criteria: (Model WQMP Section 7.II-2.4.2.2)	If a hydrologic condition of concern (HCOC) exists, priority projects shall implement onsite or regional hydromodification controls such that: ▪ Post-development runoff volume for the two-year frequency storm does not exceed that of the predevelopment condition by more than five percent, and ▪ Time of concentration of post-development runoff for the two-year storm event is not less than that for the predevelopment condition by more than five percent. Where the Project WQMP documents that excess runoff volume from the two-year runoff event cannot feasibly be retained and where in-stream controls cannot be used to otherwise mitigate HCOCs, the project shall implement on-site or regional hydromodification controls to: ▪ Retain the excess volume from the two-year runoff event to the MEP, and ▪ Implement on-site or regional hydromodification controls such that the post-development runoff two-year peak flow rate is no greater than 110 percent of the predevelopment runoff two-year peak flow rate.
LID Performance Criteria: (Model WQMP Section 7.II-2.4.3)	Infiltrate, harvest and use, evapotranspire, or biotreat/biofilter, the 85th percentile, 24-hour storm event (Design Capture Volume). LID BMPs must be designed to retain, on-site, (infiltrate, harvest and use, or evapotranspire) storm water runoff up to 80 percent average annual capture efficiency.
Treatment Control BMP Performance Criteria: (Model WQMP Section 7.II-3.2.2)	If it is not feasible to meet LID performance criteria through retention and/or biotreatment provided on-site or at a sub-regional/regional scale, then treatment control BMPs shall be provided on-site or offsite prior to discharge to waters of the US. Sizing of treatment control BMP(s) shall be based on either the unmet volume after claiming applicable water quality credits, if appropriate.

PROJECT PERFORMANCE CRITERIA	
LID Design Storm Capture Volume:	DCV = C × d × A × 43560 sf/ac × 1/12 in/ft Where: DCV = design storm capture volume, cu-ft C = runoff coefficient = (0.75 × imp + 0.15) Imp = impervious fraction of drainage area (ranges from 0 to 1) d = storm depth (inches) A = tributary area (acres) Imp = 84% d = 0.90 inches A = 1.01 acres *DCV* = *(0.75 x* 0.84 *+0.15) x* 0.90 *inches x* 1.01 *ac x 43560 sf/ac x 1/12 in/ft* = 2,574 ft^3 *Refer to Section IV.2.2 for specific Drainage Manage Area (DMA) breakdown and Appendix A for detailed calculations (Worksheet B).*

IV.2 SITE DESIGN AND DRAINAGE PLAN

The following section describes the site design BMPs used in this project and the methods used to incorporate them. Careful consideration of site design is a critical first step in storm water pollution prevention from new developments and redevelopments.

IV.2.1 Site Design BMPs

Minimize Impervious Area

Impervious surfaces have been minimized by incorporating landscaped areas throughout the site surrounding the proposed building. Landscaping will be provided throughout the site within the common areas as well as around the perimeter of the building.

Maximize Natural Infiltration Capacity

Infiltration to treat project runoff is not recommended for the project site due to low infiltration rates and proximity to a former LUST within 250 feet of the project site. Refer to Section IV.3.2 for details.

Preserve Existing Drainage Patterns and Time of Concentration

Runoff from the site will continue to flow similar to existing conditions. Low-flows and first-flush runoff will drain landscaped bioretention cells with underdrains for water quality treatment via bio-filtration.

Disconnect Impervious Areas

Landscaping will be provided adjacent to sidewalks and between the proposed buildings. Low-flows and first-flush runoff will drain to landscaped bioretention cells with underdrains for water quality treatment via bio-filtration. Refer to Section IV.3.4 for further details.

Protect Existing Vegetation and Sensitive Areas, and Revegetate Disturbed Areas

There are no existing vegetated or sensitive areas to preserve on the project site. All disturbed areas will either be paved or landscaped.

Xeriscape Landscaping

Xeriscape landscaping is not proposed for the project. However, native and/or tolerant landscaping will be incorporated into the site design consistent with City guidelines.

IV.2.2 Drainage Management Areas

In accordance with the MS4 permit and the 2011 Model WQMP, the project site has been divided into Drainage Management Areas (DMAs) to be utilized for defining drainage areas and sizing LID and other treatment control BMPs. DMAs have been delineated based on the proposed site grading patterns, drainage patterns, storm drain and catch basin locations.

The design capture volumes (DCV) and treatment flow rates (Q_{Design}) for each DMA are summarized in the table below. These have been derived utilizing the "Simple Method" in accordance with the TGD Section III.1.1. Actual BMP sizing requirements, including 80 percent capture design volumes, flow rates, depths, and other design details for the specific BMPs proposed are provided in Sections IV.3.1 and IV.3.4 below. Locations of DMAs and associated LID and treatment BMPs are identified on the exhibits in Section VI. Additional calculations and TGD Worksheets are provided in Appendix A.

DRAINAGE MANAGEMENT AREAS (DMAs)								
DMA/ Drainage Area ID[1]	Tributary Drainage Area (ft^2)	Tributary Drainage Area (ac)	% Imp.	Design Storm Depth[2] (in)	Estimated Tc (min)	Rainfall Intensity[3] (in/hr)	Simple Method DCV[4] (ft^3)	Q_{Design} [5] (cfs)
DMA 1	22,994	0.53	85%	0.9	5	0.26	1,359	0.105
DMA 2	12,096	0.28	100%	0.9	5	0.26	817	0.065
DMA 3	8,906	0.20	5%	0.9	5	0.26	125	0.010

Notes:
1. Refer to exhibits in Section VI for locations of each DMA.
2. Per Figure XVI-1 of the Technical Guidance Document, dated May 19, 2011. See also Appendix A.
3. Per Figure III.4 of the Technical Guidance Document, dated May 19, 2011. See also Appendix A.
4. Per Section III.1.1 of the Technical Guidance Document.
5. Per Section III.3.3 and Worksheet D of the Technical Guidance Document.

IV.3 LID BMP SELECTION AND PROJECT CONFORMANCE ANALYSIS

Low Impact Development (LID) BMPs are required in addition to site design measures and source controls to reduce pollutants in storm water discharges. LID BMPs are engineered facilities that are designed to retain or biotreat runoff on the project site. The 4th Term MS4 Storm Water Permit (Order R8-2009-0030) requires the evaluation and use of LID features using the following hierarchy of treatment: infiltration, evapotranspiration, harvest/reuse, and biotreatment. The following sections summarize the LID BMPs proposed for the project in accordance with the permit hierarchy and performance criteria outlined in Section IV.1.

IV.3.1 Hydrologic Source Controls (HSCs)

Hydrologic source controls (HSCs) can be considered to be a hybrid between site design practices and LID BMPs. HSCs are distinguished from site design BMPs in that they do not reduce the tributary area or reduce the imperviousness of a drainage area; rather they reduce the runoff volume that would result from a drainage area with a given imperviousness compared to what would result if HSCs were not used.

HYDROLOGIC SOURCE CONTROLS		
ID	**Name**	**Included?**
HSC-1	Localized on-lot infiltration	☐
HSC-2	Impervious area dispersion (e.g. roof top disconnection)	☒
HSC-3	Street trees (canopy interception)	☐
HSC-4	Residential rain barrels (not actively managed)	☐
HSC-5	Green roofs/Brown roofs	☐
HSC-6	Blue roofs	☐
HSC-7	Impervious area reduction (e.g. permeable pavers, site design)	☐

The project will utilize hydrologic source controls (impervious area dispersion) within the ground level landscaping and side walk surrounding the building. There will be a decomposed granite pathway at the southern and eastern boundary of the project site while the sidewalk along the northern and western boundary will consist of pervious pavers to maximize the natural pervious surfaces. Based on the capture efficiency calculations, the large amounts of landscaping in these areas are sufficient to treat runoff from the adjacent impervious surfaces in accordance with the Model WQMP and TGD (meeting 80% minimum average annual capture efficiency). Calculations and worksheets are included in Appendix A.

HYDROLOGIC SOURCE CONTROL BMP SUMMARY						
Drainage Area ID	HSC Type	Drainage Area	Pervious to Impervious Ratio Tributary to HSC	$d_{HSC\ total}$ (1)	% Capture by HSC (2)	Sufficient?
DMA 3	HSC-2 Impervious Area Dispersion	0.20 ac	28.5	1.00″	80%	Yes

Notes:
1. Per chart in Fact Sheet HSC-2 of the Technical Guidance Document, dated May 19, 2011.
2. Per Table III.1 of the Technical Guidance Document, dated May 19, 2011.

IV.3.2 Infiltration BMPs

Infiltration BMPs are LID BMPs that capture, store and infiltrate storm water runoff. These BMPs are engineered to store a specified volume of water and have no design surface discharge (underdrain or outlet structure) until this volume is exceeded. Examples of infiltration BMPs include infiltration trenches, bioretention without underdrains, drywells, permeable pavement, and underground infiltration galleries.

INFILTRATION		
ID	Name	Included?
INF-3 INF-4	Bioretention Without Underdrains	☐
	Rain Gardens	☐
	Porous Landscaping	☐
	Infiltration Planters	☐
	Retention Swales	☐
INF-2	Infiltration Trenches	☐
INF-1	Infiltration Basins	☐
INF-5	Drywells	☐
INF-7	Subsurface Infiltration Galleries	☐
--	French Drains	☐
INF-6	Permeable Asphalt	☐
	Permeable Concrete	☐
	Permeable Concrete Pavers	☐
	Other:	☐

As discussed in Section III.2, due to low infiltration rates between 0.1-0.2 in/hr and proximity to former LUST within 250 feet of the project site, infiltration is deemed infeasible. Refer to Table 2.7 in Appendix A for further information on infiltration feasibility.

IV.3.3 Evapotranspiration & Rainwater Harvesting BMPs

Evapotranspiration (ET) BMPs are a class of retention BMPs that discharges stored volume predominately to ET, though some infiltration may occur. ET includes both evaporation and transpiration, and ET BMPs may incorporate one or more of these processes. BMPs must be designed to achieve the maximum feasible ET, where required to demonstrate that the maximum amount of water has been retained on-site. Since ET is not the sole process in these BMPs, specific design and sizing criteria have not been developed for ET-based BMPs.

EVAPOTRANSPIRATION		
ID	**Name**	**Included?**
--	HSCs, *see Section IV.3.1*	☒
--	Surface-based infiltration BMPs	☐
--	Biotreatment BMPs, see *Section VI.3.4*	☒
	Other:	☐

Both HSCs and Bioretention BMPs are proposed which utilize evapotranspiration as physical process for runoff volume reduction. Bioretention BMPs are described further in Section IV.3.4.

Harvest and use (aka. Rainwater Harvesting) BMPs are LID BMPs that capture and store storm water runoff for later use. These BMPs are engineered to store a specified volume of water and have no design surface discharge until this volume is exceeded. Harvest and use BMPs include both above-ground and below-ground cisterns. Examples of uses for harvested water include irrigation, toilet and urinal flushing, vehicle washing, evaporative cooling, industrial processes and other non-potable uses.

HARVEST & REUSE / RAINWATER HARVESTING		
ID	**Name**	**Included?**
HU-1	Above-ground cisterns and basins	☐
HU-2	Underground detention	☐
--	Other:	☐

In order to quantify harvested water demand for the common areas of the project, the Modified Estimated Applied Water Use (EAWU) method was used, consistent with Appendix X of the Model WQMP's Technical Guidance Document (TGD), dated May 19, 2011.

The Modified EAWU method is modified from the OC Irrigation Code (County Ordinance No. 09-010) to account for the wet season demand and storm events (assuming that no irrigation would be applied for approximately 30% of the days in the wet season).

The equation used to calculate the Modified EAWU is:

$$Modified\ EAWU = \frac{(ETo\text{wet} \times K\text{L} \times LA \times 0.015)}{IE}$$

Where:

$Modified\ EAWU$ = estimated daily average water use during wet season
ETo_{wet} = average reference ET from November through April (inches per month) per Table X.2 of the TGD
K_L = landscape coefficient (Table X.4 of the TGD)
LA = landscape area irrigated with harvested water (square feet)
IE = irrigation efficiency (assumed at 90%)

Note: In the equation, the coefficient (0.015) accounts for unit conversions and shut down of irrigation during and for three days following a significant precipitation event.

For a system to be considered "feasible", the system must be designed with a storage volume equal to the DCV from the tributary area and achieve more than 40% capture. The system must also be able to drawdown in 30 days to meet the 40% capture value. In addition, Table X.6 of the Technical Guidance Document sets forth the demand thresholds for minimum partial capture.

TABLE X.6: HARVESTED WATER DEMAND THRESHOLDS FOR MINIMUM PARTIAL CAPTURE

Design Capture Storm Depth, inches	Wet Season Demand Required for Minimum Partial Capture, gpd per impervious acre
0.60	490
0.65	530
0.70	570
0.75	610
0.80	650
0.85	690
0.90	730
0.95	770
1.00	810

The following table summarizes the estimated applied water use for the common area landscaping of the project.

ESTIMATED APPLIED WATER USE (EAWU) FOR COMMON AREA LANDSCAPING									
Landscape Type	Total Area (ac)	% Impervious	Impervious Tributary (ac)	Irrigated LS Area (ac)	ETo_{Wet} [1] (in/mo)	K_L [2]	Modified EAWU (gpd)	Modified EAWU per impervious acre (gpd/ac)	Minimum Capture Threshold [3] (gpd/ac)
Blended Use	1.01	84%	0.85	0.16	3.00	0.55	189	223	730
Design Capture Volume (gal)				19,252	Drawdown (days)				102

Notes:

1 Per Table X.2 for Santa Ana (similar climate type), Model WQMP Technical Guidance Document, dated May 19, 2011.
2 Per Table X.4 of the Model WQMP Technical Guidance Document, dated May 19, 2011.
3 Per Table X.6 of Model WQMP Technical Guidance Document, dated May 19, 2011.

As shown above, the project site does not have sufficient water demand during the wet season to support harvest and reuse. The project does not meet the minimum capture threshold of 730 gallons per day/acre with its Modified EAWU or estimated daily average water usage during the wet season. Therefore, the DCV will not be fully utilized and emptied for the next storm event. Drawdown of the DCV is anticipated to take approximately 102 days by the landscape's water demand usage, which is greater than the maximum drawdown time of 30 days.

IV.3.4 Biotreatment BMPs

Biotreatment BMPs are a broad class of LID BMPs that reduce storm water volume to the maximum extent practicable, treat storm water using a suite of treatment mechanisms characteristic of biologically active systems, and discharge water to the downstream storm drain system or directly to receiving waters. Treatment mechanisms include media filtration (though biologically-active media), vegetative filtration (straining, sedimentation, interception, and stabilization of particles resulting from shallow flow through vegetation), general sorption processes (i.e., absorption, adsorption, ion-exchange, precipitation, surface complexation), biologically-mediated transformations, and other processes to address both suspended and dissolved constituents. Examples of biotreatment BMPs include bioretention with underdrains, vegetated swales, constructed wetlands, and proprietary biotreatment systems.

BIOTREATMENT		
ID	Name	Included?
BIO-1	Bioretention with underdrains	☐
	Storm Water planter boxes with underdrains	☒
	Rain gardens with underdrains	☐
BIO-5	Constructed wetlands	☐

BIOTREATMENT		
ID	Name	Included?
BIO-2	Vegetated swales	☐
BIO-3	Vegetated filter strips	☐
BIO-7	Proprietary vegetated biotreatment systems	☐
BIO-4	Wet extended detention basin	☐
BIO-6	Dry extended detention basins	☐
--	Other:	☐

Since both infiltration and harvest and reuse are considered infeasible, biotreatment BMPs will be utilized on-site for water quality treatment. These biotreatment systems were selected based on their ability to treat the project's pollutants of concerns to a medium or high effectiveness, in accordance with the Model WQMP and TGD requirements. Additional details on the proposed BMPs are included in Section VI of this WQMP. At this preliminary stage of planning, planter sizes are provided at a conceptual level and will be finalized in subsequent submittals of the Final WQMP.

Bioretention Planters with Underdrains

Bioretention planters with underdrains will be integrated into the landscaping areas to filter/treat runoff from the proposed building and hardscape areas prior to discharging off-site. Bioretention planters with underdrains are plant-based biotreatment systems that typically consist of a ponding area, mulch layer, planting soils and plants. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded and sequestered by the soil and plants. Underdrains collect the treated water and return it back into the storm drain system.

Bioretention planters with underdrains are proposed to treat DMAs 1 & 2 for the podium and rooftop level areas, respectively. Runoff from DMA 1, i.e., runoff from the podium level, will flow in a south and easterly direction towards the raised planter box along the southern and eastern boundary of the project site, while runoff from DMA 2, i.e., rooftop runoff, will drain towards the interior of the podium level and be intercepted by raised planted boxes. Proposed planters treating DMAs 1 & 2 will be an above-ground planter consisting of a 6-inch ponding depth to receive incoming roof runoff via downspout, and a 2-foot media layer for biotreatment and filtration. Once runoff has been biofiltered by this media layer, it will percolate through a gravel layer into a perforated pipe that daylights at grade before continuing as treated surface flows to the southeastern corner discharge point. High flows will bypass biotreatment and surface flow to the existing point of connection.

In accordance with the Model WQMP and TGD, the bioretention/biotreatment BMPs will be sized to treat runoff from the Design Capture Storm (85th percentile, 24-hour). The bioretention planters have been sized utilizing the "Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs" in accordance with TGD Section III.3.2 and Worksheet C, to achieve the target capture efficiency of 80%. Detailed calculations and associated TGD Worksheets are included in Appendix A. Refer to Water Quality Management Plan Site Map located in Section 6, for locations. Operation and maintenance details are included in Section V and Appendix D (O&M Plan). At this preliminary stage

of planning, planter sizes are provided at a conceptual level and will be finalized in subsequent submittals of the Final WQMP.

BIORETENTION PLANTER DESIGN SUMMARY								
DMA[1]	Total Drainage Area[2]	% Imp.	Fraction of Design Capture Storm Depth (in/hr)[3,4]	80% Capture Design Storm Depth (in)[4]	80% Capture DCV (ft^3)[4]	BMP Surface Area Needed (ft^2)	BMP Surface Area Provided (ft^2)	BMP Volume Treated (ft^3)
1	0.53	85%	0.27	0.243	367	734	1,868	1,028
2	0.28	100%	0.27	0.243	221	442	2,055	934

Notes:
1. Refer to WQMP Exhibit in Section VI for locations of DMA and BMPs.
2. Refer to Section IV.2.2 for individual DMA tributary areas.
3. Per Figure III.2 of the TGD.
4. Per Worksheet C, "Determining Capture Efficiency of Volume Based, Constant Drawdown BMP based on Design Volume. Copies are included in Appendix A.

IV.3.5 Hydromodification Control BMPs

As described in Section II.3, the project site is subject to hydromodification control and the proposed bioretention planters and detention pipes at the eastern and southern boundary of the project site will be used for hydromodification control. Runoff will filter through the bioretention planters for treatment and continue to the pipes for detention storage; the pipes will be approximately 24" in diameter, measuring a total length of 600 linear feet. Final design and materials of the detention pipes will be provided in the Final WQMP. The bioretention planters and pipe system will detain runoff volumes to meet the southeastern corner's existing 2-year, 24-hour peak flows, i.e., the existing eastern sub-drainage area, prior to draining off-site. Results are summarized in the table below.

HYDROMODIFICATION CONTROL BMP SUMMARY			
Pre-Development Flow (Eastern Sub-Drainage Area) (cfs)	BMP	Mitigated, Post-Development Flow (Total Site) (cfs)	Percent Change
0.7	Bioretention Planter/Underground Detention Pipes	0.6	-14%

IV.3.6 Regional/Sub-Regional LID BMPs

Not applicable. LID BMPs (biotreatment) will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

IV.3.7 Treatment Control BMPs

Treatment control BMPs can only be considered if the project conformance analysis indicates that it is not feasible to retain the full design capture volume with LID BMPs.

TREATMENT CONTROL BMPs		
ID	**Name**	**Included?**
TRT-1	Sand Filters	☐
TRT-2	Cartridge Media Filter	☐
PRE-1	Hydrodynamic Separation Device	☐
PRE-2	Catch Basin Insert	☐
	Other:	☐

Not applicable. LID BMPs (biotreatment) will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

IV.3.8 Non-Structural Source Control BMPs

The table below indicates all BMPs to be incorporated in the project. For those designated as not applicable (N/A), a brief explanation why is provided.

NON-STRUCTURAL SOURCE CONTROL BMPs				
ID	**Name**	**Included?**	**Not Applicable?**	**If Not Applicable, Provide Brief Reason**
N1	Education for Property Owners, Tenants and Occupants	☒	☐	
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☒	☐	
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	No hazardous materials
N6	Local Water Quality Permit Compliance	☐	☒	Not an industrial facility
N7	Spill Contingency Plan	☐	☒	No hazardous materials
N8	Underground Storage Tank Compliance	☐	☒	No underground storage tanks are proposed

NON-STRUCTURAL SOURCE CONTROL BMPs				
ID	Name	Included?	Not Applicable?	If Not Applicable, Provide Brief Reason
N9	Hazardous Materials Disclosure Compliance	☐	☒	Hazardous materials will not be stored on-site
N10	Uniform Fire Code Implementation	☐	☒	No hazardous materials
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☐	☒	No loading docks are proposed
N14	Common Area Catch Basin Inspection	☐	☒	No catch basins are proposed
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	No retail gasoline outlets are proposed

N1, Education for Property Owners, Tenants and Occupants

Educational materials will be provided to tenants, including brochures and restrictions to reduce pollutants from reaching the storm drain system. Examples include tips for pet care, household tips, and proper household hazardous waste disposal. Tenants will be provided with these materials by the property management prior to occupancy, and periodically thereafter. Refer to Section VII for a list of materials available and attached to this WQMP. Additional materials are available through the County of Orange Stormwater Program website (http://ocwatersheds.com/PublicEd/) and the California Stormwater Quality Association's (CASQA) BMP Handbooks (https://www.casqa.org/resources/bmp-handbooks).

N2, Activity Restrictions

The Owner shall develop ongoing activity restrictions that include those that have the potential to create adverse impacts on water quality. Activities include, but are not limited to: handling and disposal of contaminants, fertilizer and pesticide application restrictions, litter control and pick-up, and vehicle or equipment repair and maintenance in non-designated areas, as well as any other activities that may potentially contribute to water pollution.

N3, Common Area Landscape Management

Management programs will be designed and implemented by the Owner to maintain all the common areas within the project site. These programs will cover how to reduce the potential pollutant sources of fertilizer and pesticide uses, utilization of water-efficient landscaping practices and proper disposal of landscape wastes by the owner/developer and/or contractors.

N4, BMP Maintenance

The Owner will be responsible for the implementation and maintenance of each applicable non-structural BMP, as well as scheduling inspections and maintenance of all applicable structural BMP facilities through its staff, landscape contractor, and/or any other necessary maintenance contractors. Details on BMP maintenance are provided in Section V of this WQMP, and the O&M Plan is included in Appendix D.

N11, Common Area Litter Control

The Owner will be responsible for performing trash pickup and sweeping of littered common areas on a weekly basis or whenever necessary. Responsibilities will also include noting improper disposal materials by the public and reporting such violations for investigation.

N12, Employee Training

All employees of the Owner and any contractors will require training to ensure that employees are aware of maintenance activities that may result in pollutants reaching the storm drain. Training will include, but not be limited to, spill cleanup procedures, proper waste disposal, housekeeping practices, etc.

N15, Street Sweeping Private Streets and Parking Lots

The Owner shall be responsible for sweeping all on-site drive aisles within the project on a quarterly basis.

IV.3.9 Structural Source Control BMPs

The table below indicates all BMPs to be incorporated in the project. For those designated as not applicable (N/A), a brief explanation why is provided.

STRUCTURAL SOURCE CONTROL BMPs				
ID	Name	Included?	Not Applicable?	If Not Applicable, Provide Brief Reason
S1 SD-13	Provide storm drain system stenciling and signage	☐	☒	No catch basins are proposed
S2 SD-34	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒	No outdoor storage areas are proposed.
S3 SD-32	Design and construct trash and waste storage areas to reduce pollution introduction	☐	☒	No outdoor trash storage areas are proposed. Trash will be managed indoors within the parking structure.
S4 SD-12	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☒	☐	

STRUCTURAL SOURCE CONTROL BMPs				
ID	Name	Included?	Not Applicable?	If Not Applicable, Provide Brief Reason
S5	Protect slopes and channels and provide energy dissipation	☐	☒	There are no slopes or channels on the project site.
S6 SD-31	Properly Design: Dock areas	☐	☒	No loading docks are proposed.
S7 SD-31	Properly Design: Maintenance bays	☐	☒	No maintenance bays are proposed.
S8 SD-33	Properly Design: Vehicle wash areas	☐	☒	No vehicle wash areas are proposed.
S9 SD-36	Properly Design: Outdoor processing areas	☐	☒	No outdoor processing areas are proposed.
S10	Properly Design: Equipment wash areas	☐	☒	No equipment wash areas are proposed.
S11 SD-30	Properly Design: Fueling areas	☐	☒	No fueling areas are proposed.
S12 SD-10	Properly Design: Hillside landscaping	☐	☒	Project is not located in a hillside area.
S13	Properly Design: Wash water control for food preparation areas	☐	☒	No food preparation areas are proposed.
S14	Properly Design: Community car wash racks	☐	☒	No community car wash racks are proposed.

S4/SD-12, Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control

The Owner will be responsible for the installation and maintenance of all common landscape areas utilizing similar planting materials with similar water requirements to reduce excess irrigation runoff. The Owner will be responsible for implementing all efficient irrigation systems for common area landscaping including, but not limited to, provisions for water sensors and programmable irrigation cycles. This includes smart timers, rain sensors, and moisture shut-off valves. The irrigation systems shall be in conformance with water efficiency guidelines. Systems shall be tested twice per year, and water used during testing/flushing shall not be discharged to the storm drain system.

IV.4 ALTERNATIVE COMPLIANCE PLAN

IV.4.1 Water Quality Credits

Local jurisdictions may develop a water quality credit program that applies to certain types of development projects after they first evaluate the feasibility of meeting LID requirements on-site. If it is not feasible to meet the requirements for on-site LID, project proponents for specific project types can apply credits that would reduce project obligations for selecting and sizing other treatment BMPs or participating in other alternative programs.

WATER QUALITY CREDITS	
Credit	**Applicable?**
Redevelopment projects that reduce the overall impervious footprint of the project site.	☐
Brownfield redevelopment, meaning redevelopment, expansion, or reuse of real property which may be complicated by the presence or potential presence of hazardous substances, pollutants or contaminants, and which have the potential to contribute to adverse ground or surface water quality if not redeveloped.	☐
Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance)	☐
Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g. reduced vehicle trip traffic with the potential to reduce sources of water or air pollution).	☐
Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned	☐
Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping).	☐
Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.	☐
Developments in a city center area.	☐
Developments in historic districts or historic preservation areas.	☐
Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria to mixed use development; would not be able to take credit for both categories.	☐

WATER QUALITY CREDITS	
Credit	**Applicable?**
In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.	☐

Not applicable. Water quality credits will not be applied for the project. LID BMPs will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

IV.4.2 Alternative Compliance Plan Information

Not applicable. LID BMPs (infiltration) will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

SECTION V INSPECTION/MAINTENANCE RESPONSIBILITY FOR BMPs

It has been determined that Manley Fanticola Holdings, LLC shall assume all BMP inspection and maintenance responsibilities for the Mercury and Berry project.

Contact Name:	Dwight Manley
Title:	
Company:	Manley Fanticola Holdings, LLC
Address:	330 West Birch Street, Brea CA 92821
Phone:	
Fax:	714.990.2405
Email:	dmanleyinc@aol.com

Should the maintenance responsibility be transferred at any time during the operational life of Mercury and Berry, such as when an HOA or POA is formed for a project, a formal notice of transfer shall be submitted to the City of Brea at the time responsibility of the property subject to this WQMP is transferred. The transfer of responsibility shall be incorporated into this WQMP as an amendment.

The Owner shall verify BMP implementation and ongoing maintenance through inspection, self-certification, survey, or other equally effective measure. The certification shall verify that, at a minimum, the inspection and maintenance of all structural BMPs including inspection and performance of any required maintenance in the late summer / early fall, prior to the start of the rainy season. A form that may be used to record implementation, maintenance, and inspection of BMPs is included in Appendix D.

The City of Brea may conduct verifications to assure that implementation and appropriate maintenance of structural and non-structural BMPs prescribed within this WQMP is taking place at the project site. The Owner shall retain operations, inspections and maintenance records of these BMPs and they will be made available to the City or County upon request. All records must be maintained for at least five (5) years after the recorded inspection date for the lifetime of the project.

Long-term funding for BMP maintenance will be provided by Manley Fanticola Holdings, LLC.

The Operations and Maintenance (O&M) Plan can be found in Appendix D.

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
BIOTREATMENT BMPs				
BIO-1	Bioretention with Underdrains	Inspections should occur semi-annually or after major storm events to check for the following and remove accordingly: standing water, sediment, and trash & debris. Inspections should also look for potential clogging and clean planters or, if necessary, replace the entire filter bed. Inspect for weeds, and prune and/or replace plants in accordance with routine landscape maintenance activities. Replace mulch and prune shrubs as necessary.	2x per year	Owner
	Underground Detention Pipes for Hydromodification	Maintenance is recommended at minimum annually, and additionally when the sediment occupies more than one-tenth of the system's volume. Also refer to local municipality regulations for their maintenance requirements and schedules. Inspections should be a part of standard operating procedure. Inspect for sediment build-up and structural damage. Maintenance is typically preformed using a vacuum truck. Remove manhole cover at grade and lower vac hose into system (or sump pit within system if applicable). Sediment should be flushed towards vac hose to provide for thorough removal. When finished, replace all covers that were removed.	Annually	Owner
NON-STRUCTURAL SOURCE CONTROL BMPs				

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
N1	Education for Property Owners, Tenants and Occupants	Educational materials will be provided to tenants, including brochures and restrictions to reduce pollutants from reaching the storm drain system. Examples include tips for pet care, household tips, and proper household hazardous waste disposal. Tenants will be provided with these materials by the property management prior to occupancy, and periodically thereafter.	Upon first occupancy, Annually thereafter	Owner
N2	Activity Restrictions	The Owner will prescribe activity restrictions to protect surface water quality, through lease terms or other equally effective measure, for the property. Restrictions include, but are not limited to, prohibiting vehicle maintenance or vehicle washing.	Ongoing	Owner
N3	Common Area Landscape Management	Maintenance shall be consistent with City requirements. Fertilizer and/or pesticide usage shall be consistent with County Management Guidelines for Use of Fertilizers (OC DAMP Section 5.5). Maintenance includes mowing, weeding, and debris removal on a weekly basis. Trimming, replanting, and replacement of mulch shall be performed on an as-needed basis to prevent exposure of erodible surfaces. Trimmings, clippings, and other landscape wastes shall be properly disposed of in accordance with local regulations. Materials temporarily stockpiled during maintenance activities shall be placed away from water courses and storm drains inlets.	Monthly	Owner

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
N4	BMP Maintenance	Maintenance of structural BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP. Records of inspections and BMP maintenance shall be kept by the Owner and shall be available for review upon request.	Ongoing	Owner
N5	Title 22 CCR Compliance (How development will comply)	Not Applicable		
N6	Local Industrial Permit Compliance	Not Applicable		
N7	Spill Contingency Plan	Not Applicable		
N8	Underground Storage Tank Compliance	Not Applicable		
N9	Hazardous Materials Disclosure Compliance	Not Applicable		
N10	Uniform Fire Code Implementation	Not Applicable		
N11	Common Area Litter Control	Litter patrol, violations investigations, reporting and other litter control activities shall be performed on a weekly basis and in conjunction with routine maintenance activities.	Weekly	Owner
N12	Employee Training	The Owner shall educate all new employees/ managers on storm water pollution prevention, particularly good housekeeping practices, prior to the start of the rainy season (October 1). Refresher courses shall be conducted on an as needed basis. Materials that may be utilized on BMP maintenance are included in Appendix D.	Annually	Owner

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
N13	Housekeeping of Loading Docks	Not Applicable		
N15	Street Sweeping Private Streets and Parking Lots	On-site parking lots, drive aisles, and the parking structure basement level will be swept on a monthly basis, at minimum.	Monthly	Owner
N16	Retail Gasoline Outlets	Not Applicable		
STRUCTURAL SOURCE CONTROL BMPs				
S2 SD-34	Design and construct outdoor material storage areas to reduce pollution introduction	Not Applicable		
S3 SD-32	Design and construct trash and waste storage areas to reduce pollution introduction	Not Applicable		
S4 SD-12	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	In conjunction with routine maintenance, verify that landscape design continues to function properly by adjusting systems to eliminate overspray to hardscape areas and to verify that irrigation timing and cycle lengths are adjusted in accordance to water demands, given the time of year, weather, and day or nighttime temperatures. System testing shall occur twice per year. Water from testing/flushing shall be collected and properly disposed to the sewer system and shall not discharge to the storm drain system.	2x per year	Owner
S5	Protect slopes and channels and provide energy dissipation	Not Applicable		
S6 SD-31	Properly Design: Dock areas	Not Applicable		

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
S7 SD-31	Properly Design: Maintenance bays	Not Applicable		
S8 SD-33	Properly Design: Vehicle wash areas	Not Applicable		
S9 SD-36	Properly Design: Outdoor processing areas	Not Applicable		
S10	Properly Design: Equipment wash areas	Not Applicable		
S11 SD-30	Properly Design: Fueling areas	Not Applicable		
S12 SD-10	Properly Design: Hillside landscaping	Not Applicable		
S13	Properly Design: Wash water control for food preparation areas	Not Applicable		
S14	Properly Design: Community car wash racks	Not Applicable		

Any waste generated from maintenance activities will be disposed of properly. Wash water and other waste from maintenance activities is not to be discharged or disposed of into the storm drain system. Clippings from landscape maintenance (i.e. prunings) will be collected and disposed of properly off-site, and will not be washed into the streets, local area drains/conveyances, or catch basin inlets.

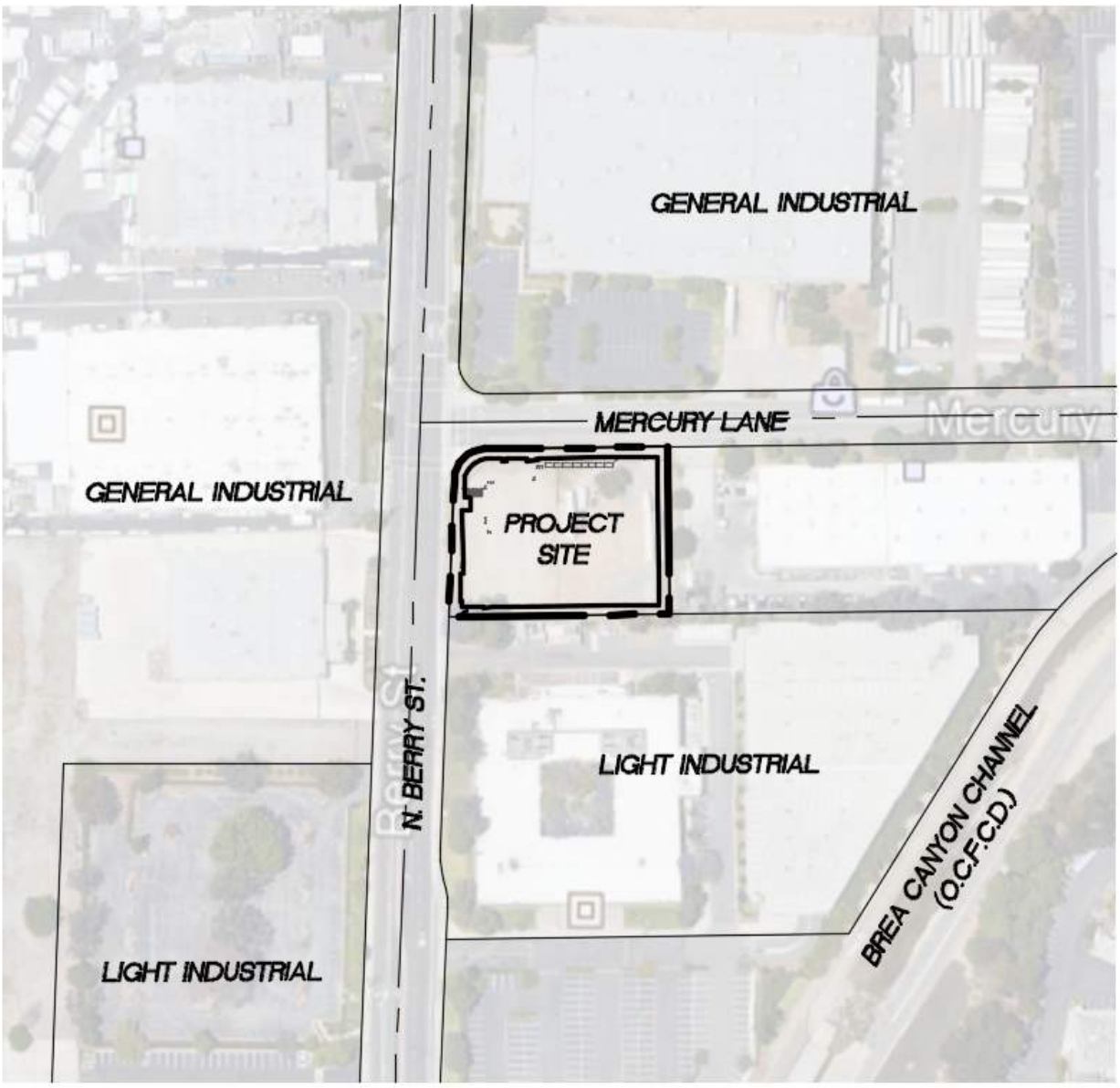
SECTION VI SITE PLAN AND DRAINAGE PLAN

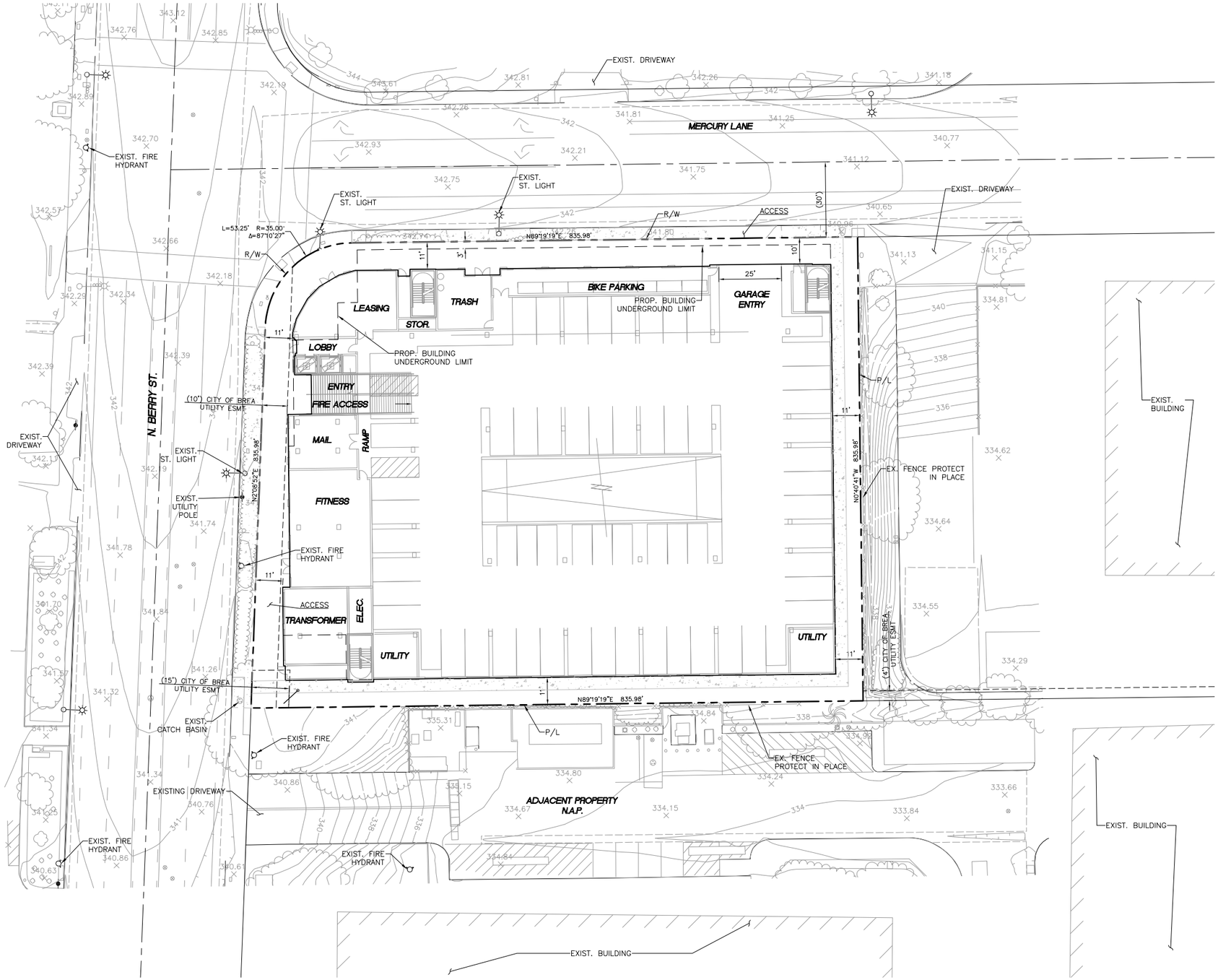
The exhibits provided in this section are to illustrate the post construction BMPs prescribed within this WQMP. Drainage flow information of the proposed project, such as general surface flow lines, concrete or other surface drainage conveyances, and storm drain facilities are also depicted. All structural source control and treatment control BMPs are shown as well.

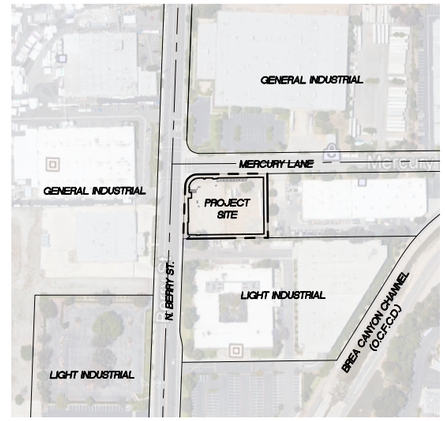
EXHIBITS

- Vicinity Map
- Site Plan
- WQMP Exhibit
- Typical Cross Sections

VICINITY MAP







SITE UTILIZATION MAP
1"=200'

20' 0' 10' 20'
SCALE: 1" = 20'

Know what's below. Call before you dig.

REVISIONS

REV.	DATE	BY	DESCRIPTION	APP'VD	REV.	DATE	BY	DESCRIPTION	APP'VD

PREPARED UNDER THE SUPERVISION OF:

JOHN OLIVER
R.C.E. NO. 044568
DATE

H-43

FUSCOE ENGINEERING
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www.fuscoe.com

CITY OF BREA
PUBLIC WORKS DEPARTMENT

MERCURY AND BERRY

TECHNICAL SITE PLAN

SHEET 1 OF 4

F:\Projects\1743\001\Plans\Entitlements\Conceptual Grading Plan\1743-01-cgp01sp.dwg (5/31/2018 2:04 PM) Plotted by: Terrence Ngu

MERCURY LN.

BERRY ST.

DMA 3
0.20

DMA 2
0.28

DMA 1
0.53

PROPOSED DETENTION SYSTEM
120' 2-24"ø
HP N-12

335.95
INV

335.35
INV

335.32
INV

336.24
INV

PROPOSED DETENTION
SYSTEM
120' 2-24"ø
HP N-12

PREFAB DINING TABLES

LINEAR FIRE TROUGH

TABLE TENNIS

CUSTOM COMMUNITY TABLE

CANOPY OVER DINING AREA

DAY BEDS ON ART. TURF

BOCCE BALL COURT

BBQ COUNTER

HAMMOCKS ON ARTIFICIAL TURF

LEGEND

- PROPERTY LINE
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- BMP DRAINAGE AREA BOUNDARY
- PROPOSED COMMON AREA LANDSCAPING
- PROPOSED BUILDING
- STREET SWEEPING PRIVATE STREETS & PARKING LOTS
- PROPOSED D.G. PAVING
- PROPOSED SYNTHETIC TURF
- PROPOSED PERVIOUS PAVEMENT
- PROPOSED BIORETENTION PLANTER
- PROPOSED DETENTION SYSTEM FOR HYDROMODIFICATION
- DIRECTION OF SURFACE FLOW
- DIRECTION OF PIPED FLOW
- A / 5.8 — DRAINAGE MANAGEMENT AREA & ACREAGE

NOTES

1. ROOF RUNOFF FROM DMA 2 WILL DRAIN INTO THE PODIUM LEVEL BIORETENTION PLANTERS LOCATED IN DMA 1.

2. PODIUM RUNOFF IN DMA 1 WILL DRAIN TO THE LARGE BIORETENTION PLANTER IN DMA 3 THAT SURROUNDS THE PROPOSED BUILDING.

30' 0' 15' 30'

SCALE: 1" = 30'

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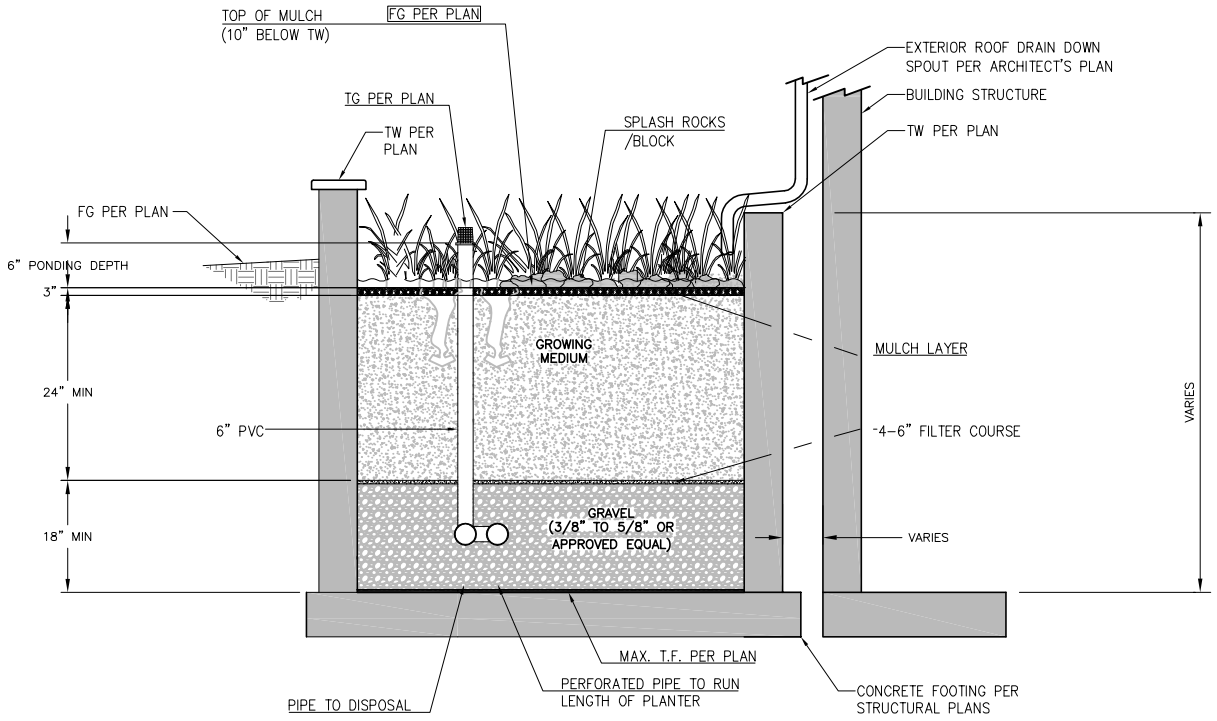
N

Scale: 1" = 30'

Exhibit Date: 06/06/2018

WATER QUALITY MANAGEMENT PLAN
MERCURY AND BERRY
BREA, CA



FLOW THROUGH PLANTER

TYPICAL BIORETENTION PLANTER BOX

NOT TO SCALE

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Not-to-Scale

Exhibit Date: 6/6/2018

TYPICAL CROSS SECTIONS
MERCURY AND BERRY
BREA, CA

SECTION VII EDUCATIONAL MATERIALS

The educational materials included in this WQMP are provided to inform people involved in future uses, activities, or ownership of the site about the potential pitfalls associated with careless storm water management. "The Ocean Begins at Your Front Door" provides users with information about storm water that is/will be generated on site, what happens when water enters a storm drain, and its ultimate fate, discharging into the ocean. Also included are activities guidelines to educate anyone who is or will be associated with activities that have a potential to impact storm water runoff quality, and provide a menu of BMPs to effectively reduce the generation of storm water runoff pollutants from a variety of activities. The educational materials that may be used for the proposed project are included in Appendix C of this WQMP and are listed below.

EDUCATION MATERIALS			
Residential Materials (http://www.ocwatersheds.com)	**Check If Attached**	**Business Materials (http://www.ocwatersheds.com)**	**Check If Attached**
The Ocean Begins at Your Front Door	☒	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☐
Tips for the Home Mechanic	☐	Tips for the Food Service Industry	☐
Homeowners Guide for Sustainable Water Use	☐	Proper Maintenance Practices for Your Business	☐
Household Tips	☒	**Other Materials (http://www.ocwatersheds.com) (https://www.casqa.org/resources/bmp-handbooks)**	**Check If Attached**
Proper Disposal of Household Hazardous Waste	☒		
Recycle at Your Local Used Oil Collection Center (North County)	☒	DF-1 Drainage System Operation & Maintenance	☒
Recycle at Your Local Used Oil Collection Center (Central County)	☐	R-1 Automobile Repair & Maintenance	☐
Recycle at Your Local Used Oil Collection Center (South County)	☐	R-2 Automobile Washing	☐
Tips for Maintaining Septic Tank Systems	☐	R-3 Automobile Parking	☐
Responsible Pest Control	☐	R-4 Home & Garden Care Activities	☐
Sewer Spill	☐	R-5 Disposal of Pet Waste	☒
Tips for the Home Improvement Projects	☐	R-6 Disposal of Green Waste	☒
Tips for Horse Care	☐	R-7 Household Hazardous Waste	☐
Tips for Landscaping and Gardening	☒	R-8 Water Conservation	☒
Tips for Pet Care	☒	SD-10 Site Design & Landscape Planning	☒
Tips for Pool Maintenance	☒	SD-11 Roof Runoff Controls	☐
Tips for Residential Pool, Landscape and Hardscape Drains	☐	SD-12 Efficient Irrigation	☒
Tips for Projects Using Paint	☐	SD-13 Storm Drain Signage	☐
Tips for Protecting Your Watershed	☒	SD-31 Maintenance Bays & Docs	☐
Other: Children's Brochure	☐	SD-32 Trash Storage Areas	☐

APPENDICES

APPENDIX A

SUPPORTING CALCULATIONS

Table 2.7: Infiltration BMP Feasibility Worksheet

	Infeasibility Criteria	***Yes***	***No***
1	**Would Infiltration BMPs pose significant risk for groundwater related concerns?** Refer to Appendix VII (Worksheet I) for guidance on groundwater-related infiltration feasibility criteria.	X	
Provide basis: Per Geotracker website, the project site is within 250 feet of a former LUST, located at the northeastern corner of Mercury Lane and Berry Street. Refer to Section III.3 of the WQMP for further information. Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	Would Infiltration BMPs **pose significant risk of increasing risk of geotechnical hazards that cannot be mitigated to an acceptable level**? (Yes if the answer to any of the following questions is yes, as established by a geotechnical expert): The BMP can only be located less than 50 feet away from slopes steeper than 15 percent The BMP can only be located less than eight feet from building foundations or an alternative setback. A study prepared by a geotechnical professional or an available watershed study substantiates that stormwater infiltration would potentially result in significantly increased risks of geotechnical hazards that cannot be mitigated to an acceptable level.		X
Provide basis: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
3	Would infiltration of the DCV from drainage area **violate downstream water rights**?		X
Provide basis: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

	Partial Infeasibility Criteria	***Yes***	***No***
4	Is proposed infiltration facility **located on HSG D soils** or the site geotechnical investigation identifies presence of soil characteristics which support categorization as D soils?	X	
Provide basis: Per TGD Figure XVI-2a Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
5	Is **measured infiltration rate below proposed facility less than 0.3 inches per hour**? This calculation shall be based on the methods described in Appendix VII.	X	
Provide basis: Per geotechnical report in Appendix F, infiltration rates were found to be between 0.1-0.2 in/hr. Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
6	Would **reduction of over predeveloped conditions cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters?**		X
Provide citation to applicable study and summarize findings relative to the amount of infiltration that is permissible: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
7	Would **an increase in infiltration over predeveloped conditions cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters?**		X

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

Provide citation to applicable study and summarize findings relative to the amount of infiltration that is permissible: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.		
Infiltration Screening Results (check box corresponding to result):		
8	Is there substantial evidence that infiltration from the project would result in a significant increase in I&I to the sanitary sewer that cannot be sufficiently mitigated? (See Appendix XVII) Provide narrative discussion and supporting evidence: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.	
9	If any answer from row 1-3 is yes: infiltration of any volume is **not feasible** within the DMA or equivalent. Provide basis: Summarize findings of infeasibility screening	X
10	If any answer from row 4-7 is yes, infiltration is **permissible but is not presumed to be feasible for the entire DCV.** Criteria for designing biotreatment BMPs to achieve the maximum feasible infiltration and ET shall apply. Provide basis: Summarize findings of infeasibility screening	X

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

11	If all answers to rows 1 through 11 are no, infiltration of the full DCV is potentially feasible, BMPs must be designed to infiltrate the full DCV to the maximum extent practicable.	

Harvest & Reuse Irrigation Demand Calculations

6/6/2018

Storm Water Design Caputre Volume (SQDV)

Drainage Area / Land Use Type	Impervious Area (ac)	Irrigated Area (ac)	% impervious	Runoff Coefficient	Design Storm Depth (in)	Drainage Area (acres)	DCV (ft^3)	DCV (gal)
Total Site	0.85	0.16	84%	0.780	0.90	1.010	**2,573.7**	**19,252**
				0.788			**0.0**	**0**
				0.900			**0.0**	**0**
				0.188			**0.0**	**0**
				0.150			**0.0**	**0**
				0.150			**0.0**	**0**

	Eto
Irvine	3.00
Laguna Beach	2.75
Santa Ana	2.93

Modified EAWU = $\frac{(Eto \times KL \times LA \times 0.015)}{IE}$

EIATA = $\frac{LA \times KL}{(IE \times \text{Tributary Imp. Area})}$

Blend of High-Use and Low-Use Landscaping

Drainage Area / Land Use Type	Total Area (ac)	Total Area (sf)	% Impervious	Impervious (sf)	Pervious / LA (sf)	Eto	KL	Modified EAWU	EAWU/ Impervious Acre	Minimum EAWU/ Impervious Acre (Table X.6)	Feasible?	EIATA	Minimum EIATA (interpo-lated)	Drawdown (days)	Drawdown (hours)
Total Site	1.010	43,996	84%	36,956	7,039	2.93	0.55	189.06	222.85	730	No	0.12	0.00	101.8	2,444
0	0.000	0	0%	0	0		0.55	0.00	#DIV/0!			#DIV/0!	0.00	#DIV/0!	#DIV/0!
0	0.000	0	0%	0	0		0.55	0.00	#DIV/0!			#DIV/0!	0.00	#DIV/0!	#DIV/0!
0	0.000	0	0%	0	0		0.55	0.00	#DIV/0!			#DIV/0!	0.00	#DIV/0!	#DIV/0!
0	0.000	0	0%	0	0		0.55	0.00	#DIV/0!			#DIV/0!	0.00	#DIV/0!	#DIV/0!
0	0.000	0	0%	0	0		0.55	0.00	#DIV/0!			#DIV/0!	0.00	#DIV/0!	#DIV/0!

TABLE X.6: HARVESTED WATER DEMAND THRESHOLDS FOR MINIMUM PARTIAL CAPTURE

Design Capture Storm Depth, inches	Wet Season Demand Required for Minimum Partial Capture, gpd per impervious acre
0.60	490
0.65	530
0.70	570
0.75	610
0.80	650
0.85	690
0.90	730
0.95	770
1.00	810

TABLE X.8: MINIMUM IRRIGATED AREA FOR POTENTIAL PARTIAL CAPTURE FEASIBILITY

General Landscape Type	Conservation Design: KL = 0.35			Active Turf Areas: KL = 0.7		
Closest ET Station	Irvine	Santa Ana	Laguna	Irvine	Santa Ana	Laguna
Design Capture Storm Depth, inches	Minimum Required Irrigated Area per Tributary Impervious Acre for Potential Partial Capture, ac/ac					
0.60	0.66	0.68	0.72	0.33	0.34	0.36
0.65	0.72	0.73	0.78	0.36	0.37	0.39
0.70	0.77	0.79	0.84	0.39	0.39	0.42
0.75	0.83	0.84	0.9	0.41	0.42	0.45
0.80	0.88	0.9	0.96	0.44	0.45	0.48
0.85	0.93	0.95	1.02	0.47	0.48	0.51
0.90	0.99	1.01	1.08	0.49	0.51	0.54
0.95	1.04	1.07	1.14	0.52	0.53	0.57
1.00	1.1	1.12	1.2	0.55	0.56	0.6

Source: Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs). March 22, 2011. Appendix X.

Worksheet A: Hydrologic Source Control Calculation Form

Project:

Date:

Drainage area ID: **See Below**

Total drainage area: 0.204 acres

Total drainage area Impervious Area (IA_{total}): 0.007 acres

HSC ID	HSC Type/ Description/ Reference BMP Fact Sheet	Effect of individual HSC_i per BMP Fact Sheets (XIV.1) (d_{HSCi})[1]	Impervious Area Tributary to HSC_i (IA_i)	$d_i \times IA_i$
DMA 3	HSC-2: Impervious Area Dispersion, Ratio = 28.5	1.00"	0.0069	0.0069
	Box 1:		$\sum d_i \times Iai =$	0.0069
	Box 2:		$IA_{total} =$	0.007
	[Box 1]/[Box 2]:		$d_{HSC\ total} =$	1.000
			Percent Capture Provided by HSCs (Table III.1)	80%

1 - For HSCs meeting criteria to be considered self-retaining, enter the DCV for the project.

Area	***Impervious Area (SF)***	***Pervious Area (SF)***	***Total Area (SF)***	***Ratio***
DMA 3	*301.6*	*8,604.0*	*8,905.6*	*28.5*

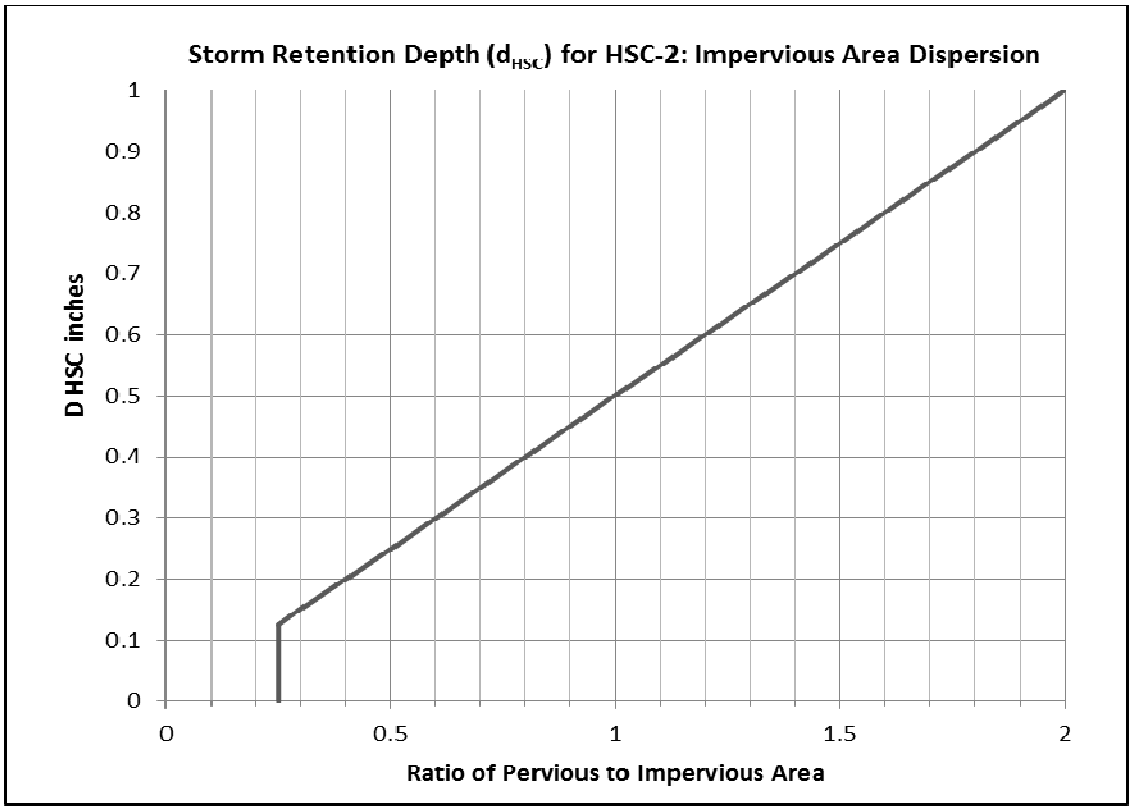


Table III.1: Fraction of Long Term Runoff Reduced (Capture Efficiency) by HSCs

Cumulative HSC Adjustment to Design Capture Storm Depth (d_{HSC})	Capture Efficiency Achieved Lowland Regions (<1,000 ft)	Capture Efficiency Achieved Mountainous Regions (>1,000 ft)
<0.05	0%	0%
0.05"	8%	7%
0.1"	20%	16%
0.2"	37%	31%
0.3"	48%	42%
0.4"	57%	50%
0.5"	64%	57%
0.6"	70%	63%
0.7"	75%	68%
0.8"	80%	72%
0.9"	80%	76%
1.0"	80%	80%

Worksheet B: Simple Design Capture Volume Sizing Method

		DMA =	DMA 1	DMA 2	DMA 3	
Step 1: Determine the design capture storm depth used for calculating volume						
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	0.90	0.90	0.90	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	0	0	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.90	0.90	0.90	inches
Step 2: Calculate the DCV						
1	Enter Project area tributary to BMP(s), *A* (acres)	A=	0.528	0.278	0.204	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	85.0%	100.0%	5.0%	%
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	0.788	0.900	0.188	
4	Calculate runoff volume, V_{design} = *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=	1,359.3	817.4	125.3	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV						
Step 3a: Determine design infiltration rate						
1	Enter measured infiltration rate, $K_{measured}$ (in/hr) (Appendix VII)	$K_{measured}$=	*Infiltration not feasible, Refer to Worksheet C*		*Refer to Worksheet A*	in/hr
2	Enter combined safety factor from Worksheet H, S_{final} (unitless)	S_{final}=				
3	Calculate design infiltration rate, $K_{design} = K_{measured} / S_{final}$	K_{design}=				in/hr
Step 3b: Determine minimum BMP footprint						
4	Enter drawdown time, *T* (max 48 hours)	T=	*Infiltration not feasible, Refer to Worksheet C*		*Refer to Worksheet A*	hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=				feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=				sq-ft

Worksheet C: Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs

		DMA=	DMA 1	DMA 2	
Step 1: Determine the design capture storm depth used for calculating volume					
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	0.90	0.90	inches
2	Enter calculated drawdown time of the proposed BMP based on equation provided in applicable BMP Fact Sheet, *T* (hours)	T=	3.84	3.84	hours
3	Using Figure III.2, determine the "fraction of design capture storm depth" at which the BMP drawdown time (T) line achieves 80% capture efficiency, X_1	X_1=	0.27	0.27	
4	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	0	inches
5	Enter capture efficiency corresponding to d_{HSC}, Y_2 (Worksheet A)	Y_2=	0%	0%	%
6	Using Figure III.2, determine the fraction of "design capture storm depth" at which the drawdown time (T) achieves the equivalent of the upstream capture efficiency (Y_2), X_2	X_2=	0.00	0.00	
7	Calculate the fraction of design volume that must be provided by BMP, *fraction* = $X_1 - X_2$	fraction=	0.27	0.27	
8	Calculate the resultant design capture storm depth (inches), $d_{fraction}$ = *fraction* × *d*	$d_{fraction}$=	0.2430	0.2430	inches
Step 2: Calculate the DCV					
1	Enter Project area tributary to BMP(s), *A* (acres)	A=	0.528	0.278	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	85.0%	100.0%	%
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	0.788	0.900	
4	Calculate runoff volume, V_{design} = *(C x* $d_{rfraction}$ *x A x 43560 x (1/12))*	V_{design}=	367.0	220.7	cu-ft
Supporting Calculations					
Describe System:					
		Bioretention with Underdrains (BIO-1):			
		Ponding Depth (d_P) =	*0.5*	*0.5*	ft
		Media Depth (d_{Media}) =	*2.0*	*2.0*	ft
		Effective Depth ($d_{Effective}$) =	*1.0*	*1.0*	ft
		Media Filtration Rate (K_{Design}) =	*2.5*	*2.5*	in/hr
		Surface Area Needed (Amin) =	*734.0*	*441.4*	ft^2
		Surface Area Provided (A) =	*1,868.0*	*2,055.0*	ft^2
		Total Volume Bio-Treated (V) =	*934.0*	*1,027.5*	ft^3
Provide drawdown time calculations per applicable BMP Fact Sheet:					
		Per Section III.3.2 and Fact Sheet BIO-1:			
		Drawdown (DD or T) = (η_R x d_R) / (K_{Design}) x 12			
		Time to Drawdown Ponding Depth (T_P) =	*3.8*	*3.8*	hours
		Time to Drawdown Effective Depth ($T_{Effective}$) =	*4.8*	*4.8*	hours
		Is $T_{Effective}$ / T_P > 125%?	*125%*	*125%*	
		If the initial drawdown time (T_P) is greater than 125% of actual drawdown ($T_{Effective}$), revise the initial drawdown time assumption in Step 2			
		Design Drawdown for Step 2 (T) =	*3.8*	*3.8*	hours
		$T_{Effective}$ / T =	*125%*	*125%*	

SUBJECT TO FURTHER REVISION

PROJECT SITE

LOS ANGELES COUNTY
ORANGE COUNTY

SAN BERNARDINO COUNTY
ORANGE COUNTY

RIVERSIDE COUNTY
ORANGE COUNTY

LOS ANGELES COUNTY
ORANGE COUNTY

LEGEND

City Boundaries

Hydrologic Soil Groups

- A Soils
- B Soils
- C Soils
- D Soils

Source:
Soils: Natural Resources Conservation Service (NRCS)
Soil Survey - soil_ca678, Orange County & Western Riverside
Date of publication: 2006-02-08
http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

0 2.5 5 10 Kilometers

0 1.8 3.6 7.2 Miles

TITLE: NRCS HYDROLOGIC SOILS GROUPS

JOB: ORANGE CO. INFILTRATION STUDY — ORANGE COUNTY CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE Advanced Water Engineering

FIGURE XVI-2a

P: \ 9526E \ 6-GIS \ Mxds \ Reports \ InfiltrationFeasability_20110215 \ 9526E_FigureXVI-2a_HydroSoils_20110215.mxd

Susceptibility

Potential Areas of Erosion, Habitat, & Physical Structure Susceptibility

Channel Type

Earth (Unstable)
Earth (Stabilized)
Stabilized

Tidel Influence

<= Mean High Water Line (4.28')

Water Body

Basin
Lake
Reservoir

Other Lands

Airport/Military

PROJECT SITE

Humble Reservoir
Orange County
Valencia Reservoir
Fullerton Reservoir
Loftus Diversion Channel
Desilting Basin
Brea Creek Reservior
Fullerton Reservoir
Fullerton Reservoir
Hillcrest Park Reservoir
Miller Retarding Basin
La Jolla Recharge Basin
Kraemer Basin
Placentia Retarding Basin
Raymond Retarding Basin
Gilbert Retarding Basin
Crescent Retarding Basin
Cypress Retarding Basin
Rossmoor Retarding Basin
Los Alamitos Retarding Basin
Channel in Retarding Basin

Los Angeles County
Santa River Watershed
Anaheim Bay-Huntington Harbor Watershed
Newport Bay-Newport Coastal Streams Watershed

Fullerton Airport
Los Alamitos Naval Air Station
Seal Beach Naval Weapons Station

Feet
0 8,000 16,000

TITLE
SUSCEPTIBILITY ANALYIS
SAN GABRIEL-COYOTE CREEK

JOB
ORANGE COUNTY
WATERSHED
MASTER PLANNING
ORANGE CO. CA

SCALE	1" = 8000'
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/30/10
JOB NO.	9526-E

PACE
Advanced Water Engineering

1

P:\9526E\6-GIS\Mxds\SuceptabilityMaps_20100505\9526E_SanGabrielCoyoteCreekSusceptibility_20100430.mxd

SUBJECT TO FURTHER REVISION

PROJECT SITE

0.9
0.9
0.95
0.7
0.75
0.7
0.65
0.75
0.8
0.85
0.9
0.6
0.95
1
1.05

LOS ANGELES COUNTY
ORANGE COUNTY
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
San Diego County

LEGEND

- Orange County Precipitation Stations
- 24 Hour, 85th Percentile Rainfall (Inches)
- 24 Hour, 85th Percentile Rainfall (Inches) - Extrapolated
- City Boundaries

Rainfall Zones

Design Capture Storm Depth (inches)

- 0.65"
- 0.7
- 0.75
- 0.80
- 0.85
- 0.90
- 0.95
- 1.00
- 1.10"

Note: Events defined as 24-hour periods (calendar days) with greater than 0.1 inches of rainfall.
For areas outside of available data coverage, professional judgment shall be applied.

0 3 6 12 Kilometers
0 1.8 3.6 7.2 Miles

TITLE
RAINFALL ZONES

JOB
ORANGE COUNTY
TECHNICAL GUIDANCE
DOCUMENT
ORANGE CO. CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/22/10
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-1

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-1_RainfallZones_20110215.mxd

APPENDIX B

NOTICE OF TRANSFER OF RESPONSIBILITY

NOTICE OF TRANSFER OF RESPONSIBILITY

WATER QUALITY MANAGEMENT PLAN

Mercury and Berry
APN 296-141-05

Submission of this Notice Of Transfer of Responsibility constitutes notice to the City of Brea that responsibility for the Water Quality Management Plan ("WQMP") for the subject property identified below, and implementation of that plan, is being transferred from the Previous Owner (and his/her agent) of the site (or a portion thereof) to the New Owner, as further described below.

I. Previous Owner/ Previous Responsible Party Information

Company/ Individual Name:		Contact Person:	
Street Address:		Title:	
City:	State:	ZIP:	Phone:

II. Information about Site Transferred

Name of Project (if applicable):	
Title of WQMP Applicable to site:	
Street Address of Site (if applicable):	
Planning Area (PA) and/ or Tract Number(s) for Site:	Lot Numbers (if Site is a portion of a tract):
Date WQMP Prepared (and revised if applicable):	

III. New Owner/ New Responsible Party Information

Company/ Individual Name:		Contact Person:	
Street Address:		Title:	
City:	State:	ZIP:	Phone:

IV. Ownership Transfer Information

General Description of Site Transferred to New Owner:	General Description of Portion of Project/ Parcel Subject to WQMP Retained by Owner (if any):

Lot/ Tract Numbers of Site Transferred to New Owner:
Remaining Lot/ Tract Numbers Subject to WQMP Still Held by Owner (if any):
Date of Ownership Transfer:

Note: When the Previous Owner is transferring a Site that is a portion of a larger project/ parcel addressed by the WQMP, as opposed to the entire project/parcel addressed by the WQMP, the General Description of the Site transferred and the remainder of the project/ parcel no transferred shall be set forth as maps attached to this notice. These maps shall show those portions of a project/ parcel addressed by the WQMP that are transferred to the New Owner (the Transferred Site), those portions retained by the Previous Owner, and those portions previously transferred by Previous Owner. Those portions retained by Previous Owner shall be labeled as "Previously Transferred".

V. Purpose of Notice of Transfer

The purposes of this Notice of Transfer of Responsibility are: 1) to track transfer of responsibility for implementation and amendment of the WQMP when property to which the WQMP is transferred from the Previous Owner to the New Owner, and 2) to facilitate notification to a transferee of property subject to a WQMP that such New Order is now the Responsible Party of record for the WQMP for those portions of the site that it owns.

VI. Certifications

A. Previous Owner

I certify under penalty of law that I am no longer the owner of the Transferred Site as described in Section II above. I have provided the New Owner with a copy of the WQMP applicable to the Transferred Site that the New Owner is acquiring from the Previous Owner.

Printed Name of Previous Owner Representative:	Title:
Signature of Previous Owner Representative:	Date:

B. New Owner

I certify under penalty of law that I am the owner of the Transferred Site, as described in Section II above, that I have been provided a copy of the WQMP, and that I have informed myself and understand the New Owner's responsibilities related to the WQMP, its implementation, and Best Management Practices associated with it. I understand that by signing this notice, the New Owner is accepting all ongoing responsibilities for implementation and amendment of the WQMP for the Transferred Site, which the New Owner has acquired from the Previous Owner.

Printed Name of New Owner Representative:	Title:
Signature:	Date:

APPENDIX C

EDUCATIONAL MATERIALS

Clean beaches and healthy creeks, rivers, bays, and ocean are important to Orange County. However, many common activities can lead to water pollution if you're not careful. Swimming pools and spas are common in Orange County, but they must be maintained properly to guarantee that chemicals aren't allowed to enter the street, where they can flow into the storm drains and then into the waterways. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never dump pool chemicals into the ocean, so don't let it enter the storm drains. Follow these easy tips to help prevent water pollution.

For more information, please call the **Orange County Stormwater Program** at **1-877-89-SPILL** (1-877-897-7455) or visit **www.ocwatersheds.com**

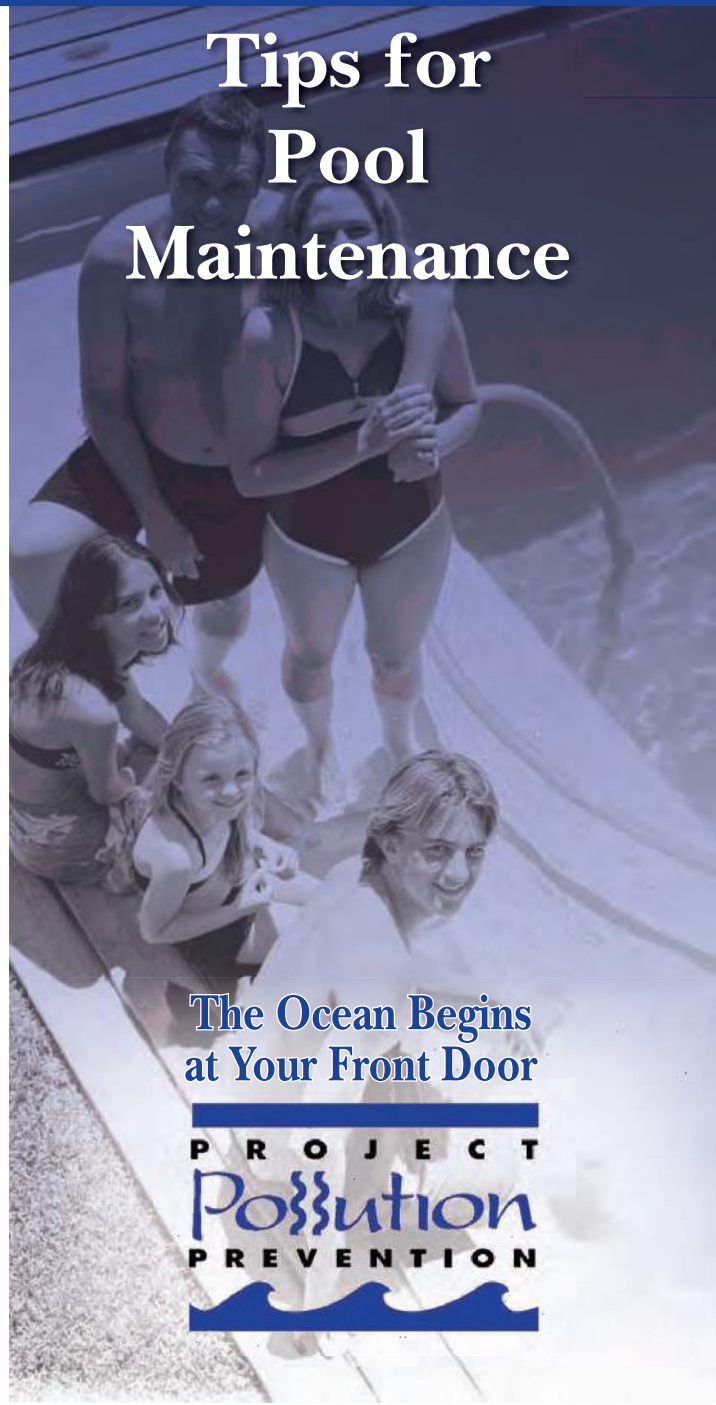
To report a spill, call the **Orange County 24-Hour Water Pollution Reporting Hotline 1-877-89-SPILL** (1-877-897-7455).

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while maintaining your pool. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

Help Prevent Ocean Pollution:

Tips for Pool Maintenance



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Tips for Pool Maintenance

Many pools are plumbed to allow the pool to drain directly to the sanitary sewer. If yours is not, follow these instructions for disposing of pool and spa water.

Acceptable and Preferred Method of Disposal

When you cannot dispose of pool water in the sanitary sewer, the release of dechlorinated swimming pool water is allowed if all of these tips are followed:

- The residual chlorine does not exceed 0.1 mg/l (parts per million).
- The pH is between 6.5 and 8.5.
- The water is free of any unusual coloration, dirt or algae.
- There is no discharge of filter media.
- There is no discharge of acid cleaning wastes.
- Some cities may have ordinances that do not allow pool water to be disposed into a storm drain. Check with your city.

How to Know if You're Following the Standards

You can find out how much chlorine is in your water by using a pool testing kit. Excess chlorine can be removed by discontinuing the use of chlorine for a few days prior to discharge or by purchasing dechlorinating chemicals from a local pool supply company. Always make sure to follow the instructions that come with any products you use.

Doing Your Part

By complying with these guidelines, you will make a significant contribution toward keeping pollutants out of Orange County's creeks, streams, rivers, bays and the ocean. This helps to protect organisms that are sensitive to pool chemicals, and helps to maintain the health of our environment.

PROJECT Pollution PREVENTION

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, if we are not careful, our daily activities can lead directly to water pollution problems. Water that drains through your watershed can pick up pollutants which are then transported to our waterways and beautiful ocean.

You can prevent water pollution by taking personal action and by working with members of your watershed community to prevent urban runoff from entering your waterway.

For more information, please call the **Orange County Stormwater Program** at **1.877.89.SPILL** or visit **www.ocwatersheds.com**

To report a spill, call the **Orange County 24-Hour Water Pollution Problem Reporting Hotline** at **1.877.89.SPILL**.

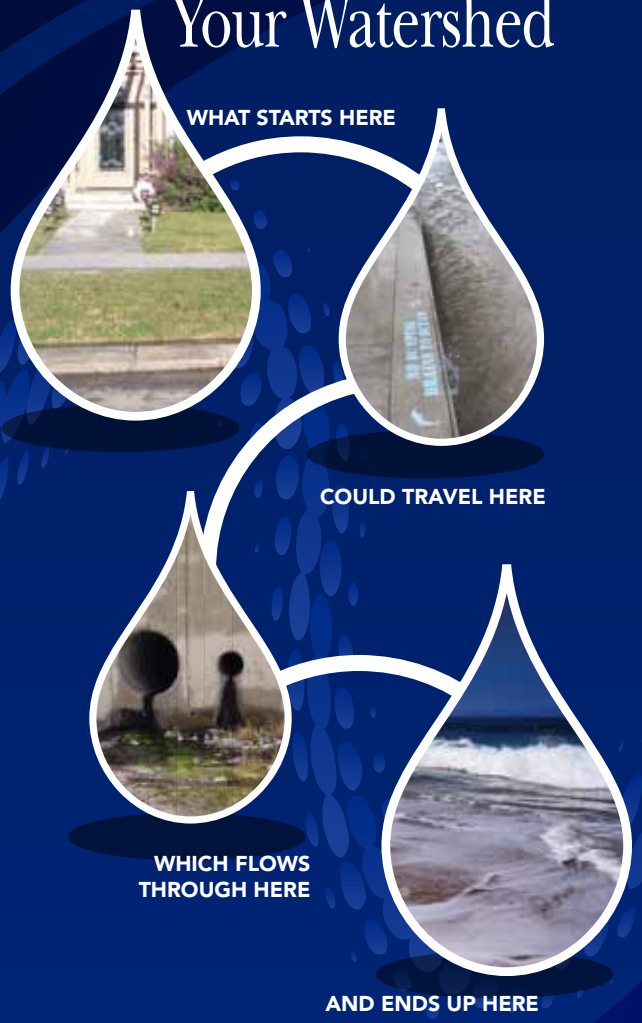
For emergencies, dial 911.

The tips contained in this brochure provide useful information to help protect your watershed. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

Printed on Recycled Paper
R-67

Help Prevent Ocean Pollution:

Tips For Protecting Your Watershed



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Tips for Protecting Your Watershed

My Watershed. Our Ocean.

Water + shed, *noun: A region of land within which water flows down into a specified water body, such as a river, lake, sea, or ocean; a drainage basin or catchment basin.*

Orange County is comprised of 11 major watersheds into which most of our water flows, connecting all of Orange County to the Pacific Ocean.

As water from rain (stormwater) or sprinklers and hoses (urban runoff) runs down your driveway and into your neighborhood streets, sidewalks and gutters, it flows into storm drains that lead to waterways within your watershed. The waterways from other cities merge as they make their way through our watersheds until all the runoff water in Orange County meets at the Pacific Ocean. The water that reaches our ocean is not pure. As it flows through the watershed, it picks up pollutants such as litter, cigarette butts, fertilizer, pesticides, pet waste, motor oil and lawn clippings. Unlike water that enters the sewer (from sinks and toilets), water that enters the storm drain is not treated before it flows, ultimately, to the ocean.

Water quality can be improved by "Adopting Your Watershed." Through this effort, we are challenging citizens and organizations to join the Orange County Stormwater Program and others who are working to protect and restore our creeks, rivers, bays and ocean.

There are many opportunities to get involved:

- Appreciate your watershed - explore the creeks, trails and ocean and make observations about its conditions. If you see anything abnormal (such as dead fish, oil spills, leaking barrels, and other pollution) contact the Orange County 24-hour water pollution problem reporting hotline at 1.877.89.SPILL to report the problem.
- Research your watershed. Learn about what watershed you live in by visiting www.ocwatersheds.com.
- Find a watershed organization in your community and volunteer to help. If there are no active groups, consider starting your own.
- Visit EPA's Adopt Your Watershed's Catalog of Watershed Groups at www.epa.gov/adopt to locate groups in your community.
- Organize or join in a creek, river, bay or ocean cleanup event such as Coastal & Inner Coastal Cleanup Day that takes place the 3rd Saturday of every September. For more information visit www.coast4u.org.

Follow these simple tips to protect the water quality of your watershed:

- **Sweep up debris and dispose of it in the trash. Do not hose down driveways or sidewalks into the street or gutter.**
- **Use dry cleanup methods such as cat litter to absorb spills and sweep up residue.**
- **Set your irrigation systems to reflect seasonal water needs or use weather-based controllers. Inspect for runoff regularly.**
- **Cover trashcans securely.**
- **Take hazardous waste to a household hazardous waste collection center. (For example, paint, batteries and petroleum products)**
- **Pick up after your pet.**
- **Follow application and disposal directions for pesticides and fertilizers.**
- **If you wash your car at home, wash it on your lawn or divert the runoff onto a landscaped area. Consider taking your car to a commercial car wash, where the water is reclaimed or recycled.**
- **Keep your car well maintained.**
- **Never pour oil or antifreeze in the street, gutter or storm drain.**

DF-1
DRAINAGE FACILITY OPERATION AND MAINTENANCE

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and storm water that may contain certain pollutants. Consequently these pollutants may accumulate in the system and must be removed periodically. In addition, the systems must also be maintained to function properly hydraulically to avoid flooding. Maintaining the system may involve the following activities:

1. Inspection and Cleaning of Stormwater Conveyance Structures
2. Controlling Illicit Connections and Discharges
3. Controlling Illegal Dumping

This list of Model Maintenance Procedures can be utilized as an inspection checklist to determine where better compliance with Designated Minimum Best Management Practices (notated with checkmarks and capital letters) is needed, and to recommend Additional Best Management Practices (notated with bullet points and lower case letters) that may be applicable under certain circumstances, especially where there are certain Pollutant Constituents of Concern. BMPs applicable to certain constituents are notated as:

Bacteria (BACT) *Sediment (SED)* *Nutrients (NUT)* *Oil and Grease (O&G)* *Pesticides (PEST)*
OtherToxic Compounds (TOX) *Trash (TRASH)* *Hydrological Impacts (HYD)* *Any/All or General (ANY)*

Program/Facility Being Inspected: _____

Date: _____ Inspector Name: _____

When completed, the checklist should be attached to the General Inspection Form Cover Sheet and copies should be provided to the Supervisor of the Facility/Program being inspected.

MAINTENANCE PROCEDURES:

1. Inspection and Cleaning of Drainage Facilities

Unsatisfactory	OK	General Guidelines
☐ _____	☐	T 1A. Annually inspect and clean drainage structures as needed.
☐ _____	☐	T 1B. Maintain appropriate records of cleaning and inspections.
☐ _____	☐	T 1C. Properly dispose of removed materials at a landfill or recycling facility.
☐ _____	☐	T 1D. Conduct intermittent supplemental visual inspections during the wet season to determine if there are problem inlets where sediment/trash or other pollutants accumulate, and provide for additional cleanouts as appropriate.
☐ _____	☐	T 1E. Prevent or clean up any discharges that may occur during the course of maintenance and cleaning procedures.
☐ _____	☐	T 1F. Verify that appropriate employees or subcontractors are trained in proper conductance of maintenance activities, including record keeping and disposal.
☐ _____	☐	T 1G. Annually inspect and clean v-ditches as needed, prior to the wet season. On shrub-covered slopes, vegetative debris may be placed on the downhill side of the ditch. Trash should be bagged and disposed at a landfill.

Unsatisfactory	OK
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐

General Guidelines (cont.)

- 1a. Remove trash or debris as needed from open channels. It should be noted that major vegetative debris removal may require other regulatory permits prior to completing the work. (TRASH)
- 1b. Consider retrofitting energy dissipaters (e.g. riprap) below culvert outfalls to minimize potential for erosion. (SED)
- 1c. Repair any v-ditches that have cracked or displaced in a manner that accelerates erosion. (SED)
- 1d. If suspicious conditions appear to exist, test selected samples of the removed wastes for compliance with hazardous waste regulations prior to disposal. (TOX)
- 1e. Consider more frequent regular cleaning of selected drainage structures to help address ongoing specific impairments. (SED, BACT, NUT, TRASH)
- 1f. Consider structural retrofits to the MS4 to help address ongoing specific impairments (SED, BACT, NUT, TRASH, O&G)
- 1g. Consider cleaning out pipes at gradient breaks or other in-pipe debris accumulation points as identified/needed. (ANY, BACT, NUT, TRASH)

Storm Drain Flushing

- 1h. Flushing of storm drains or storm drain inlets should only be done when critically necessary and no other solution is practical. (SED, BACT, TRASH).
- 1i. If flushed, to the extent practical the material should be collected (vacuumed), treated with an appropriate filtering device to remove sand and debris and disposed of properly. (SED)

Waste Management

T 1H. Store wastes collected from cleaning activities of the drainage facilities in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.

- 1j. Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device to remove the sand and debris prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not permitted, water should be pumped or vacuumed to a tank and properly disposed of. Do not dewater near a storm drain or stream. (SED, TRASH)
- 1k. Provide for laboratory analysis of at least one randomly collected sediment (less the debris) sample per year from the storm drain inlet leaning program to ensure that it does not meet the EPA criteria for hazardous waste. If the sample is determined to be hazardous, the sediment must be disposed of as hazardous waste and the source should be investigated. (TOX).

2. Controlling Illicit Connections and Discharges

Unsatisfactory	OK	General Guidelines
☐	☐	T 2A. Report prohibited discharges such as dumping, paint spills, abandoned oil containers, etc. observed during the course of normal daily activities so they can be investigated, contained, and cleaned up.
☐	☐	T 2B. Where field observations and/or monitoring data indicate significant problems, conduct field investigations to detect and eliminate existing illicit connections and improper disposal of pollutants into the storm drain (i.e. identify problem areas where discharges or illegal connections may occur and follow up stream to determine the source(s)). (Refer to Appendices A-10 and A-11.)
☐	☐	T 2C. Report all observed illicit connections and discharges to the 24-hour water pollution problem reporting hotline (714) 567-6363.
☐	☐	T 2D. Encourage public reporting of improper waste disposal by distributing public education materials and advertising the 24-hour water pollution problem reporting hotline.
		Storm Drain Stenciling ("No Dumping—Drains to Ocean")
☐	☐	T 2E. Implement and maintain a storm drain stenciling program.
☐	☐	• 2a. Consider adding the hotline number to the storm drain stencils (BACT, TOX, TRASH).

3. Controlling Illegal Dumping

		Field Investigation
☐	☐	T 3A. Report prohibited discharges such as dumpings observed during the course of normal daily activities so they can be investigated, contained and cleaned up.
☐	☐	T 3B. Conduct field investigations to detect and eliminate improper disposal of pollutants into the storm drain (i.e. identify problem areas where discharges or illegal connections may occur and follow up stream to determine the source(s)).
☐	☐	T 3C. Report all observed illegal dumping to the 24-hour water pollution problem reporting hotline (714) 567-6363.
☐	☐	T 3D. Encourage public reporting of improper waste disposal by distributing public education materials and advertising the 24-hour water pollution problem reporting hotline.
☐	☐	T 3E. If perpetrator can be identified, take appropriate enforcement action.
☐	☐	• 3a. Consider posting "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs could also indicate fines and penalties for illegal dumping. (ANY)

Unsatisfactory	OK	Training/Education/Outreach
☐	☐	T 3F. Verify that appropriate employees and subcontractors are trained to recognize and report illegal dumping.
☐	☐	T 3G. Encourage public reporting of illegal dumping by advertising the 24-hour water pollution problem reporting hotline (714) 567-6363.
☐	☐	• 3b. Take extra steps to educate the public in neighborhoods where illegal dumping has occurred to inform them why illegal dumping is a problem, and that illegal dumping carries a significant financial penalty. (ANY)

LIMITATIONS:

Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.

R-5
DISPOSAL OF PET WASTES

Pet wastes left in the environment may introduce solids, bacteria, and nutrients to the storm drain. The type and quantity of waste will dictate the proper disposal method. Small quantities of waste are best disposed with regular trash or flushed down a toilet. Large quantities of wastes from herbivore animals may be composted for subsequent use or disposal to landfill.

The activities outlined in this fact sheet target the following pollutants:	
Sediment	x
Nutrients	x
Bacteria	x
Foaming Agents	
Metals	
Hydrocarbons	
Hazardous Materials	
Pesticides and Herbicides	
Other	

Pick up after your pet! It's as easy as 1-2-3. 1) Bring a bag. 2) Clean it up. 3) Dispose of it properly (toilet or trash). The pollution prevention activities outlined in this fact sheets are used to prevent the discharge of pollutants to the storm drain system.

Think before you dispose of any pet wastes. Remember - The ocean starts at your front door.

Required Activities

- All pet wastes must be picked up and properly disposed of. Pet waste should be disposed of in the regular trash, flushed down a toilet, or composted as type and quantities dictate.
- Properly dispose of unused flea control products (shampoo, sprays, or collars).
- Manure produced by livestock in uncovered areas should be removed at least daily for composting, or storage in water-tight container prior to disposal. Never hose down to stream or storm drain. Composting or storage areas should be configured and maintained so as not to allow contact with runoff. Compost may be donated to greenhouses, nurseries, and botanical parks. Topsoil companies and composting centers may also accept composted manure.
- Line waste pits or trenches with an impermeable layer, such as thick plastic sheeting.
- When possible, allow wash water to infiltrate into the ground, or collect in an area that is routed to the sanitary sewer.
- Confine livestock in fenced in areas except during exercise and grazing times. Restrict animal access to creeks and streams, preferably by fencing.

For additional information contact:
County of Orange, OC Watershed
Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL
or visit our website at: www.ocwatersheds.com

- Install gutters that will divert roof runoff away from livestock areas.

Recommended Activities

- In order to properly dispose of pet waste, carry bags, pooper-scooper, or equivalent to safely pick up pet wastes while walking with pets.

- Bathe pets indoors and use less toxic shampoos. When possible, have pets professionally groomed.

- Properly inoculate your pet in order to maintain their health and reduce the possibility of pathogens in pet wastes.

- Maintain healthy and vigorous pastures with at least three inches of leafy material.

- Consider indoor feeding of livestock during heavy rainfall, to minimize manure exposed to potential runoff.

- Locate barns, corrals, and other high use areas on portions of property that either drain away from or are located distant form nearby creeks or storm drains.

R-6
DISPOSAL OF GREEN WASTES

The activities outlined in this fact sheet target the following pollutants:	
Sediment	x
Nutrients	x
Bacteria	x
Foaming Agents	
Metals	
Hydrocarbons	
Hazardous Materials	x
Pesticides and Herbicides	x
Other	

Green wastes entering the storm drain may clog the system creating flooding problems. Green wastes washed into receiving waters create an oxygen demand as they are decomposed, reducing the available oxygen for aquatic life. Pesticide and nutrient residues may be carried to the receiving water with the green wastes. The pollution prevention activities outlined in this fact sheets are used to prevent the discharge of pollutants to the storm drain system.

Think before disposing of any green wastes – Remember - The ocean starts at your front door.

Required Activities

- Green wastes can not be disposed of in the street, gutter, public right-of-way, storm drain, or receiving water. Dispose of green wastes as a part of the household trash. If the quantities are too large, arrange a pick up with the local waste hauler.

- After conducting yard or garden activities sweep the area and properly dispose of the clippings and waste. Do not sweep or blow out into the street or gutter.

Recommended Activities

- Utilize a commercial landscape company to conduct the landscape activities and waste disposal.

- Utilize native plants and drought tolerant species to reduce the water use and green waste produced.

- Use a lawn mower that has a mulcher so that the grass clippings remain on the lawn and do not have to be collected and disposed of.

- Compost materials in a designated area within the yard.

- Recycle lawn clippings and greenery waste through local programs if available.

For additional information contact:
County of Orange, OC Watershed
Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL
or visit our website at: www.ocwatersheds.com

R-8
WATER CONSERVATION

Excessive irrigation and/or the overuse of water is often the most significant factor in transporting pollutants to the storm drain system. Pollutants from a wide variety of sources including automobile repair and maintenance, automobile washing, automobile parking, home and garden care activities and pet care may dissolve in the water and be transported to the storm drain. In addition, particles and materials coated with fertilizers and pesticides may be suspended in the flow and be transported to the storm drain.

The activities outlined in this fact sheet target the following pollutants:	
Sediment	x
Nutrients	x
Bacteria	x
Foaming Agents	x
Metals	x
Hydrocarbons	x
Hazardous Materials	x
Pesticides and Herbicides	x
Other	x

Hosing off outside areas to wash them down not only consumes large quantities of water, but also transports any pollutants, sediments, and waste to the storm drain system. The pollution prevention activities outlined in this fact sheets are used to prevent the discharge of pollutants to the storm drain system.

Think before using water. Remember - The ocean starts at your front door.

Required Activities

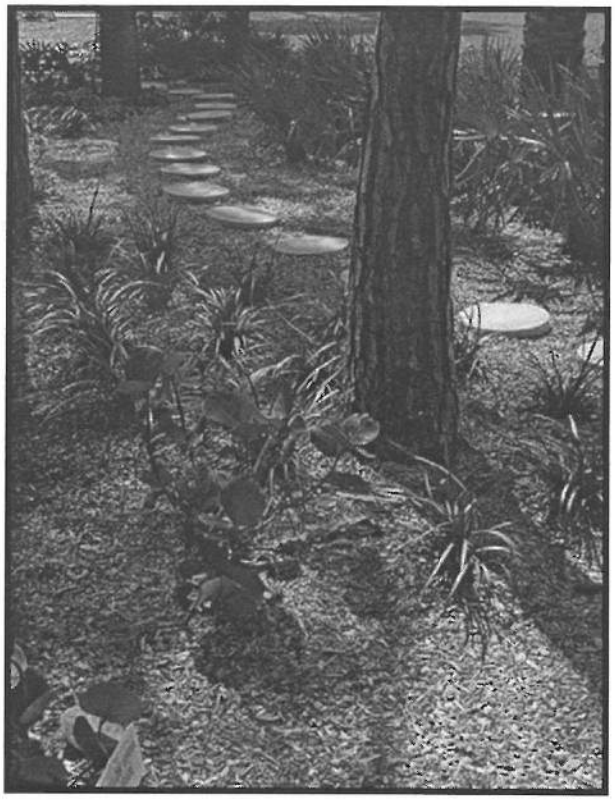
- Irrigation systems must be properly adjusted to reflect seasonal water needs.
- Do not hose off outside surfaces to clean, sweep with a broom instead.

Recommended Activities

- Fix any leaking faucets and eliminate unnecessary water sources.
- Use xeroscaping and drought tolerant landscaping to reduce the watering needs.
- Do not over watering lawns or gardens. Over watering wastes water and promotes diseases.
- Use a bucket to re-soak sponges/rags while washing automobiles and other items outdoors. Use hose only for rinsing.
- Wash automobiles at a commercial car wash employing water recycling.

For additional information contact:
County of Orange, OC Watershed
Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL
or visit our website at: www.ocwatersheds.com

Site Design & Landscape Planning SD-10



Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

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Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.
- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.
- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Efficient Irrigation SD-12

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

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- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

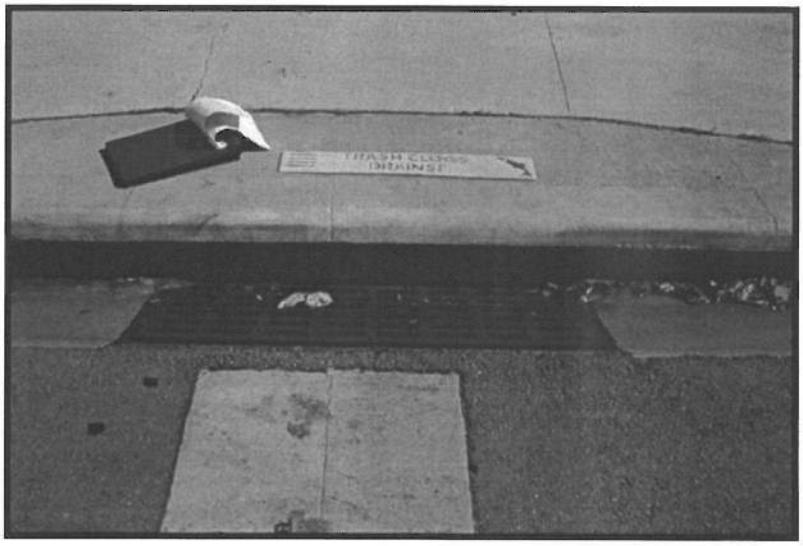
A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13



Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include "NO DUMPING

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– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.

- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

The Ocean Begins at Your Front Door

Even if you live miles from the Pacific Ocean, you may be unknowingly polluting it.

Did You Know?

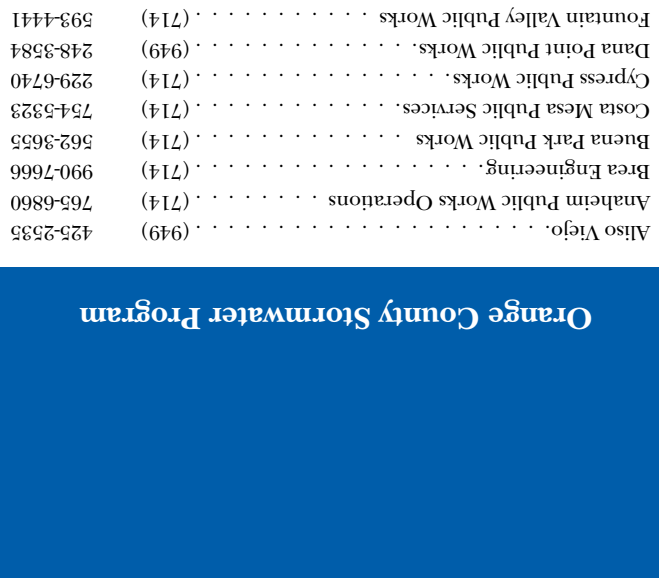
- Most people believe that the largest source of water pollution in urban areas comes from specific sources such as factories and sewage treatment plants. In fact, the largest source of water pollution comes from city streets, neighborhoods, construction sites and parking lots. This type of pollution is sometimes called "non-point source" pollution.
- There are two types of non-point source pollution: stormwater and urban runoff pollution.
- Stormwater runoff results from rainfall. When rainstorms cause large volumes of water to rinse the urban landscape, picking up pollutants along the way.
- Urban runoff can happen any time of the year when excessive water use from irrigation, vehicle washing and other sources carries trash, lawn clippings and other urban pollutants into storm drains.

Where Does It Go?

- Anything we use outside homes, vehicles and businesses – like motor oil, paint, pesticides, fertilizers and cleaners – can be blown or washed into storm drains.
- A little water from a garden hose or rain can also send materials into storm drains.
- Storm drains are separate from our sanitary sewer systems; unlike water in sanitary sewers (from sinks or toilets), water in storm drains is not treated before entering our waterways.

Sources of Non-Point Source Pollution

- Automotive leaks and spills.
- Improper disposal of used oil and other engine fluids.
- Metals found in vehicle exhaust, weathered paint, rust, metal plating and tires.
- Pesticides and fertilizers from lawns, gardens and farms.
- Improper disposal of cleaners, paint and paint removers.
- Soil erosion and dust debris from landscape and construction activities.
- Litter, lawn clippings, animal waste, and other organic matter.
- Oil stains on parking lots and paved surfaces.

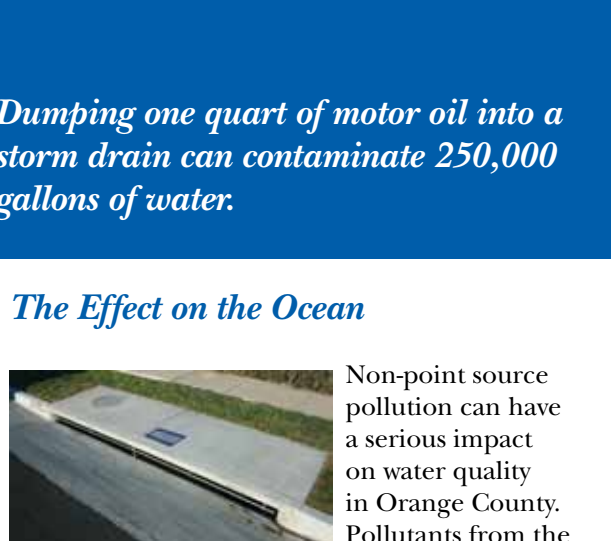


The Effect on the Ocean

Non-point source pollution can have a serious impact on water quality in Orange County. Pollutants from the storm drain system can harm marine life as well as coastal and wetland habitats. They can also degrade recreation areas such as beaches, harbors and bays.

Stormwater quality management programs have been developed throughout Orange County to educate and encourage the public to protect water quality, monitor runoff in the storm drain system, investigate illegal dumping and maintain storm drains.

Support from Orange County residents and businesses is needed to improve water quality and reduce urban runoff pollution. Proper use and disposal of materials will help stop pollution before it reaches the storm drain and the ocean.



Dumping one quart of motor oil into a storm drain can contaminate 250,000 gallons of water.

For More Information

Orange County Stormwater Program

California Environmental Protection Agency
www.calepa.ca.gov

- **Air Resources Board**
  www.arb.ca.gov
- **Department of Pesticide Regulation**
  www.cdpr.ca.gov
- **Department of Toxic Substances Control**
  www.dtsc.ca.gov
- **Integrated Waste Management Board**
  www.ciwmb.ca.gov
- **Office of Environmental Health Hazard Assessment**
  www.oehha.ca.gov
- **State Water Resources Control Board**
  www.waterboards.ca.gov

Earth 911 - Community-Specific Environmental Information 1-800-cleanup or visit www.1800cleanup.org

Health Care Agency's Ocean and Bay Water Closure and Posting Hotline
(714) 433-6400 or visit www.ocbeachinfo.com

Integrated Waste Management Dept. of Orange County (714) 834-6752 or visit www.oclandfills.com for information on household hazardous waste collection centers, recycling centers and solid waste collection

O.C. Agriculture Commissioner
(714) 447-7100 or visit www.ocagcomm.com

Stormwater Best Management Practice Handbook
Visit www.cabmphandbooks.com

UC Master Gardener Hotline
(714) 708-1646 or visit www.uccemg.com

The Orange County Stormwater Program has created and moderates an electronic mailing list to facilitate communications, take questions and exchange ideas among its users about issues and topics related to stormwater and urban runoff and the implementation of program elements. To join the list, please send an email to ocstormwaterinfo-join@list.ocwatersheds.com

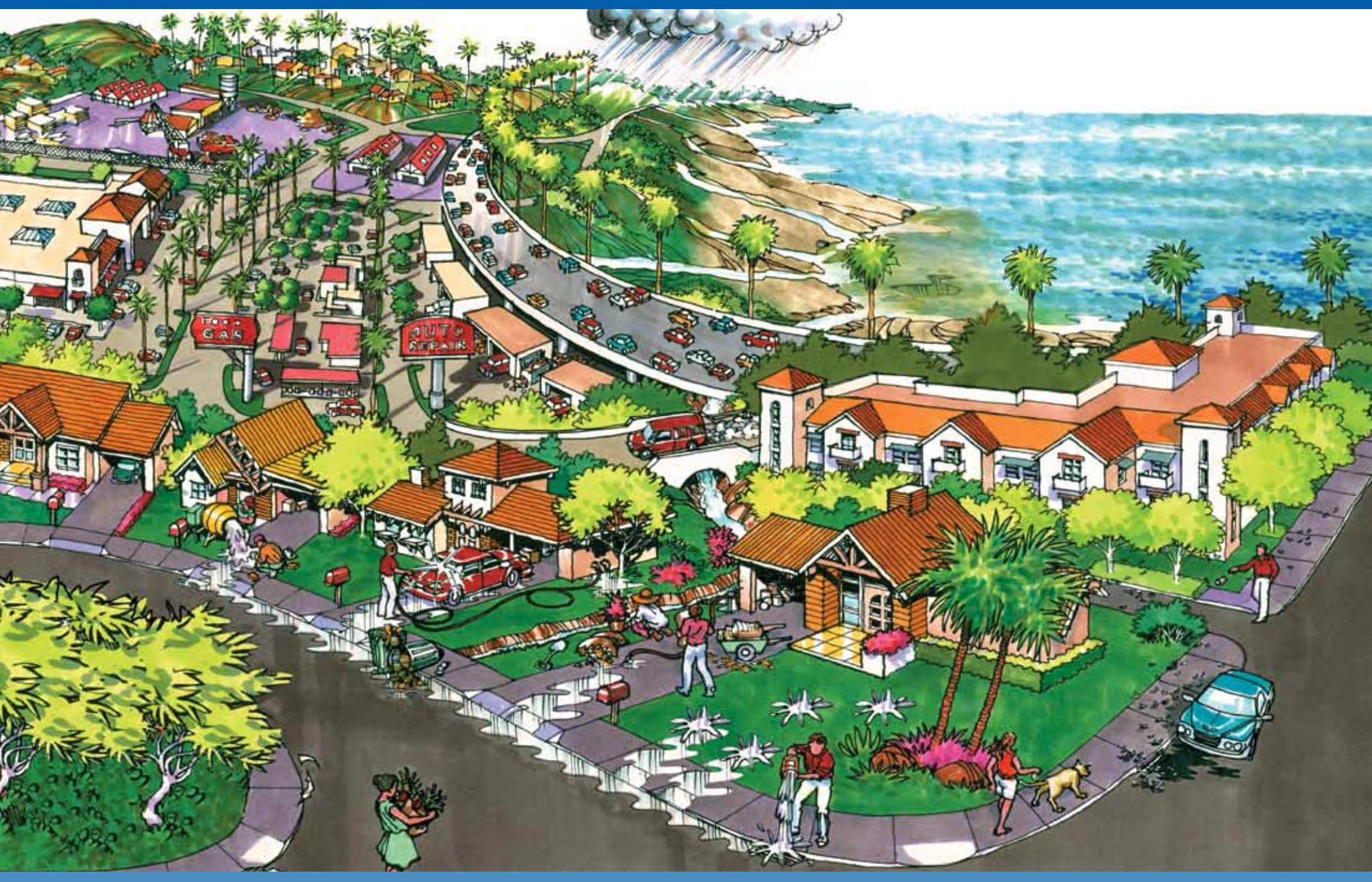
Aliso Viejo	(949)	425-2535
Anaheim Public Works Operations	(714)	765-6860
Brea Engineering	(714)	990-7666
Buena Park Public Works	(714)	562-3655
Costa Mesa Public Services	(714)	754-5323
Cypress Public Works	(714)	229-6740
Dana Point Public Works	(949)	248-3584
Fountain Valley Public Works	(714)	593-4441
Fullerton Engineering Dept.	(714)	738-6853
Garden Grove Public Works	(714)	741-5956
Huntington Beach Public Works	(714)	536-5431
Irvine Public Works	(949)	724-6315
La Habra Public Services	(562)	905-9792
La Palma Public Works	(714)	690-3310
Laguna Beach Water Quality	(949)	497-0378
Laguna Hills Public Services	(949)	707-2650
Laguna Niguel Public Works	(949)	362-4337
Laguna Woods Public Works	(949)	639-0500
Lake Forest Public Works	(949)	461-3480
Los Alamitos Community Dev.	(562)	431-3538
Mission Viejo Public Works	(949)	470-3056
Newport Beach, Code & Water Quality Enforcement	(949)	644-3215
Orange Public Works	(714)	532-6480
Placentia Public Works	(714)	993-8245
Rancho Santa Margarita	(949)	635-1800
San Clemente Environmental Programs	(949)	361-6143
San Juan Capistrano Engineering	(949)	234-4413
Santa Ana Public Works	(714)	647-3380
Seal Beach Engineering	(562)	431-2527 x317
Stanton Public Works	(714)	379-9222 x204
Tustin Public Works/Engineering	(714)	573-3150
Villa Park Engineering	(714)	998-1500
Westminster Public Works/Engineering	(714)	898-3311 x446
Yorba Linda Engineering	(714)	961-7138
Orange County Stormwater Program	(877)	897-7455

Orange County 24-Hour
Water Pollution Problem Reporting Hotline
1-877-89-SPILL (1-877-897-7455)

On-line Water Pollution Problem Reporting Form

www.ocwatersheds.com

The Ocean Begins at Your Front Door



Never allow pollutants to enter the street, gutter or storm drain!

Follow these simple steps to help reduce water pollution:

Household Activities

- Do not rinse spills with water. Use dry cleanup methods such as applying cat litter or another absorbent material, sweep and dispose of in the trash. Take items such as used or excess batteries, oven cleaners, automotive fluids, painting products and cathode ray tubes, like TVs and computer monitors, to a Household Hazardous Waste Collection Center (HHWCC).
- For a HHWCC near you call (714) 834-6752 or visit www.oclandfills.com.
- Do not hose down your driveway, sidewalk or patio to the street, gutter or storm drain. Sweep up debris and dispose of it in the trash.

Automotive

- Take your vehicle to a commercial car wash whenever possible. If you wash your vehicle at home, choose soaps, cleaners, or detergents labeled non-toxic, phosphate- free or biodegradable. Vegetable and citrus-based products are typically safest for the environment.
- Do not allow washwater from vehicle washing to drain into the street, gutter or storm drain. Excess washwater should be disposed of in the sanitary sewer (through a sink or toilet) or onto an absorbent surface like your lawn.
- Monitor your vehicles for leaks and place a pan under leaks. Keep your vehicles well maintained to stop and prevent leaks.
- Never pour oil or antifreeze in the street, gutter or storm drain. Recycle these substances at a service station, a waste oil collection center or used oil recycling center. For the nearest Used Oil Collection Center call 1-800-CLEANUP or visit www.1800cleanup.org.

Pool Maintenance

- Pool and spa water must be dechlorinated and free of excess acid, alkali or color to be allowed in the street, gutter or storm drain.
- When it is not raining, drain dechlorinated pool and spa water directly into the sanitary sewer.
- Some cities may have ordinances that do not allow pool water to be disposed of in the storm drain. Check with your city.

Landscape and Gardening

- Do not over-water. Water your lawn and garden by hand to control the amount of water you use or set irrigation systems to reflect seasonal water needs. If water flows off your yard onto your driveway or sidewalk, your system is over-watering. Periodically inspect and fix leaks and misdirected sprinklers.
- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of waste by composting, hauling it to a permitted landfill, or as green waste through your city's recycling program.
- Follow directions on pesticides and fertilizer, (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Take unwanted pesticides to a HHWCC to be recycled. For locations and hours of HHWCC, call (714) 834-6752 or visit www.oclandfills.com.

Trash

- Place trash and litter that cannot be recycled in securely covered trash cans.
- Whenever possible, buy recycled products.
- Remember: Reduce, Reuse, Recycle.

Pet Care

- Always pick up after your pet. Flush waste down the toilet or dispose of it in the trash. Pet waste, if left outdoors, can wash into the street, gutter or storm drain.
- If possible, bathe your pets indoors. If you must bathe your pet outside, wash it on your lawn or another absorbent/permeable surface to keep the washwater from entering the street, gutter or storm drain.
- Follow directions for use of pet care products and dispose of any unused products at a HHWCC.

Common Pollutants

Home Maintenance
- Detergents, cleaners and solvents
- Oil and latex paint
- Swimming pool chemicals
- Outdoor trash and litter

Lawn and Garden
- Pet and animal waste
- Pesticides
- Clippings, leaves and soil
- Fertilizer

Automobile
- Oil and grease
- Radiator fluids and antifreeze
- Cleaning chemicals
- Brake pad dust

Do your part to prevent water pollution in our creeks, rivers, bays and ocean.

Clean beaches and healthy creeks, rivers, bays, and ocean are important to Orange County. However, many common household activities can lead to water pollution if you're not careful.

Remember the Water in Your Storm Drain is Not Treated BEFORE It Enters Our Waterways

Litter, oil, chemicals and other substances that are left on your yard or driveway can be blown or washed into storm drains that flow to the ocean. Over-watering your lawn and washing your car can also flush materials into the storm drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated.

You would never pour soap, fertilizers or oil into the ocean, so don't let them enter streets, gutters or storm drains. Follow the easy tips in this brochure to help prevent water pollution.

For more information, please call the **Orange County Stormwater Program** at **1-877-89-SPILL** (1-877-897-7455) or visit **www.ocwatersheds.com**

To report a spill, call the **Orange County 24-Hour Water Pollution Problem Reporting Hotline 1-877-89-SPILL** (1-877-897-7455).

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while performing everyday household activities. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

GENUINE RECYCLED PAPER
50% PRE-CONSUMER AND 15% POST-CONSUMER

RECYCLE USED OIL

Help Prevent Ocean Pollution:

Household Tips

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Pollution Prevention

Household Activities

- **Do not rinse spills with water!** Sweep outdoor spills and dispose of in the trash. For wet spills like oil, apply cat litter or another absorbent material, then sweep and bring to a household hazardous waste collection center (HHWCC).
- Securely cover trash cans.
- Take household hazardous waste to a household hazardous waste collection center.
- Store household hazardous waste in closed, labeled containers inside or under a cover.
- Do not hose down your driveway, sidewalk or patio. Sweep up debris and dispose of in trash.
- Always pick up after your pet. Flush waste down the toilet or dispose of in the trash.
- Bathe pets indoors or have them professionally groomed.

Household Hazardous Wastes include:

- ▲ **Batteries**
- ▲ **Paint thinners, paint strippers and removers**
- ▲ **Adhesives**
- ▲ **Drain openers**
- ▲ **Oven cleaners**
- ▲ **Wood and metal cleaners and polishes**
- ▲ **Herbicides and pesticides**
- ▲ **Fungicides/wood preservatives**
- ▲ **Automotive fluids and products**
- ▲ **Grease and rust solvents**
- ▲ **Thermometers and other products containing mercury**
- ▲ **Fluorescent lamps**
- ▲ **Cathode ray tubes, e.g. TVs, computer monitors**
- ▲ **Pool and spa chemicals**

Gardening Activities

- Follow directions on pesticides and fertilizers, (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Water your lawn and garden by hand to control the amount of water you use. Set irrigation systems to reflect seasonal water needs. If water flows off your yard and onto your driveway or sidewalk, your system is over-watering.
- Mulch clippings or leave them on the lawn. If necessary, dispose in a green waste container.
- Cultivate your garden often to control weeds.

Washing and Maintaining Your Car

- Take your car to a commercial car wash whenever possible.
- Choose soaps, cleaners, or detergents labeled "non-toxic," "phosphate free" or "biodegradable." Vegetable and citrus-based products are typically safest for the environment, **but even these should not be allowed into the storm drain.**
- Shake floor mats into a trash can or vacuum to clean.
- Do not use acid-based wheel cleaners and "hose off" engine degreasers at home. They can be used at a commercial facility, which can properly process the washwater.
- **Do not dump washwater onto your driveway, sidewalk, street, gutter or storm drain.** Excess washwater should be disposed of in the sanitary sewers (through a sink, or toilet) or onto an absorbent surface like your lawn.
- Use a nozzle to turn off water when not actively washing down automobile.
- Monitor vehicles for leaks and place pans under leaks. Keep your car well maintained to stop and prevent leaks.
- Use cat litter or other absorbents and sweep to remove any materials deposited by vehicles. Contain sweepings and dispose of at a HHWCC.
- Perform automobile repair and maintenance under a covered area and use drip pans or plastic sheeting to keep spills and waste material from reaching storm drains.
- **Never pour oil or antifreeze in the street, gutter or storm drains.** Recycle these substances at a service station, HHWCC, or used oil recycling center. For the nearest Used Oil Collection Center call 1-800-CLEANUP or visit www.ciwmb.ca.gov/UsedOil.

For locations and hours of Household Hazardous Waste Collection Centers in Anaheim, Huntington Beach, Irvine and San Juan Capistrano, call (714)834-6752 or visit www.oclandfills.com.

Do your part to prevent water pollution in our creeks, rivers, bays and ocean.

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, not properly disposing of household hazardous waste can lead to water pollution. Batteries, electronics, paint, oil, gardening chemicals, cleaners and other hazardous materials cannot be thrown in the trash. They also must never be poured or thrown into yards, sidewalks, driveways, gutters or streets. Rain or other water could wash the materials into the storm drain and eventually into our waterways and the ocean. In addition, hazardous waste must not be poured in the sanitary sewers (sinks and toilets).

NEVER DISPOSE OF HOUSEHOLD HAZARDOUS WASTE IN THE TRASH, STREET, GUTTER, STORM DRAIN OR SEWER.

For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

To Report Illegal Dumping of Household Hazardous Waste call 1-800-69-TOXIC

To report a spill,
call the
Orange County 24-Hour Water Pollution Problem Reporting Hotline
1-877-89-SPILL (1-877-897-7455).

For emergencies, dial 911.

RECYCLE USED OIL

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H-91

Help Prevent Ocean Pollution:

Proper Disposal of Household Hazardous Waste

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

ORANGE COUNTY

Pollution Prevention

Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be "household hazardous waste" or "HHW." HHW can be found throughout your home, including the bathroom, kitchen, laundry room and garage.

WHEN POSSIBLE, USE NON-HAZARDOUS OR LESS-HAZARDOUS PRODUCTS.

Disposal of HHW down the drain, on the ground, into storm drains, or in the trash is illegal and unsafe.

Proper disposal of HHW is actually easy. Simply drop them off at a Household Hazardous Waste Collection Center (HHWCC) for free disposal and recycling. Many materials including anti-freeze, latex-based paint, motor oil and batteries can be recycled. Some centers have a "Stop & Swap" program that lets you take partially used home, garden, and automobile products free of charge. There are four HHWCCs in Orange County:

Anaheim:.....1071 N. Blue Gum St
Huntington Beach:.....17121 Nichols St
Irvine:..... 6411 Oak Canyon
San Juan Capistrano:... 32250 La Pata Ave

Centers are open Tuesday-Saturday, 9 a.m.-3 p.m. Centers are closed on rainy days and major holidays. For more information, call **(714) 834-6752** or visit **www.oclandfills.com.**

Common household hazardous wastes

- Batteries
- Paint and paint products
- Adhesives
- Drain openers
- Household cleaning products
- Wood and metal cleaners and polishes
- Pesticides
- Fungicides/wood preservatives
- Automotive products (antifreeze, motor oil, fluids)
- Grease and rust solvents
- Fluorescent lamps
- Mercury (thermometers & thermostats)
- All forms of electronic waste including computers and microwaves
- Pool & spa chemicals
- Cleaners
- Medications
- Propane (camping & BBQ)
- Mercury-containing lamps
- Television & monitors (CRTs, flatscreens)

Tips for household hazardous waste

- Never dispose of HHW in the trash, street, gutter, storm drain or sewer.
- Keep these materials in closed, labeled containers and store materials indoors or under a cover.
- When possible, use non-hazardous products.
- Reuse products whenever possible or share with family and friends.
- Purchase only as much of a product as you'll need. Empty containers may be disposed of in the trash.
- HHW can be harmful to humans, pets and the environment. Report emergencies to 911.

Did you know that just one quart of oil can pollute 250,000 gallons of water?

A clean ocean and healthy creeks, rivers, bays and beaches are important to Orange County. However, not properly disposing of used oil can lead to water pollution. If you pour or drain oil onto driveways, sidewalks or streets, it can be washed into the storm drain. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering the ocean. Help prevent water pollution by taking your used oil to a used oil collection center.

Included in this brochure is a list of locations that will accept up to five gallons of used motor oil at no cost. Many also accept used oil filters. Please contact the facility before delivering your used oil. This listing of companies is for your reference and does not constitute a recommendation or endorsement of the company.

Please note that used oil filters may not be disposed of with regular household trash. They must be taken to a household hazardous waste collection or recycling center in Anaheim, Huntington Beach, Irvine or San Juan Capistrano. For information about these centers, visit www.oclandfills.com.

Please do not mix your oil with other substances!

For more information, please call the Orange County Stormwater Program at 1-877-89-SPILL (1-877-897-7455) or visit www.watersheds.com.

For information about the proper disposal of household hazardous waste, call the Household Waste Hotline at (714) 834-6752 or visit www.oclandfills.com.

RECYCLE USED OIL

For additional information about the nearest oil recycling center, call the Used Oil Program at 1-800-CLEANUP or visit www.cleanup.org.

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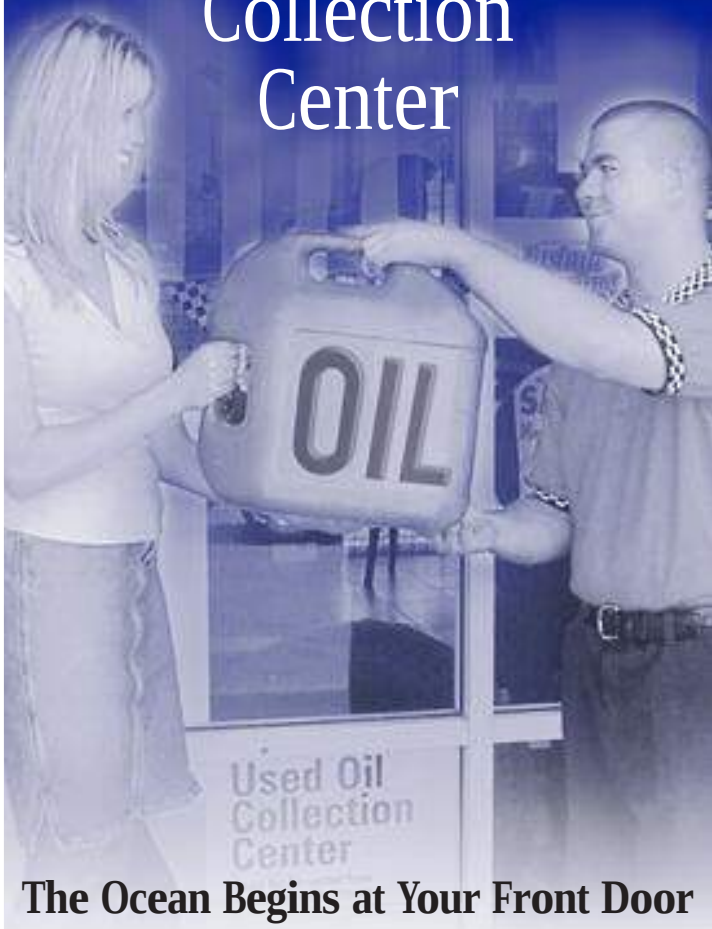
Help Prevent Ocean Pollution:

Recycle at Your Local Used Oil Collection Center



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

NORTH COUNTY

Used Oil Collection Centers

Anaheim

All Seasons Tire and Auto Center, Inc.
817 S Brookhurst St., Anaheim, CA 92804
(714)772-6090( )
CIWMB#: 30-C-03177

AutoZone #3317
423 N Anaheim Blvd., Anaheim, CA 92805
(714)776-0787( )
CIWMB#: 30-C-05263

AutoZone #5226
2145 W Lincoln Ave., Anaheim, CA 92801
(714)533-6599( )
CIWMB#: 30-C-04604

Bedard Automotive
3601 E Miraloma Ave., Anaheim, CA 92806
(714)528-1380( )
CIWMB#: 30-C-02205

Classic Chevrolet
1001 Weir Canyon Rd., Anaheim, CA 92807
(714)283-5400( )
CIWMB#: 30-C-05223

Econo Lube N' Tune #4
3201 W Lincoln Ave., Anaheim, CA 92801
(714)821-0128( )
CIWMB#: 30-C-01485

EZ Lube Inc - Savi Ranch #43
985 N Weir Canyon Rd., Anaheim, CA 92807
(714)556-1312( )
CIWMB#: 30-C-06011

Firestone Store #71C7
1200 S Magnolia Ave., Anaheim, CA 92804
(949)598-5520( )
CIWMB#: 30-C-05743

Great Western Lube Express
125 N Brookhurst St., Anaheim, CA 92801
(714)254-1300( )
CIWMB#: 30-C-05542

HR Pro Auto Service Center
3180 W Lincoln Ave., Anaheim, CA 92801
(714)761-4343( )
CIWMB#: 30-C-05927

Ira Newman Automotive Services
1507 N State College Blvd., Anaheim, CA 92806
(714)635-2392( )
CIWMB#: 30-C-01482

Jiffy Lube #1028
2400 W Ball Rd., Anaheim, CA 92804
(714)761-5211( )
CIWMB#: 30-C-00870

Jiffy Lube #1903
2505 E Lincoln Ave., Anaheim, CA 92806
(714)772-4000( )
CIWMB#: 30-C-05511

Jiffy Lube #2340
2181 W Lincoln Ave., Anaheim, CA 92801
(714)533-1000( )
CIWMB#: 30-C-04647

Kragen Auto Parts #1303
1088 N State College Blvd., Anaheim, CA 92806
(714)956-7351( )
CIWMB#: 30-C-03438

Kragen Auto Parts #1399
2245 W Ball Rd., Anaheim, CA 92804
(714)490-1274( )
CIWMB#: 30-C-04094

Kragen Auto Parts #1565
2072 Lincoln Ave., Anaheim, CA 92806
(714)502-6992( )
CIWMB#: 30-C-04078

Kragen Auto Parts #1582
3420 W Lincoln Ave., Anaheim, CA 92801
(714)828-7977( )
CIWMB#: 30-C-04103

Pep Boys #613
10912 Katella Ave., Anaheim, CA 92804
(714)638-0863( )
CIWMB#: 30-C-01756

Pep Boys #663
3030 W Lincoln Anaheim, CA 92801
(714)826-4810( )
CIWMB#: 30-C-03417

Pep Boys #809
8205 E Santa Ana Cyn Rd., Anaheim, CA 92808
(714)974-0105( )
CIWMB#: 30-C-03443

Pick Your Part
1235 S Beach Blvd., Anaheim, CA 92804
(714)527-1645( )
CIWMB#: 30-C-03744

PK Auto Performance
3106 W. Lincoln Ave., Anaheim, CA 92801
(714)826-2141( )
CIWMB#: 30-C-05628

Quick Change Lube and Oil
2731 W Lincoln Ave., Anaheim, CA 92801
(714)821-4464( )
CIWMB#: 30-C-04363

Saturn of Anaheim
1380 S Auto Center Dr., Anaheim, CA 92806
(714)648-2444( )
CIWMB#: 30-C-06332

Sun Tech Auto Service
105 S State College Blvd., Anaheim, CA 92806
(714)956-1389( )
CIWMB#: 30-C-06455

Vonic Truck Services
515 S Rose St., Anaheim, CA 92805
(714)533-3333( )
CIWMB#: 30-C-01142

Anaheim Hills

Anaheim Hills Car Wash & Lube
5810 E La Palma Ave., Anaheim Hills, CA 92807
(714)777-6605( )
CIWMB#: 30-C-01387

Brea

Firestone Store #27A9
891 E Imperial Hwy., Brea, CA 92821
(714)529-8404( )
CIWMB#: 30-C-01221

Oil Can Henry's
230 N Brea Blvd., Brea, CA 92821
(714)990-1900( )
CIWMB#: 30-C-04273

Buena Park

Firestone Store #71F7
6011 Orangethorpe Buena Park, CA 90620
(714)670-7912( )
CIWMB#: 30-C-01218

Firestone Store #71T8
8600 Beach Blvd., Buena Park, CA 90620
(714)827-5300( )
CIWMB#: 30-C-02121

Kragen Auto Parts #1204
5303 Beach Blvd., Buena Park, CA 90621
(714)994-1320( )
CIWMB#: 30-C-02623

Cypress

AutoZone #5521
5471 Lincoln Ave., Cypress, CA 90630
(714)995-4644( )
CIWMB#: 30-C-00836

Big O Tires
6052 Cerritos Ave., Cypress, CA 90630
(714)826-6334( )
CIWMB#: 30-C-04245

Econo Lube N' Tune #213
5497 Cerritos Ave., Cypress, CA 90630
(714)761-0456( )
CIWMB#: 30-C-06240

Jiffy Lube #851
4942 Lincoln Ave., Cypress, CA 90630
(626)965-9689( )
CIWMB#: 30-C-06182

M & N Coastline Auto & Tire Service
4005 Ball Rd., Cypress, CA 90630
(714)826-1001( )
CIWMB#: 30-C-04387

Masterlube #103
5904 Lincoln Cypress, CA 90630
(714)826-2323( )
CIWMB#: 30-C-01071

Masterlube #104
5971 Ball Rd., Cypress, CA 90630
(714)220-1555( )
CIWMB#: 30-C-04682

Metric Motors of Cypress
6042 Cerritos Ave., Cypress, CA 90630
(714)821-4702( )
CIWMB#: 30-C-05157

Fullerton

AutoZone #2898
146 N. Raymond Ave., Fullerton, CA 92831
(714)870-9772( )
CIWMB#: 30-C-04488

AutoZone #5522
1801 Orangethorpe W. Fullerton, CA 92833
(714)870-8286( )
CIWMB#: 30-C-06062

AutoZone #5523
102 N Euclid Fullerton, CA 92832
(714)870-8286( )
CIWMB#: 30-C-04755

EZ Lube #17
4002 N Harbor Blvd., Fullerton, CA 92835
(714)871-9980( )
CIWMB#: 30-C-03741

Firestone Store #27EH
1933 N Placentia Ave., Fullerton, CA 92831
(714)993-7100( )
CIWMB#: 30-C-02122

Fox Service Center
1018 W Orangethorpe Fullerton, CA 92833
(714)879-1430( )
CIWMB#: 30-C-02318

Fullerton College Automotive Technology
321 E Chapman Ave., Fullerton, CA 92832
(714)992-7275( )
CIWMB#: 30-C-03165

Kragen Auto Parts #0731
2978 Yorba Linda Fullerton, CA 92831
(714)996-4780( )
CIWMB#: 30-C-02628

Kragen Auto Parts #4133
904 W Orangethorpe Ave., Fullerton, CA 92832
(714)526-3570( )
CIWMB#: 30-C-06256

Pep Boys #642
1530 S Harbor Blvd., Fullerton, CA 92832
(714)870-0700( )
CIWMB#: 30-C-01755

Sunnyside 76 Car Care Center
2701 N Brea Blvd., Fullerton, CA 92835
(714)256-0773( )
CIWMB#: 30-C-01381

Garden Grove

76 Pro Lube Plus
9001 Trask Ave., Garden Grove, CA 92844
(714)393-0590( )
CIWMB#: 30-C-05276

AutoZone #5527
13190 Harbor Blvd., Garden Grove, CA 92843
(714)636-5665( )
CIWMB#: 30-C-04760

David Murray Shell
12571 Vly View St., Garden Grove, CA 92845
(714)898-0170( )
CIWMB#: 30-C-00547

Express Lube & Wash
8100 Lampson Ave., Garden Grove, CA 92841
(909)316-8261( )
CIWMB#: 30-C-06544

Firestone Store #7180
10081 Chapman Ave., Garden Grove, CA 92840
(714)530-4630( )
CIWMB#: 30-C-01224

Firestone Store #71W3
13961 Brookhurst St., Garden Grove, CA 92843
(714)590-2741( )
CIWMB#: 30-C-03690

Jiffy Lube #1991
13970 Harbor Blvd., Garden Grove, CA 92843
(714)554-0610( )
CIWMB#: 30-C-05400

Kragen Auto Parts #1251
13933 N Harbor Blvd., Garden Grove, CA 92843
(714)554-3780( )
CIWMB#: 30-C-02663

Kragen Auto Parts #1555
9851 Chapman Ave., Garden Grove, CA 92841
(714)741-8030( )
CIWMB#: 30-C-04079

Nissan of Grarden Grove
9670 Trask Ave., Garden Grove, CA 92884
(714)537-0900( )
CIWMB#: 30-C-06553

Toyota of Garden Grove
9444 Trask Ave., Garden Grove, CA 92844
(714)895-5595( )
CIWMB#: 30-C-06555

La Habra

AutoZone #5532
1200 W Imperial Hwy., La Habra, CA 90631
(562)694-5337( )
CIWMB#: 30-C-04784

Burch Ford
201 N Harbor Blvd., La Habra, CA 90631
(562)691-3225( )
CIWMB#: 30-C-05179

Firestone Store #2736
1071 S Beach Blvd., La Habra, CA 90631
(562)691-1731( )
CIWMB#: 30-C-01169

Kragen Auto Parts #1569
1621 W Whittier Blvd., La Habra, CA 90631
(562)905-2538( )
CIWMB#: 30-C-04076

Pep Boys #997
125 W Imperial Hwy., La Habra, CA 90631
(714)447-0601( )
CIWMB#: 30-C-04026

SpeeDee Oil Change & Tune-Up
1580 W Imperial Hwy., La Habra, CA 90631
(562)697-3513( )

Los Alamitos

Jiffy Lube #1740
3311 Katella Ave., Los Alamitos, CA 90720
(562)596-1827( )
CIWMB#: 30-C-03529

Midway City

Bolsa Transmission
8331 Bolsa Ave., Midway City, CA 92655
(714)799-6158( )
CIWMB#: 30-C-05768

Placentia

Advanced Auto & Diesel
144 S Bradford Placentia, CA 92870
(714)996-8222( )
CIWMB#: 30-C-06242

Castner's Auto Service
214 S. Bradford Ave., Placentia, CA 92870
(714)528-1311( )
CIWMB#: 30-C-06452

Econo Lube N' Tune
100 W Chapman Ave., Placentia, CA 92870
(714)524-0424( )
CIWMB#: 30-C-06454

Fairway Ford
1350 E Yorba Linda Blvd., Placentia, CA 92870
(714)524-1200( )
CIWMB#: 30-C-01863

Seal Beach

M & N Coastline Auto & Tire Service
12239 Seal Beach Blvd., Seal Beach, CA 90740
(714)826-1001( )
CIWMB#: 30-C-04433

Seal Beach Chevron
12541 Seal Beach Blvd., Seal Beach, CA 90740
(949)495-0774(14)
CIWMB#: 30-C-06425

Stanton

AutoZone #2806
11320 Beach Blvd., Stanton, CA 90680
(714)895-7665( )
CIWMB#: 30-C-04563

Joe's Auto Clinic
11763 Beach Blvd., Stanton, CA 90680
(714)891-7715( )
CIWMB#: 30-C-03253

Kragen Auto Parts #1742
11951 Beach Blvd., Stanton, CA 90680
(714)799-7574( )
CIWMB#: 30-C-05231

Scher Tire #20
7000 Katella Ave., Stanton, CA 90680
(714)892-9924( )
CIWMB#: 30-C-05907

USA 10 Minute Oil Change
8100 Lampson Ave., Stanton, CA 92841
(714)373-4432( )
CIWMB#: 30-C-05909

Westminster

AutoZone #5543
6611 Westminster Blvd., Westminster, CA 92683
(714)898-2898( )
CIWMB#: 30-C-04964

AutoZone #5544
8481 Westminster Blvd., Westminster, CA 92683
(714)891-3511( )
CIWMB#: 30-C-04966

City of Westminster Corporate Yard
14381 Olive St., Westminster, CA 92683
(714)895-2876(292)
CIWMB#: 30-C-02008

Honda World
13600 Beach Blvd., Westminster, CA 92683
(714)890-8900( )
CIWMB#: 30-C-03639

Jiffy Lube #1579
6011 Westminster Blvd., Westminster, CA 92683
(714)899-2727( )
CIWMB#: 30-C-02745

John's Brake & Auto Repair
13050 Hoover St., Westminster, CA 92683
(714)379-2088( )
CIWMB#: 30-C-05617

Kragen Auto Parts #0762
6562 Westminster Blvd., Westminster, CA 92683
(714)898-0810( )
CIWMB#: 30-C-02590

Midway City Sanitary District
14451 Cedarwood St., Westminster, CA 92683
(714)893-3553( )
CIWMB#: 30-C-01626

Pep Boys #653
15221 Beach Blvd., Westminster, CA 92683
(714)893-8544( )
CIWMB#: 30-C-03415

Yorba Linda

AutoZone #5545
18528 Yorba Linda Blvd., Yorba Linda, CA 92886
(714)970-8933( )
CIWMB#: 30-C-04971

Econo Lube N' Tune
22270 La Palma Ave., Yorba Linda, CA 92887
(714)692-8394( )
CIWMB#: 30-C-06513

EZ Lube Inc. #41
17511 Yorba Linda Blvd., Yorba Linda, CA 92886
(714)556-1312( )
CIWMB#: 30-C-05739

Firestone Store #27T3
18500 Yorba Linda Blvd., Yorba Linda, CA 92886
(714)779-1966( )
CIWMB#: 30-C-01222

Jiffy Lube #1532
16751 Yorba Linda Blvd., Yorba Linda, CA 92886
(714)528-2800( )
CIWMB#: 30-C-03777

Mike Schultz Import Service
4832 Eureka Ave., Yorba Linda, CA 92886
(714)528-4411( )
CIWMB#: 30-C-04313

This information was provided by the County of Orange Integrated Waste Management Department and the California Integrated Waste Management Board (CIWMB).

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities can lead to water pollution if you're not careful. Fertilizers, pesticides and other chemicals that are left on yards or driveways can be blown or washed into storm drains that flow to the ocean. Overwatering lawns can also send materials into storm drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never pour gardening products into the ocean, so don't let them enter the storm drains. Follow these easy tips to help prevent water pollution.

For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

UCCE Master Gardener Hotline:
(714) 708-1646

To report a spill,
call the
Orange County 24-Hour
Water Pollution Problem
Reporting Hotline
1-877-89-SPILL (1-877-897-7455).

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while landscaping or gardening. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

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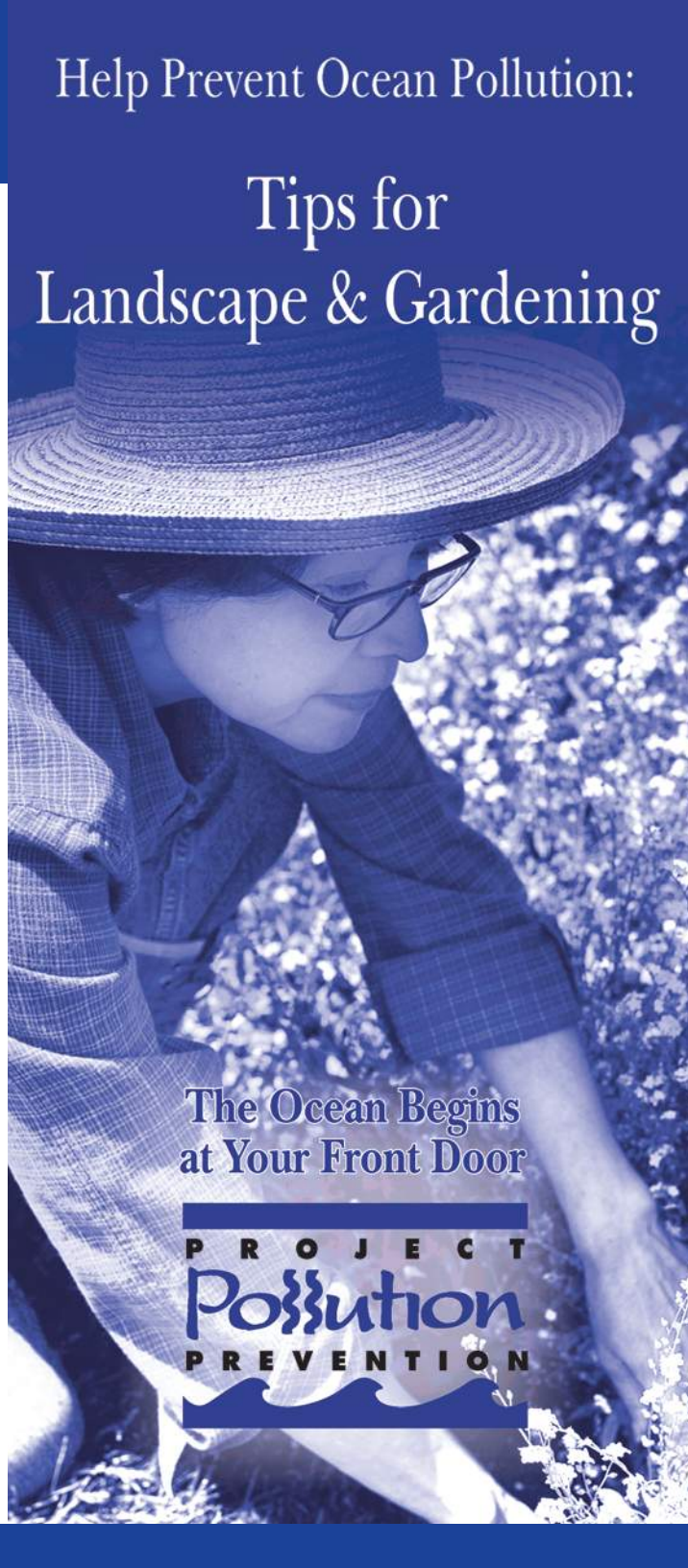
Help Prevent Ocean Pollution:

Tips for Landscape & Gardening



Tips for Landscape & Gardening

Never allow gardening products or polluted water to enter the street, gutter or storm drain.

General Landscaping Tips

- Protect stockpiles and materials from wind and rain by storing them under tarps or secured plastic sheeting.
- Prevent erosion of slopes by planting fast-growing, dense ground covering plants. These will shield and bind the soil.
- Plant native vegetation to reduce the amount of water, fertilizers, and pesticide applied to the landscape.

- Never apply pesticides or fertilizers when rain is predicted within the next 48 hours.

Garden & Lawn Maintenance

- Do not overwater. Use irrigation practices such as drip irrigation, soaker hoses or micro spray systems. Periodically inspect and fix leaks and misdirected sprinklers.
- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of green waste by composting, hauling it to a permitted landfill, or recycling it through your city's program.

- Use slow-release fertilizers to minimize leaching, and use organic fertilizers.
- Read labels and use only as directed. Do not over-apply pesticides or fertilizers. Apply to spots as needed, rather than blanketing an entire area.
- Store pesticides, fertilizers and other chemicals in a dry covered area to prevent exposure that may result in the deterioration of containers and packaging.

- Rinse empty pesticide containers and re-use rinse water as you would use the product. Do not dump rinse water down storm drains. Dispose of empty containers in the trash.
- When available, use non-toxic alternatives to traditional pesticides, and use pesticides specifically designed to control the pest you are targeting. For more information, visit **www.ipm.ucdavis.edu**.
- If fertilizer is spilled, sweep up the spill before irrigating. If the spill is liquid, apply an absorbent material such as cat litter, and then sweep it up and dispose of it in the trash.
- Take unwanted pesticides to a Household Hazardous Waste Collection Center to be recycled. Locations are provided below.

Household Hazardous Waste Collection Centers

Anaheim:	1071 N. Blue Gum St.
Huntington Beach:	17121 Nichols St.
Irvine:	6411 Oak Canyon
San Juan Capistrano:	32250 La Pata Ave.

For more information, call (714) 834-6752 or visit www.oclandfills.com

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities can lead to water pollution if you're not careful. Pet waste and pet care products can be washed into the storm drains that flow to the ocean. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never put pet waste or pet care products into the ocean, so don't let them enter the storm drains. Follow these easy tips to help prevent water pollution.

For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

To report a spill,
call the
Orange County 24-Hour
Water Pollution Problem
Reporting Hotline
1-877-89-SPILL (1-877-897-7455)**.**

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while caring for your pet. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

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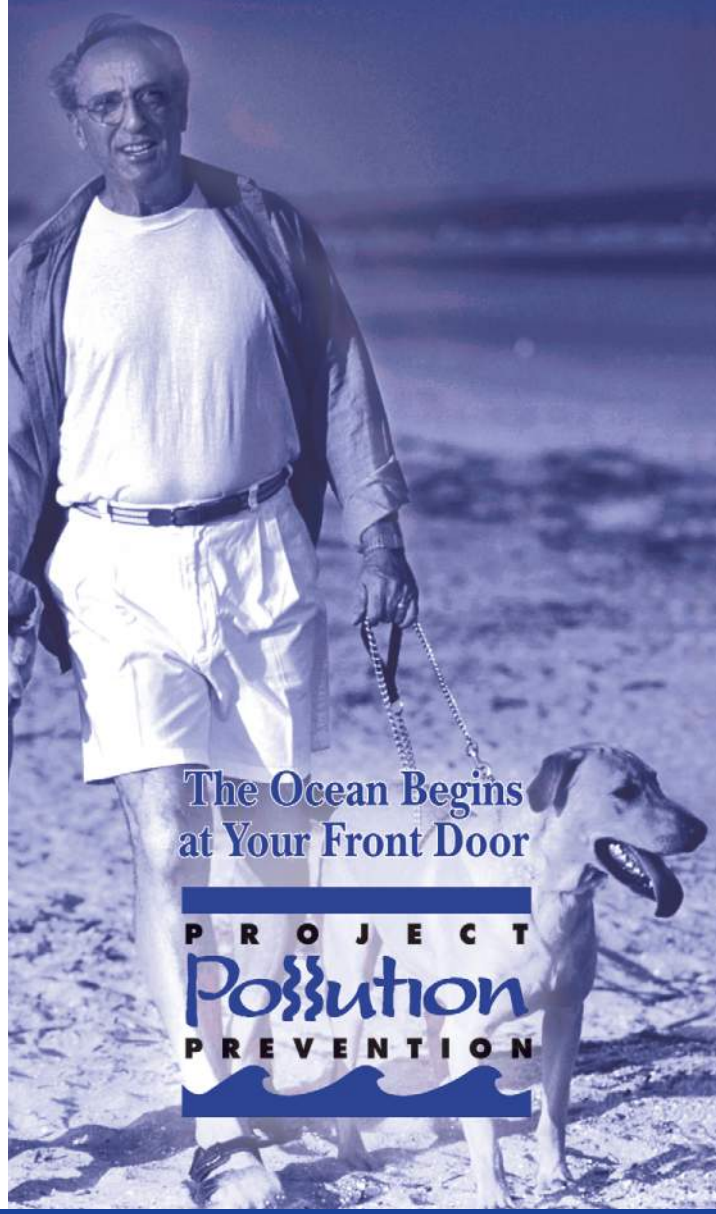
R-07

Help Prevent Ocean Pollution:

Tips for Pet Care



Tips for Pet Care

Never let any pet care products or washwater run off your yard and into the street, gutter or storm drain.

Washing Your Pets

Even biodegradable soaps and shampoos can be harmful to marine life and the environment.

- If possible, bathe your pets indoors using less-toxic shampoos or have your pet professionally groomed. Follow instructions on the products and clean up spills.

- If you bathe your pet outside, wash it on your lawn or another absorbent/ permeable surface to keep the washwater from running into the street, gutter or storm drain.

Flea Control

- Consider using oral or topical flea control products.

- If you use flea control products such as shampoos, sprays or collars, make sure to dispose of any unused products at a Household Hazardous Waste Collection Center. For location information, call **(714) 834-6752**.

Why You Should Pick Up After Your Pet

It's the law! Every city has an ordinance requiring you to pick up after your pet. Besides being a nuisance, pet waste can lead to water pollution, even if you live inland. During rainfall, pet waste left outdoors can wash into storm drains. This waste flows directly into our waterways and the ocean where it can harm human health, marine life and the environment.

As it decomposes, pet waste demands a high level of oxygen from water. This decomposition can contribute to killing marine life by reducing the amount of dissolved oxygen available to them.

Have fun with your pets, but please be a responsible pet owner by taking care of them and the environment.

- Take a bag with you on walks to pick up after your pet.

- Dispose of the waste in the trash or in a toilet.

PROJECT Pollution PREVENTION

H-98

APPENDIX D

BMP MAINTENANCE SUPPLEMENT / O&M PLAN

OPERATIONS AND MAINTENANCE (O&M) PLAN

Water Quality Management Plan

For

Mercury and Berry

Mercury Lane and Berry Street, Brea CA 92821

APN 296-141-05

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BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX			
BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
NON-STRUCTURAL SOURCE CONTROL BMPs			
Yes	N1. Education for Property Owners, Tenants and Occupants	Educational materials will be provided to tenants, including brochures and restrictions to reduce pollutants from reaching the storm drain system. Examples include tips for pet care, household tips, and proper household hazardous waste disposal. Tenants will be provided with these materials by the property management prior to occupancy, and periodically thereafter. Frequency: Upon first occupancy, Annually thereafter	Owner
Yes	N2. Activity Restrictions	The Owner will prescribe activity restrictions to protect surface water quality, through lease terms or other equally effective measure, for the property. Restrictions include, but are not limited to, prohibiting vehicle maintenance or vehicle washing. Frequency: Ongoing	Owner

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX			
BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	N3. Common Area Landscape Management	Maintenance shall be consistent with City requirements. Fertilizer and/or pesticide usage shall be consistent with County Management Guidelines for Use of Fertilizers (OC DAMP Section 5.5). Maintenance includes mowing, weeding, and debris removal on a weekly basis. Trimming, replanting, and replacement of mulch shall be performed on an as-needed basis to prevent exposure of erodible surfaces. Trimmings, clippings, and other landscape wastes shall be properly disposed of in accordance with local regulations. Materials temporarily stockpiled during maintenance activities shall be placed away from water courses and storm drains inlets. Frequency: Monthly	Owner
Yes	N4. BMP Maintenance	Maintenance of structural BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP. Records of inspections and BMP maintenance shall be kept by the Owner and shall be available for review upon request. Frequency: Ongoing	Owner
No	N5. Title 22 CCR Compliance (How development will comply)	Not applicable	
No	N6. Local Industrial Permit Compliance	Not applicable	

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX			
BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
No	N7. Spill Contingency Plan	Not applicable	
No	N8. Underground Storage Tank Compliance	Not applicable	
No	N9. Hazardous Materials Disclosure Compliance	Not applicable	
No	N10. Uniform Fire Code Implementation	Not applicable	
Yes	N11. Common Area Litter Control	Litter patrol, violations investigations, reporting and other litter control activities shall be performed on a weekly basis and in conjunction with routine maintenance activities. Frequency: Weekly	Owner
Yes	N12. Employee Training	The Owner shall educate all new employees/ managers on storm water pollution prevention, particularly good housekeeping practices, prior to the start of the rainy season (October 1). Refresher courses shall be conducted on an as needed basis. Materials that may be utilized on BMP maintenance are included in Appendix D. Frequency: Annually	Owner
No	N13. Housekeeping of Loading Docks	Not applicable	
Yes	N14. Common Area Catch Basin Inspection	Not applicable	
Yes	N15. Street Sweeping Private Streets and Parking Lots	On-site parking lots, drive aisles, and the parking structure's basement level will be swept on a monthly basis, at minimum. Frequency: Monthly	Owner

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX			
BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
No	N16. Retail Gasoline Outlets	Not applicable	
STRUCTURAL SOURCE CONTROL BMPs			
Yes	S1. Provide storm drain system stenciling and signage	Not applicable	
No	S2. Design and construct outdoor material storage areas to reduce pollution introduction	Not applicable	
No	S3. Design and construct trash and waste storage areas to reduce pollution introduction	Not applicable	
Yes	S4. Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	In conjunction with routine maintenance, verify that landscape design continues to function properly by adjusting systems to eliminate overspray to hardscape areas and to verify that irrigation timing and cycle lengths are adjusted in accordance to water demands, given the time of year, weather, and day or nighttime temperatures. System testing shall occur twice per year. Water from testing/flushing shall be collected and properly disposed to the sewer system and shall not discharge to the storm drain system. Frequency: 2x per year	Owner
No	S5. Protect slopes and channels and provide energy dissipation	Not applicable	
No	S6. Dock areas	Not applicable	

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX			
BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
No	S7. Maintenance bays	Not applicable	
No	S8. Vehicle wash areas	Not applicable	
No	S9. Outdoor processing areas	Not applicable	
No	S10. Equipment wash areas	Not applicable	
No	S11. Fueling areas	Not applicable	
No	S12. Hillside landscaping	Not applicable	
No	S13. Wash water control for food preparation areas	Not applicable	
No	S14. Community car wash racks	Not applicable	

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX		
BMP Name and BMP Implementation, Maintenance and Inspection Procedures	**Implementation, Maintenance, and Inspection Frequency and Schedule**	**Person or Entity with Operation & Maintenance Responsibility**
LOW IMPACT DEVELOPMENT BMPs		
BIO-1: Bioretention Planter with underdrains	Inspections should occur semi-annually or after major storm events to check for the following and remove accordingly: standing water, sediment, and trash & debris. Inspections should also look for potential clogging and clean planters or, if necessary, replace the entire filter bed. Inspect for weeds, and prune and/or replace plants in accordance with routine landscape maintenance activities. Replace mulch and prune shrubs as necessary. Frequency: 2x per year	Owner
Hydromodification: Underground Detention Pipe	Maintenance is recommended at minimum annually, and additionally when the sediment occupies more than one-tenth of the system's volume. Also refer to local municipality regulations for their maintenance requirements and schedules. Inspections should be a part of standard operating procedure. Inspect for sediment build-up and structural damage. Maintenance is typically preformed using a vacuum truck. Remove manhole cover at grade and lower vac hose into system (or sump pit within system if applicable). Sediment should be flushed towards vac hose to provide for thorough removal. When finished, replace all covers that were removed. Frequency: Annually	Owner

Required Permits

Permits are not required for the implementation, operation, and maintenance of the BMPs.

Forms to Record BMP Implementation, Maintenance, and Inspection

The form that will be used to record implementation, maintenance, and inspection of BMPs is attached.

Recordkeeping

All records must be maintained for at least five (5) years and must be made available for review upon request.

Waste Management

Any waste generated from maintenance activities will be disposed of properly. Wash water and other waste from maintenance activities is not to be discharged or disposed of into the storm drain system. Clippings from landscape maintenance (i.e. prunings) will be collected and disposed of properly off-site, and will not be washed into the streets, local area drains/conveyances, or catch basin inlets.

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

APPENDIX E

CONDITIONS OF APPROVAL

(PENDING ISSUANCE)

APPENDIX F

GEOTECHNICAL REPORT

May 22, 2018

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Peregrine Construction, Inc.
30211 Avenida de las Banderas,
Second Floor
Rancho Santa Margarita, California 92688

Attention: Mr. John Atherton
President

Project No.: **18G118-2**

Subject: **Results of Infiltration Testing**
Proposed Multi-Unit Apartment Complex
SEC Berry Street and Mercury Lane
Brea, California

Reference: Geotechnical Investigation, Proposed Multi-Unit Residential Development, SEC Berry Street and Mercury Lane, Brea, California, prepared by Southern California Geotechnical, Inc. (SCG) for Peregrine Construction, Inc., SCG Project No. 18G118-1, dated April 20, 2018.

Gentlemen:

In accordance with your request, we have conducted infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in general accordance with our Proposal No. 18P164-2, dated April 13, 2018. The scope of services included site reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rates of the onsite soils. The infiltration testing was performed in general accordance with the guidelines published by Orange County: Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs), Appendix VII. These guidelines are dated December 20, 2013.

Site and Project Description

The site is located at the southeast corner of Berry Street and Mercury Lane in Brea, California. The site is bounded to the north by Mercury Lane, to the east and south by existing commercial developments, and to the west by Berry Street. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The subject site consists of a rectangular-shaped property, approximately 1.01 acres in size. The site is currently undeveloped with the ground surface cover consisting of exposed soils with select areas of crushed rock in the eastern portion of the site. Multiple shrubs and medium-sized trees are located in the northeastern area of the site and in the southwest and southeast corners

of the site. The eastern portion of the site is currently being utilized as a temporary tractor-trailer storage lot. A drainage swale and a 2:1 slope, sloping downward to the east, are located along the eastern perimeter of the site. The site is surrounded with chain-link fencing along the outer boundary of the subject site with a section of chain-link fencing through the center of the site, which trends north to south.

Detailed topographic information was not available at the time of this report. However, based on visual observations, the site topography slopes downward to the south at an estimated gradient of approximately 1 to 2 percent. There was estimated to be 3 to 4± feet of elevation differential across the site.

Proposed Development

Our office was provided with architectural plans prepared by Humphreys & Partners Architects, L.P. (H&P), dated April 4, 2018. Based on our review of these documents, the site will be developed with a 120-unit multi-story residential development. The site massing study identifies the ground surface adjacent to the proposed building as "Level 1." The study indicates that the vertical distance from the ground level to the proposed finish floor of subterranean level "Level B1" is 10½± feet. The study also indicates that the vertical distances between floors above the ground level range from 9 feet to 12 feet. The study identifies a total of 7 levels consisting of the subterranean Level B1, the ground level (Level 1), levels 2 through 5, and the roof deck. The total height of the apartment complex is 65 feet, 10 inches above the ground level, as indicated on the H&P study.

Based on our review of the building sections included in the H&P study, our understanding of the project layout is described below:

- The lowest parking garage floor is located at a depth of approximately 10½ feet below the ground level and the lowest parking garage walls retain up to approximately 10½ feet of soil.
- Levels B-1, 1, and 2 are planned for residential parking and limited residential units.
- A podium level is planned for Level 3, which contains a courtyard, residential units, amenity rooms and a laundry room.
- Levels 4 and 5 contain residential units and a laundry room.
- The walls of the residential units do not retain any soil.
- The proposed apartment complex is located approximately 5 to 10 feet horizontally from the surrounding property lines.

We understand that the proposed development may include on-site infiltration to dispose of storm water. Based on our conversations with Mr. John Olivier from Fuscoe Engineering, Inc., the project civil engineer, the infiltration system is expected consist of either an infiltration trench or a drywell system. The bottom of the infiltration trench will be approximately 5 feet below the existing site grades and the proposed drywell will extend to a depth of 10 to 15± feet below the existing side grades.

Previous Study

Southern California Geotechnical, Inc. (SCG) previously performed a geotechnical investigation at the subject site, which is referenced above. As a part of this study, five (5) borings were advanced to depths 75± feet below the existing site grades. The approximate locations of the five borings from the previous study are indicated on the Infiltration Test Location Plan, included as Plate 2 of this report.

Pavements consisting of 5 to 6± inches of aggregate base were encountered at the ground surface at three of the boring locations. Fill soils were encountered at the ground surface or beneath the existing pavements at three of the boring locations, extending to depths of 2½ to 4½± feet below the existing site grades. The fill soils generally consisted of loose to medium dense silty fine to coarse sands with varying amounts of clay and fine to coarse gravel. Native alluvium was encountered below the pavements and artificial fill soils at all of the boring locations, extending to at least the maximum depth explored of 75± feet below existing site grades. The native alluvial soils, extending to depths of 8 to 12± feet, generally consisted of stiff to very stiff fine sandy clays with occasional layers of loose to medium dense silty fine sands. Beneath these soils, the native alluvium generally consisted of medium dense fine to coarse sands, silty fine sands, and clayey sands extending to depths of 27 to 33½± feet. Beneath these soils, the native alluvium generally consisted of stiff to hard sandy clays and silty clays and dense to very dense clayey sands and fine to coarse sands and occasional layers of medium dense fine to coarse sands and clayey sands extending to the maximum depth explored of 75± feet.

Groundwater

Free water was encountered during drilling at depths of 25 to 27± feet below the existing site grades. Based on the water level measurements and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at depths of 25 to 27± feet below the ground surface at the time of the subsurface investigation. As part of our research of historic groundwater levels we reviewed CA DMG Open-File Report 97-09 for the La Habra Quadrangle. Plate 1.2 of OFR 97-09 is a map which displays the historically highest ground water levels using contour lines. The water levels mapped in the vicinity of the subject site indicate the historic high groundwater table to be at a depth of 10± feet.

Subsurface Exploration

Scope of Exploration

The subsurface exploration conducted for the infiltration testing consisted of four (4) infiltration test borings advanced to depths of 5 and 15± feet below the existing site grades. The infiltration borings were advanced using a truck-mounted drilling rig, equipped with 8-inch diameter hollow stem augers and were logged during drilling by a member of our staff. The approximate locations of the infiltration borings (identified as I-1 through I-4) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Upon the completion of the infiltration borings, the bottom of each test boring was covered with 2± inches of clean ¾-inch gravel. A sufficient length of 3-inch-diameter perforated PVC casing

was then placed into each test hole so that the PVC casing extended from the bottom of the test hole to the ground surface. Clean ¾-inch gravel was then installed in the annulus surrounding the PVC casing.

Geotechnical Conditions

Artificial fill soils were encountered at the ground surface at Infiltration Boring Nos. I-1, I-2, and I-4, extending to depths of 3 to 5½± feet below existing site grades. The fill soils generally consist of very loose to dense silty fine sands and clayey fine sands with varying amounts of medium to coarse sands. The fill soils possess a disturbed appearance and trace amounts of debris, including brick and asphaltic concrete fragments within Infiltration Boring No. I-4, resulting in their classification as artificial fill.

Native alluvial soils were encountered at the ground surface at Infiltration Boring No. I-3 and beneath the artificial fill soils at the remaining infiltration boring locations, extending to at least 15± feet below existing site grades. The alluvial soils generally consist of very loose to medium dense clayey fine sands and medium stiff to very stiff fine sandy clays with varying amounts of medium sand and silt content. Free water was not encountered during the drilling of the infiltration borings. The Boring Logs, which illustrate the conditions encountered at the boring locations, are included with this report.

Infiltration Testing

As previously mentioned, the infiltration testing was performed in general accordance with the Orange County guidelines published in Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs), Appendix VII.

Pre-soaking

The first phase of the infiltration testing consisted of pre-soaking all four (4) of the infiltration test holes. The pre-soaking process for the two (2) 5± foot borings consisted of filling the borings by inverting a full 5-gallon bottle of clear water supported over the hole so that the water flow into the hole holds constant at a level at least 5 times the hole's radius above the gravel at the bottom of both infiltration borings. The two (2) 15± foot drywell infiltration borings were filled with water to a maximum depth of 4± feet below the surface of the ground. Pre-soaking was completed after all of the water had percolated through each test hole or after 15 hours since initiating the pre-soak.

Infiltration Testing

Following the pre-saturation process, SCG subsequently performed the infiltration testing the following day on May 4, 2018. The two (2) shallow test holes were filled with water to a depth of at least 5 times the hole's radius above the gravel at the bottom of both test holes prior to each test interval. The two (2) drywell infiltration borings were filled with water to a maximum depth of 4± feet below the surface prior to each test interval. In accordance with the Orange County guidelines, since "non-sandy soils" were encountered within or at the bottoms of all four (4) of the infiltration test borings (where 6 inches of water did not infiltrate into the surrounding soils for two-consecutive 25-minute readings), readings were taken at 30-minute intervals for a total

of 6 hours at all four of the infiltration test locations. After each reading, water was added to each test boring so that the depth of the water was again at a level of at least 5 times the hole's radius above the bottom of each infiltration boring or to the initial water height. The water level readings are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on the spreadsheets.

The infiltration rates for the tests are tabulated in inches per hour. In accordance with the typically accepted practice, it is recommended that the most conservative reading from the latter part of the infiltration tests be used as the design infiltration rate. The rates are summarized below:

Infiltration Test No.	Depth (feet)	Soil Description	Infiltration Rate (inches/hour)
I-1	5	Clayey fine Sand, little Silt	0.1
I-2	15	Clayey fine Sand, trace medium Sand, trace Silt	0.2
I-3	5	Clayey fine Sand to fine Sandy Clay, trace medium Sand	0.1
I-4	15	Clayey fine Sand, trace medium Sand, trace Silt	0.2

Laboratory Testing

In-situ Moisture Content

The moisture contents for the recovered soil samples within the borings were determined in accordance with ASTM D-2216 and are expressed as a percentage of the dry weight. These test results are presented on the Boring Logs.

Grain Size Analysis

The grain size distribution of selected soils taken from the bottoms and various depths within the infiltration borings has been determined using a range of wire mesh screens. The analysis was performed in general accordance with ASTM D-422 and/or ASTM D-1140. The weight of the portion of the sample retained on each screen is recorded and the percentage finer or coarser of the total weight is calculated. The results of the analysis are presented on Plates C-1 through C-10 of this report.

Design Recommendations

A total of four (4) infiltration tests were performed at the subject site. As noted above, the infiltration rates at these locations range from 0.1 to 0.2 inches per hour. The high clay and silt content of the on-site soils resulted in low infiltration rates at the infiltration test locations. **Based on the low infiltration rates at the depths tested, the on-site soils are**

generally not considered feasible for infiltration. Therefore, infiltration is not recommended for this site.

General Comments

This report has been prepared as an instrument of service for use by the client in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, structural engineer, and/or civil engineer. The design of the proposed storm water infiltration system is the responsibility of the civil engineer. The role of the geotechnical engineer is limited to determination of infiltration rate only. By using the design infiltration rate contained herein, the civil engineer agrees to indemnify, defend, and hold harmless the geotechnical engineer for all aspects of the design and performance of the proposed storm water infiltration system. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between boring locations and testing depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted. The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

Closure

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Scott McCann
Staff Scientist

Robert G. Trazo, GE 2655
Project Engineer

Distribution: (1) Addressee

Enclosures: Plate 1 - Site Location Map
Plate 2 - Infiltration Test Location Plan
Boring Log Legend and Logs (6 pages)
Infiltration Test Results Spreadsheets (4 pages)
Grain Size Distribution Graphs (10 pages)

SOURCE: ORANGE COUNTY
THOMAS GUIDE, 2013

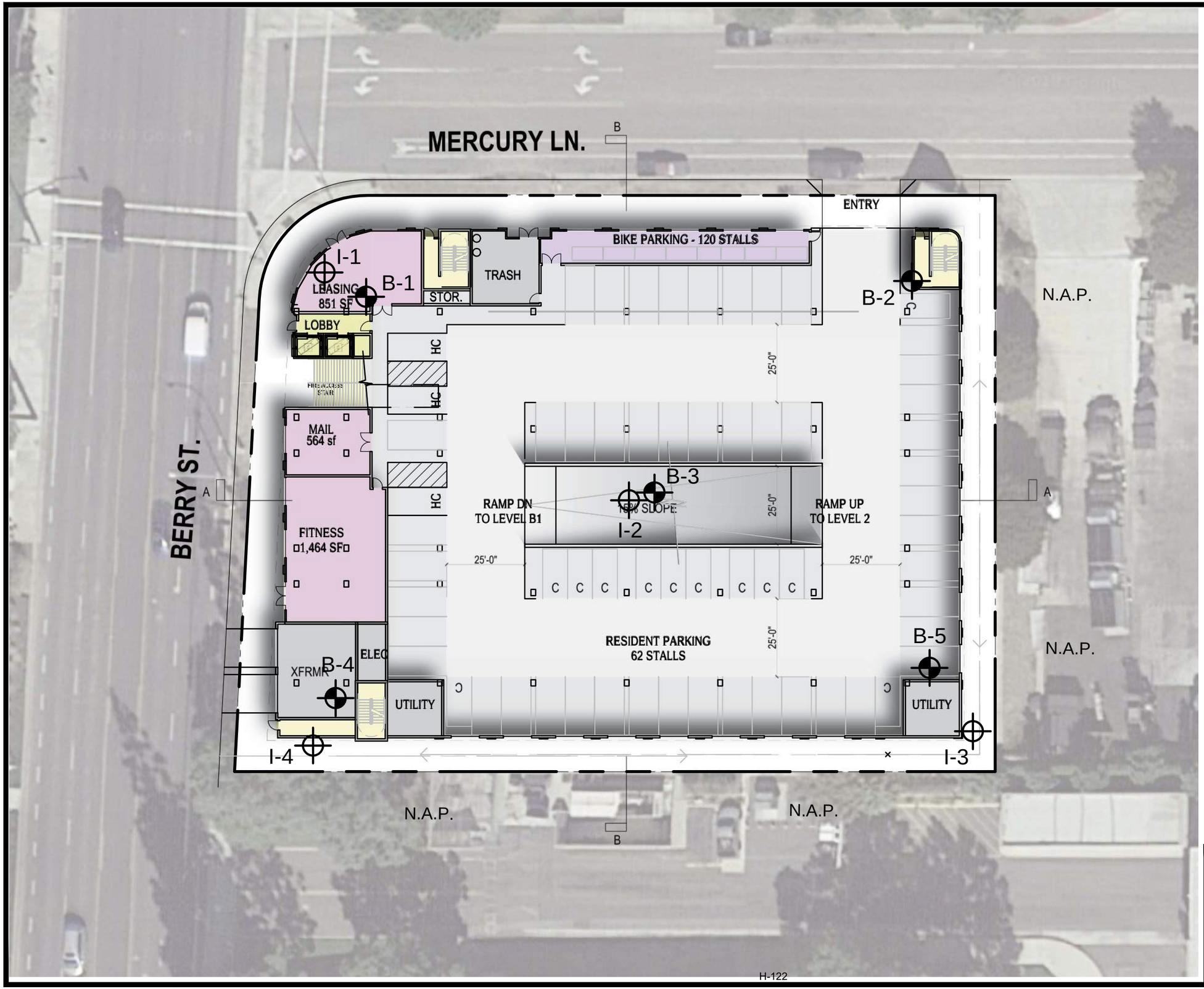
SITE LOCATION MAP

PROPOSED MULTI-UNIT APARTMENT COMPLEX

BREA, CALIFORNIA

SCALE: 1" = 2400'	
DRAWN: SM CHKD: RGT	
SCG PROJECT 18G118-2	
PLATE 1	

SOUTHERN CALIFORNIA GEOTECHNICAL



NORTH
SoCalGeo

GEOTECHNICAL LEGEND

- APPROXIMATE INFILTRATION TEST LOCATION
- BORING LOCATION FROM PREVIOUS STUDY (SCG PROJECT PROJECT NO. 18G118-1)

NOTE: SITE PLAN PREPARED BY HUMPHREYS & PARTNERS ARCHITECTS, L.P.

INFILTRATION TEST LOCATION PLAN

PROPOSED MULTI-UNIT APARTMENT COMPLEX

BREA, CALIFORNIA

SCALE: 1" = 30'

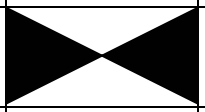
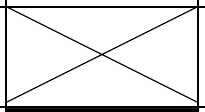
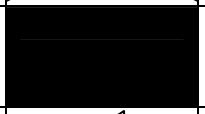
DRAWN: SM
CHKD: RGT

SCG PROJECT
18G118-2

PLATE 2

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3" indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

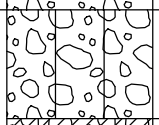
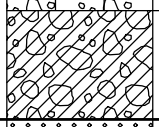
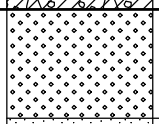
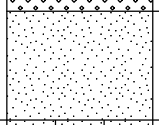
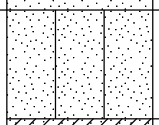
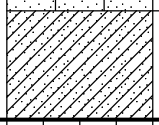
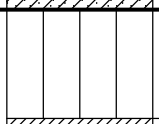
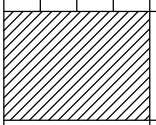
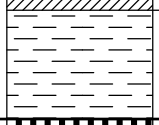
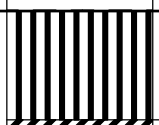
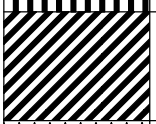
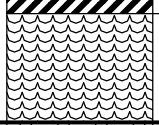
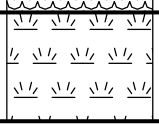
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-1

JOB NO.: 18G118-2 | DRILLING DATE: 5/3/18 | WATER DEPTH: Dry
PROJECT: Proposed MFR Development | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: ---
LOCATION: Brea, California | LOGGED BY: Anthony Luna | READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		9			FILL: Dark Brown Silty fine Sand, trace medium Sand, medium dense-moist		10					
		4			ALLUVIUM: Brown Clayey fine Sand, little Silt, very loose to loose-moist		10			37		
5					Boring Terminated at 5'							

TBL 18G118-2.GPJ SOCALGEO.GDT 5/22/18

TEST BORING LOG **PLATE I-1**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-2

JOB NO.: 18G118-2 | DRILLING DATE: 5/3/18 | WATER DEPTH: Dry
PROJECT: Proposed MFR Development | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: ---
LOCATION: Brea, California | LOGGED BY: Anthony Luna | READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		29			FILL: Brown Silty fine Sand, little medium Sand, trace coarse Sand, dense-damp		5					
		9	4.0		ALLUVIUM: Brown fine Sandy Clay, trace medium Sand, trace calcareous veining, slightly porous, stiff to very stiff-moist		10			52		
5		17					12			57		
		12					12			56		
10					Light Brown Clayey fine Sand, trace medium Sand, trace Silt, loose to medium dense-damp to moist							
		10					7			42		
15					Boring Terminated at 15'							

TBL 18G118-2.GPJ SOCALGEO.GDT 5/22/18

TEST BORING LOG **PLATE I-2**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-3

JOB NO.: 18G118-2
PROJECT: Proposed MFR Development
LOCATION: Brea, California

DRILLING DATE: 5/3/18
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Anthony Luna

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		20			ALLUVIUM: Brown fine Sandy Clay, trace calcareous veining, very stiff-very moist		17					
		8			Light Brown Clayey fine Sand to fine Sandy Clay, trace medium Sand, trace calcareous veining, loose to medium stiff-moist		14			48		
5					Boring Terminated at 5'							

TBL 18G118-2.GPJ SOCALGEO.GDT 5/22/18

TEST BORING LOG

PLATE I-3

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-4

JOB NO.: 18G118-2 | DRILLING DATE: 5/3/18 | WATER DEPTH: Dry
PROJECT: Proposed MFR Development | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: ---
LOCATION: Brea, California | LOGGED BY: Anthony Luna | READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		4			FILL: Brown Silty fine Sand, trace medium Sand, trace Asphaltic concrete fragments, very loose to loose-damp to moist		8					
		5			FILL: Brown Clayey fine Sand, trace medium Sand, trace Brick fragments, loose-moist		14			44		
5		7	4.0		ALLUVIUM: Brown fine Sandy Clay, trace medium Sand, trace calcareous veining, medium stiff to stiff-moist to very moist		19			53		
		12	4.5+				14			52		
10					Light Brown Clayey fine Sand, trace Silt, trace medium Sand, trace calcareous veining, loose-damp to moist							
		9					7			36		
15					Boring Terminated at 15'							

TBL 18G118-2.GPJ SOCALGEO.GDT 5/22/18

TEST BORING LOG **PLATE I-4**

INFILTRATION CALCULATIONS

Project Name	Proposed Multi-Unit Apartment Complex
Project Location	Brea, CA
Project Number	18G118-2
Engineer	Scott McCann

Test Hole Radius	4	(in)
Test Depth	5.0	(ft)

Infiltration Test Hole: I-1

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	9:00 AM	30.0	3.06	0.09	1.90	0.17
	Final	9:30 AM		3.15			
2	Initial	9:31 AM	30.0	3.17	0.10	1.78	0.21
	Final	10:01 AM		3.27			
3	Initial	10:02 AM	30.0	3.29	0.07	1.68	0.15
	Final	10:32 AM		3.36			
4	Initial	10:33 AM	30.0	3.30	0.07	1.67	0.15
	Final	11:03 AM		3.37			
5	Initial	11:04 AM	30.0	3.31	0.08	1.65	0.18
	Final	11:34 AM		3.39			
6	Initial	11:35 AM	30.0	3.30	0.07	1.67	0.15
	Final	12:05 PM		3.37			
7	Initial	12:06 PM	30.0	3.29	0.07	1.68	0.15
	Final	12:36 PM		3.36			
8	Initial	12:37 PM	30.0	3.30	0.07	1.67	0.15
	Final	1:07 PM		3.37			
9	Initial	1:08 PM	30.0	3.32	0.06	1.65	0.13
	Final	1:38 PM		3.38			
10	Initial	1:39 PM	30.0	3.31	0.07	1.66	0.15
	Final	2:09 PM		3.38			
11	Initial	2:10 PM	30.0	3.30	0.06	1.67	0.13
	Final	2:40 PM		3.36			
12	Initial	2:41 PM	30.0	3.31	0.06	1.66	0.13
	Final	3:11 PM		3.37			

Per County Standards, Infiltration Rate calculated as follows:

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where: Q = Infiltration Rate (in inches per hour)
ΔH = Change in Height (Water Level) over the time interval
r = Test Hole (Borehole) Radius
Δt = Time Interval H above GS= 0.1
H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed Multi-Unit Apartment Complex
Project Location	Brea, CA
Project Number	18G118-2
Engineer	Scott McCann

Test Hole Radius	4	(in)
Test Depth	15.0	(ft)

Infiltration Test Hole: I-2

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	8:10 AM	30.0	3.82	0.80	10.78	0.29
	Final	8:40 AM		4.62			
2	Initial	8:41 AM	30.0	3.90	0.75	10.73	0.28
	Final	9:11 AM		4.65			
3	Initial	9:12 AM	30.0	3.93	0.73	10.71	0.27
	Final	9:42 AM		4.66			
4	Initial	9:43 AM	30.0	3.93	0.72	10.71	0.26
	Final	10:13 AM		4.65			
5	Initial	10:14 AM	30.0	3.91	0.70	10.74	0.26
	Final	10:44 AM		4.61			
6	Initial	10:45 AM	30.0	3.95	0.70	10.70	0.26
	Final	11:15 AM		4.65			
7	Initial	11:16 AM	30.0	3.94	0.71	10.71	0.26
	Final	11:46 AM		4.65			
8	Initial	11:47 AM	30.0	3.95	0.69	10.71	0.25
	Final	12:17 PM		4.64			
9	Initial	12:18 PM	30.0	3.95	0.67	10.72	0.25
	Final	12:48 PM		4.62			
10	Initial	12:49 PM	30.0	3.94	0.66	10.73	0.24
	Final	1:19 PM		4.60			
11	Initial	1:20 PM	30.0	3.95	0.66	10.72	0.24
	Final	1:50 PM		4.61			
12	Initial	1:51 PM	30.0	3.93	0.66	10.74	0.24
	Final	2:21 PM		4.59			

Per County Standards, Infiltration Rate calculated as follows:

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where: Q = Infiltration Rate (in inches per hour)
ΔH = Change in Height (Water Level) over the time interval
r = Test Hole (Borehole) Radius
Δt = Time Interval H above GS= 0.1
H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed Multi-Unit Apartment Complex
Project Location	Brea, CA
Project Number	18G118-2
Engineer	Scott McCann

Test Hole Radius	4	(in)
Test Depth	4.8	(ft)

Infiltration Test Hole	I-3

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	8:00 AM	30.0	3.02	0.08	1.74	0.17
	Final	8:30 AM		3.10			
2	Initial	8:31 AM	30.0	3.10	0.07	1.67	0.15
	Final	9:01 AM		3.17			
3	Initial	9:02 AM	30.0	2.90	0.06	1.87	0.12
	Final	9:32 AM		2.96			
4	Initial	9:33 AM	30.0	2.90	0.06	1.87	0.12
	Final	10:03 AM		2.96			
5	Initial	10:04 AM	30.0	2.96	0.06	1.81	0.12
	Final	10:34 AM		3.02			
6	Initial	10:35 AM	30.0	2.92	0.05	1.86	0.10
	Final	11:05 AM		2.97			
7	Initial	11:06 AM	30.0	2.92	0.06	1.85	0.12
	Final	11:36 AM		2.98			
8	Initial	11:37 AM	30.0	2.94	0.05	1.84	0.10
	Final	12:07 PM		2.99			
9	Initial	12:08 PM	30.0	2.95	0.05	1.83	0.10
	Final	12:38 PM		3.00			
10	Initial	12:39 PM	30.0	2.93	0.05	1.85	0.10
	Final	1:09 PM		2.98			
11	Initial	1:10 PM	30.0	2.90	0.05	1.88	0.10
	Final	1:40 PM		2.95			
12	Initial	1:41 PM	30.0	2.93	0.05	1.85	0.10
	Final	2:11 PM		2.98			

Per County Standards, Infiltration Rate calculated as follows:

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where: Q = Infiltration Rate (in inches per hour)
ΔH = Change in Height (Water Level) over the time interval
r = Test Hole (Borehole) Radius
Δt = Time Interval H above GS= 0.2
H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed Multi-Unit Apartment Complex
Project Location	Brea, CA
Project Number	18G118-2
Engineer	Scott McCann

Test Hole Radius	4	(in)
Test Depth	14.9	(ft)

Infiltration Test Hole	I-4

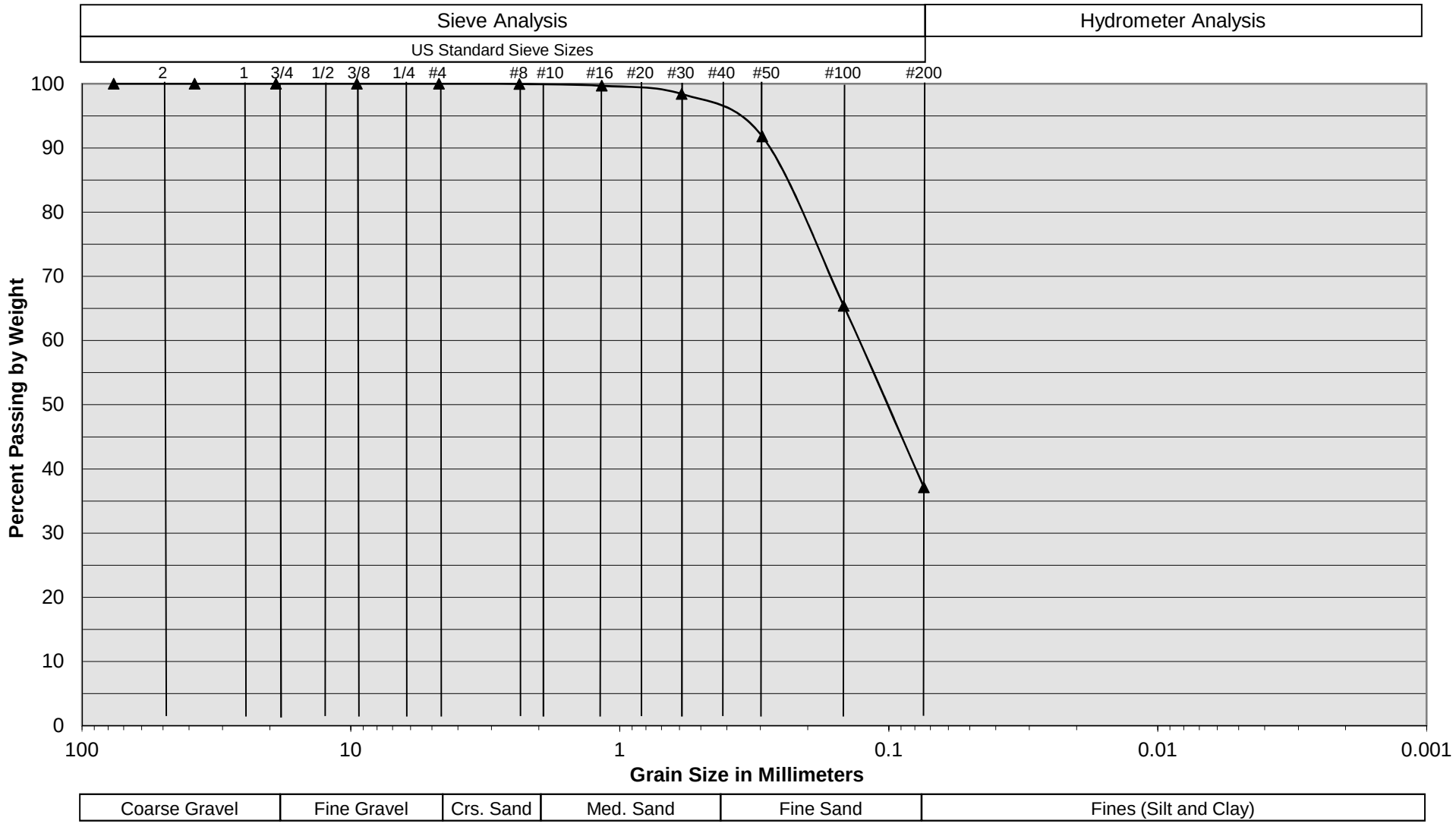
Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	9:10 AM	30.0	3.90	0.78	10.61	0.29
	Final	9:40 AM		4.68			
2	Initial	9:41 AM	30.0	3.94	0.64	10.64	0.24
	Final	10:11 AM		4.58			
3	Initial	10:12 AM	30.0	3.91	0.60	10.69	0.22
	Final	10:42 AM		4.51			
4	Initial	10:43 AM	30.0	3.92	0.62	10.67	0.23
	Final	11:13 AM		4.54			
5	Initial	11:14 AM	30.0	3.93	0.61	10.67	0.23
	Final	11:44 AM		4.54			
6	Initial	11:45 AM	30.0	3.94	0.61	10.66	0.23
	Final	12:15 PM		4.55			
7	Initial	12:16 PM	30.0	3.95	0.60	10.65	0.22
	Final	12:46 PM		4.55			
8	Initial	12:47 PM	30.0	3.94	0.60	10.66	0.22
	Final	1:17 PM		4.54			
9	Initial	1:18 PM	30.0	3.97	0.58	10.64	0.21
	Final	1:48 PM		4.55			
10	Initial	1:49 PM	30.0	3.95	0.57	10.67	0.21
	Final	2:19 PM		4.52			
11	Initial	2:20 PM	30.0	3.96	0.57	10.66	0.21
	Final	2:50 PM		4.53			
12	Initial	2:51 PM	30.0	3.97	0.56	10.65	0.21
	Final	3:21 PM		4.53			

Per County Standards, Infiltration Rate calculated as follows:

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where: Q = Infiltration Rate (in inches per hour)
ΔH = Change in Height (Water Level) over the time interval
r = Test Hole (Borehole) Radius
Δt = Time Interval H above GS= 0.1
H_{avg} = Average Head Height over the time interval

Grain Size Distribution



Sample Description	I-1 @ 3.5 to 5 feet
Soil Classification	Brown Clayey fine Sand, little Silt

Proposed Multi-Unit Apartment Complex
Brea, CA
Project No. 18G118-2
PLATE C-1

H-133

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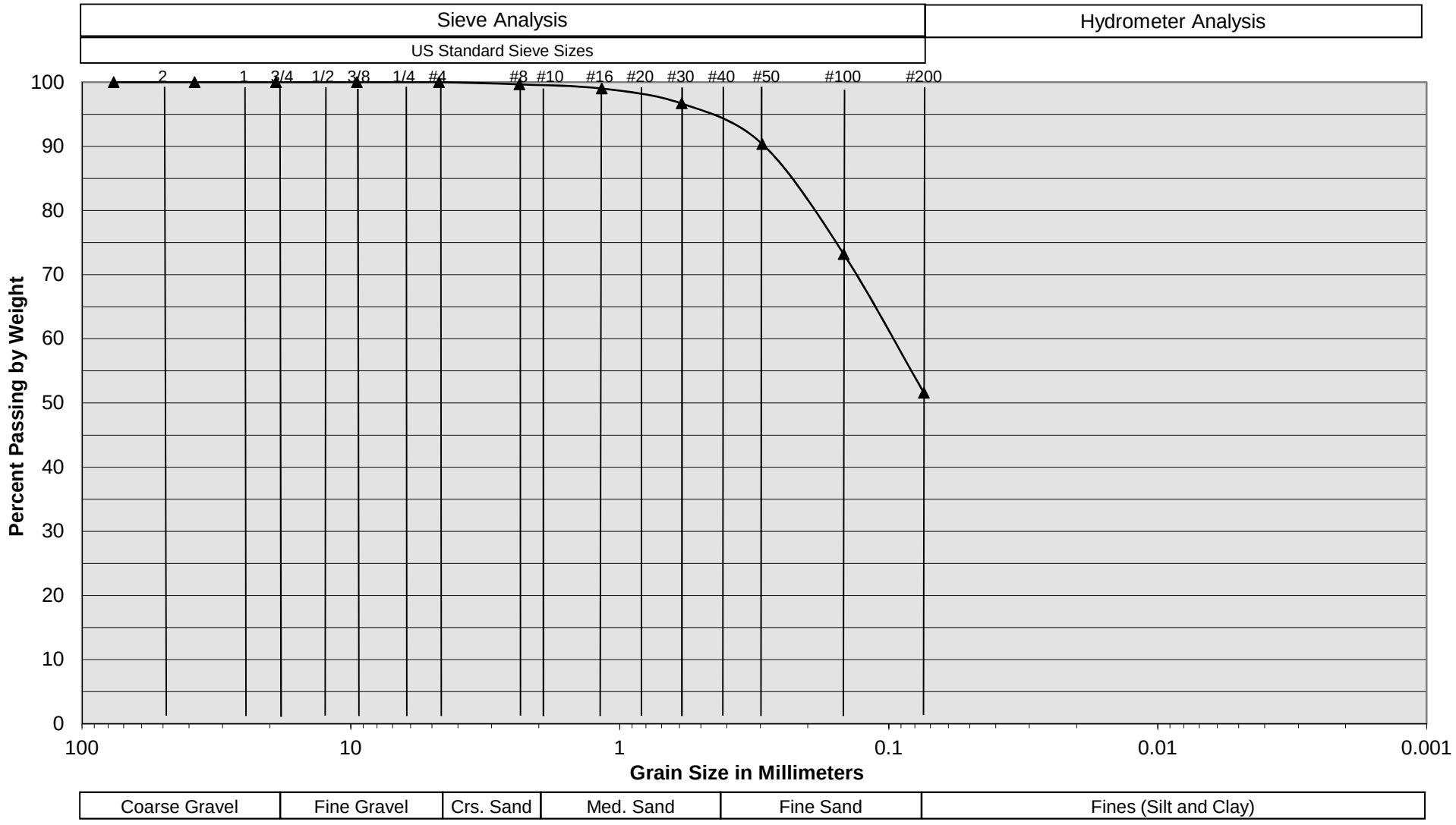
Grain Size Distribution



Sample Description	I-2 @ 3.5 to 5 feet
Soil Classification	Brown fine Sandy Clay, trace medium Sand

Proposed Multi-Unit Apartment Complex
Brea, CA
Project No. 18G118-2
PLATE C-2

SoCalGeo
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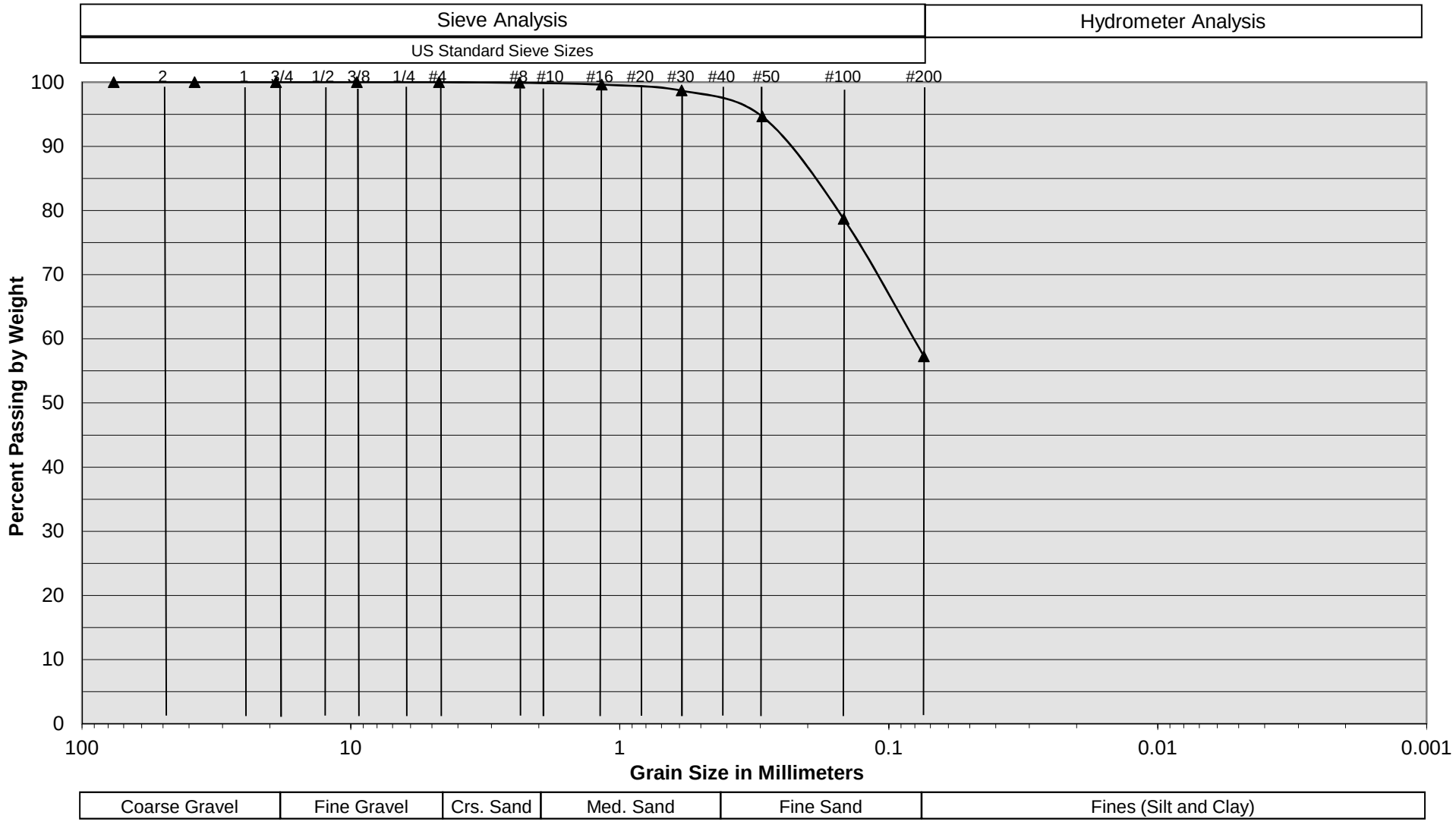
Grain Size Distribution



Sample Description	I-2 @ 6 to 7.5 feet
Soil Classification	Brown fine Sandy Clay

Proposed Multi-Unit Apartment Complex
Brea, CA
Project No. 18G118-2
PLATE C-3

SoCalGeo
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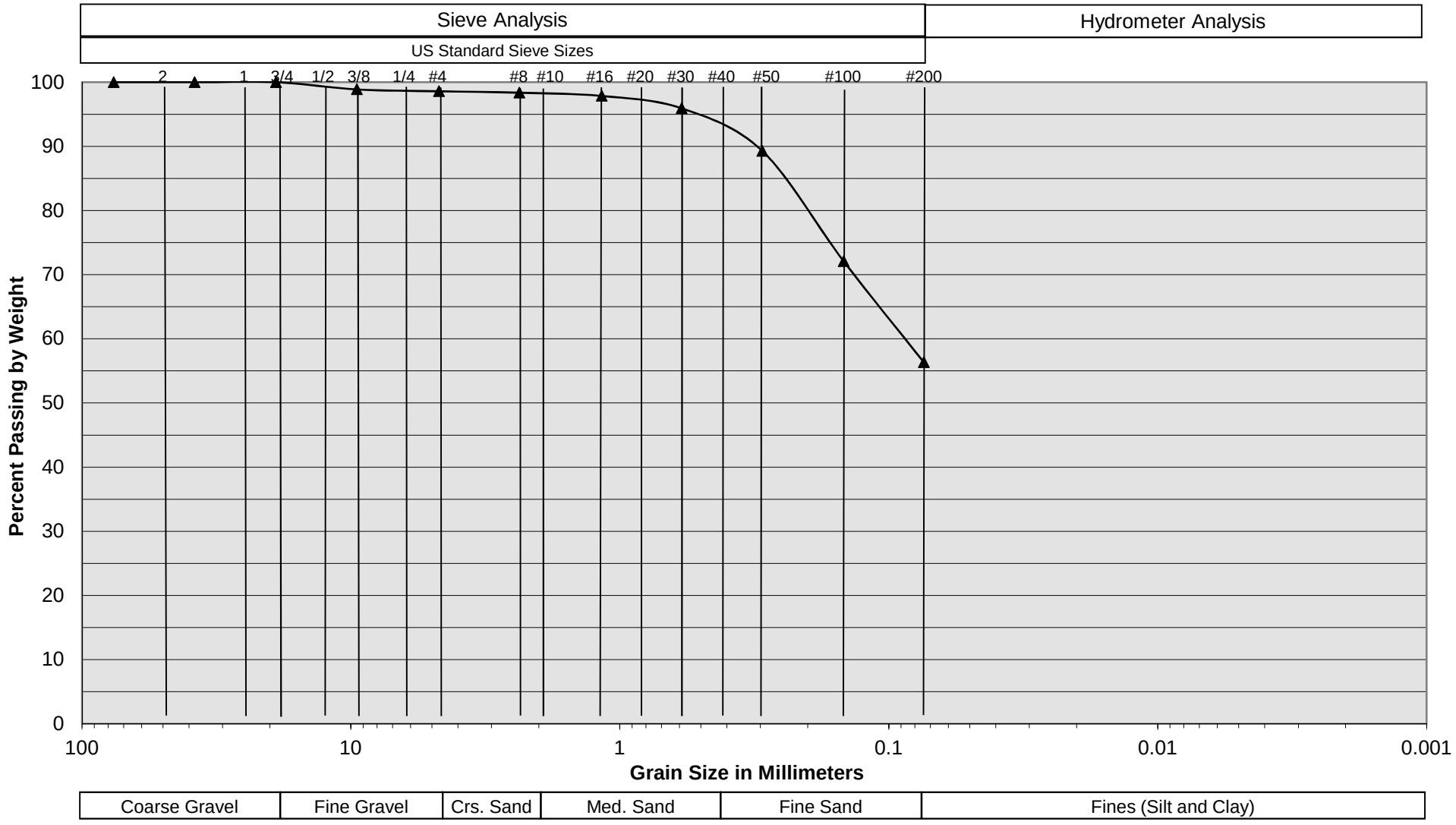
Grain Size Distribution



Sample Description	I-2 @ 8.5 to 10 feet
Soil Classification	Brown fine Sandy Clay, trace medium Sand

Proposed Multi-Unit Apartment Complex
Brea, CA
Project No. 18G118-2
PLATE C-4

H-136

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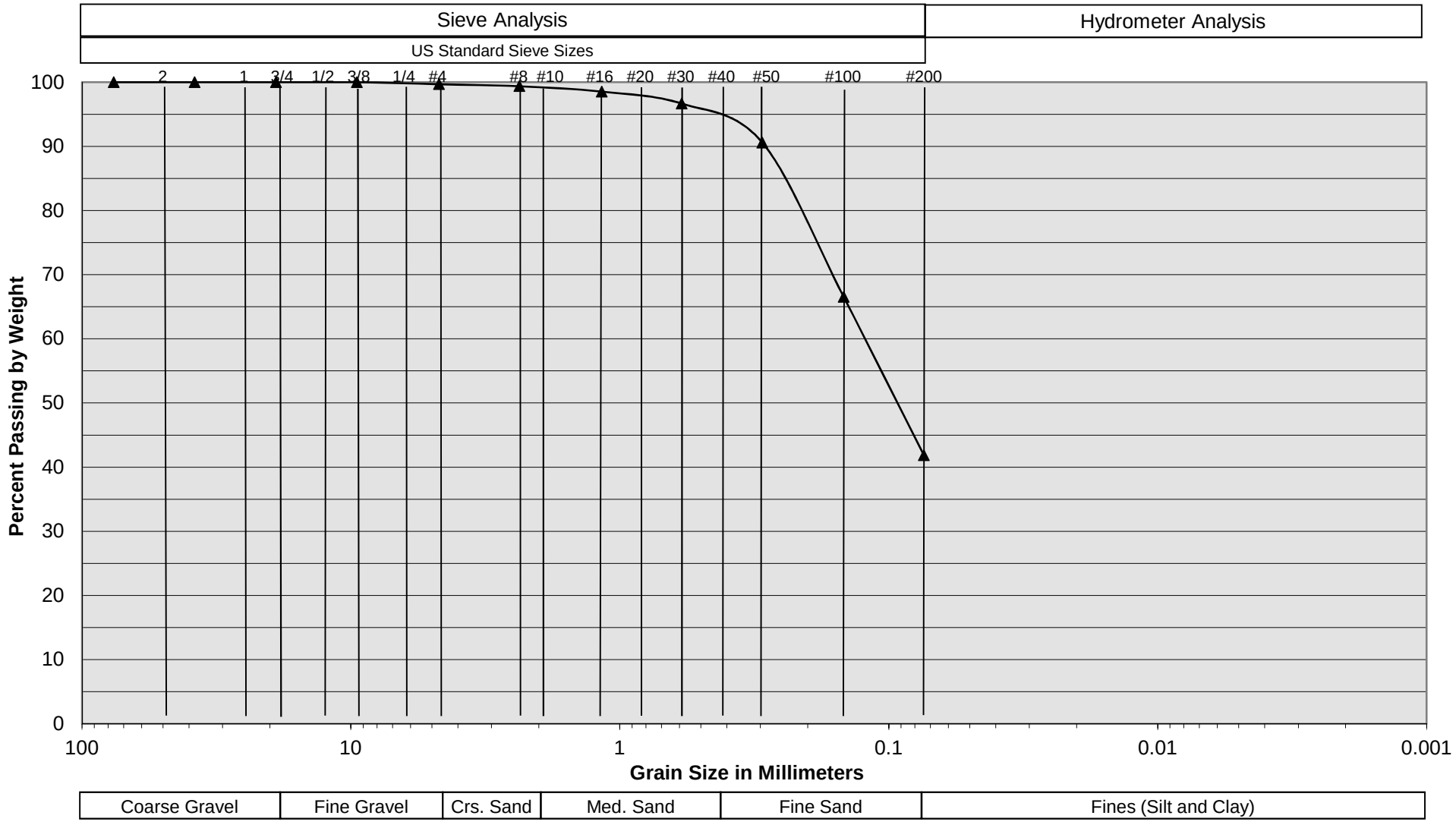
Grain Size Distribution



Sample Description	I-2 @ 13.5 to 15 feet
Soil Classification	Light Brown Clayey fine Sand, trace medium Sand, trace Silt

Proposed Multi-Unit Apartment Complex
Brea, CA
Project No. 18G118-2
PLATE C-5

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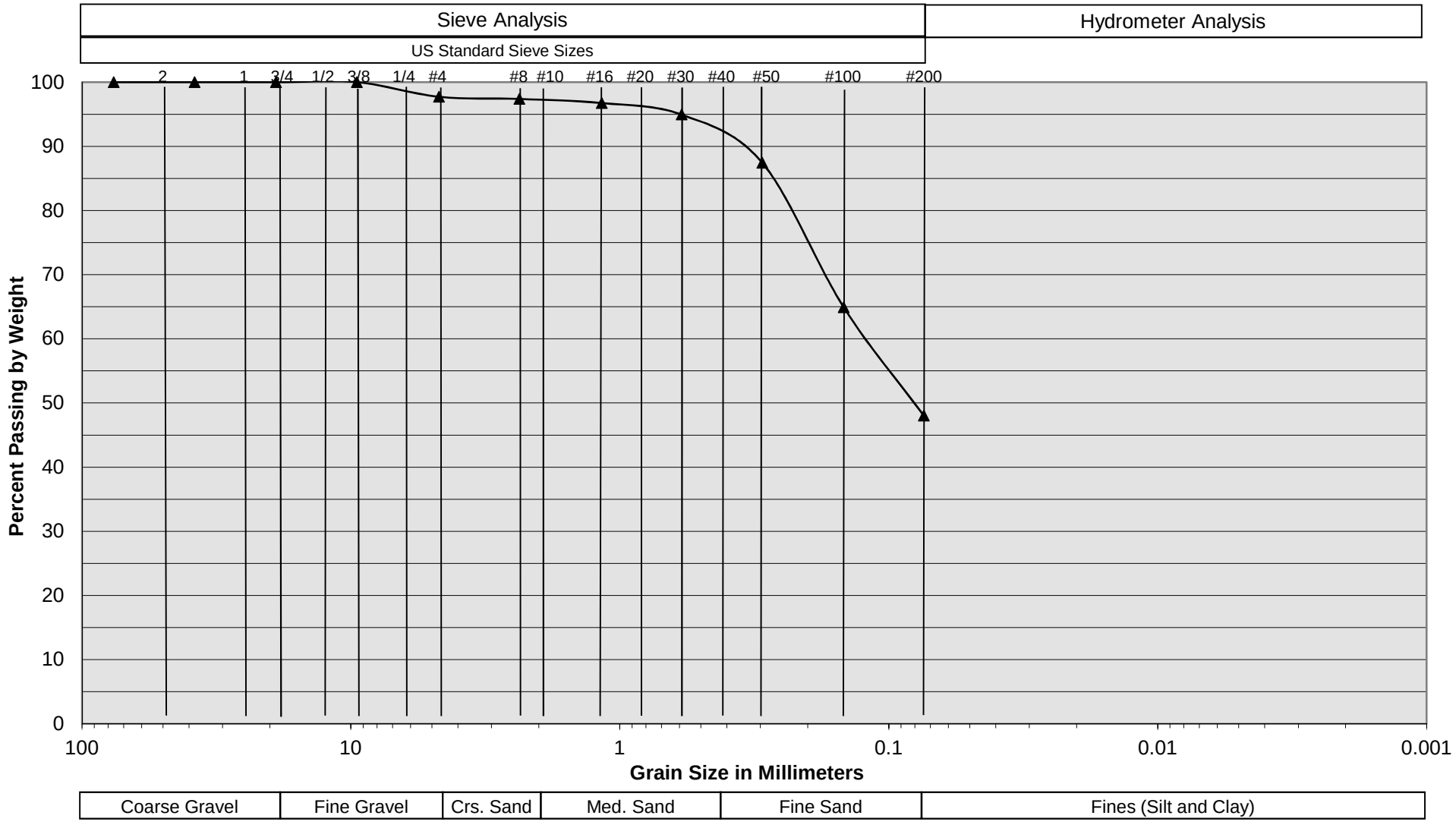
Grain Size Distribution



Sample Description	I-3 @ 3.5 to 5 feet
Soil Classification	Light Brown Clayey fine Sand to fine Sandy Clay, trace medium Sand

Proposed Multi-Unit Apartment Complex
Brea, CA
Project No. 18G118-2
PLATE C-6

H-138

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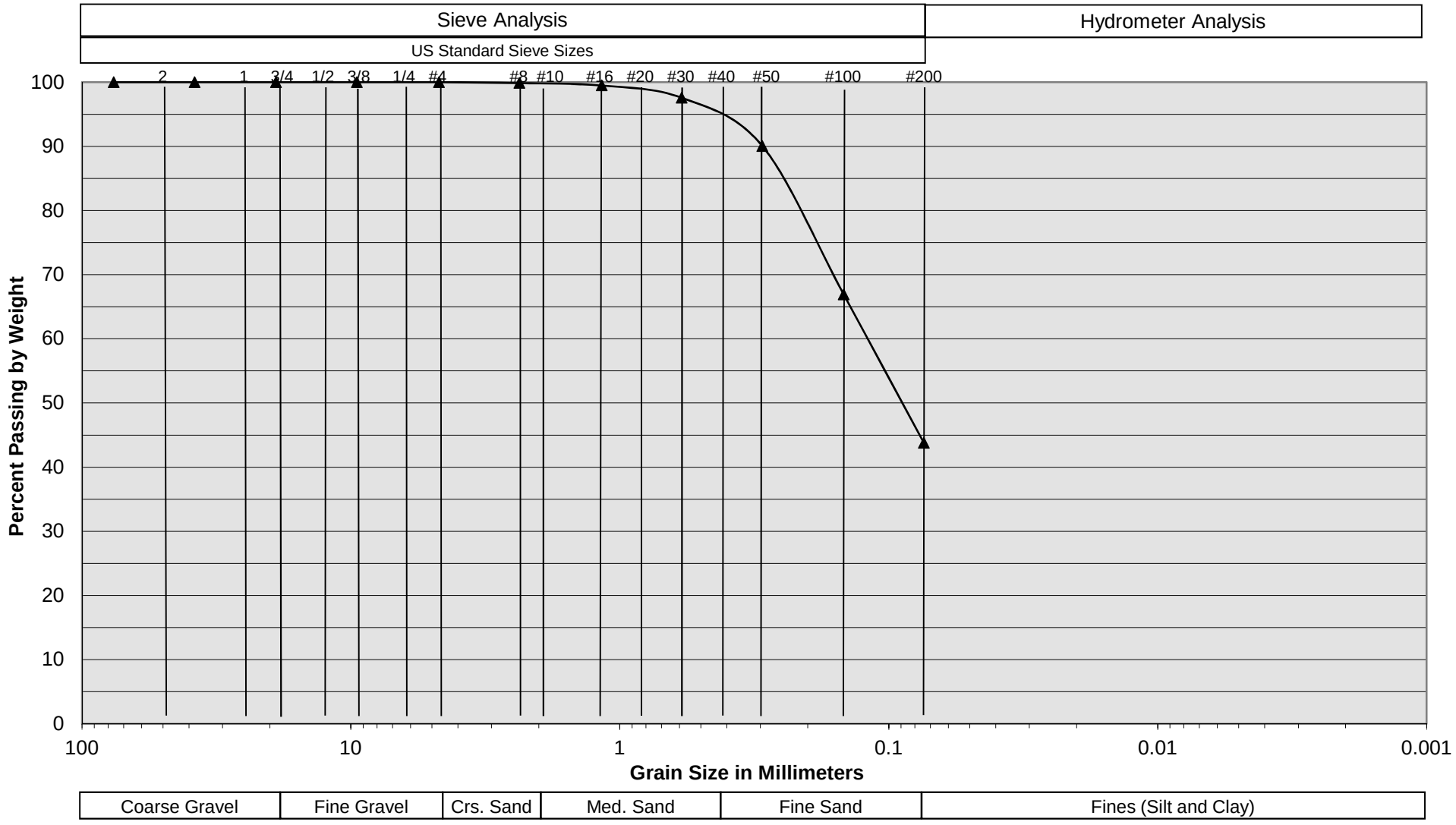
Grain Size Distribution



Sample Description	I-4 @ 3.5 to 5 feet
Soil Classification	Brown Clayey fine Sand, trace medium Sand

Proposed Multi-Unit Apartment Complex
Brea, CA
Project No. 18G118-2
PLATE C-7

SoCalGeo
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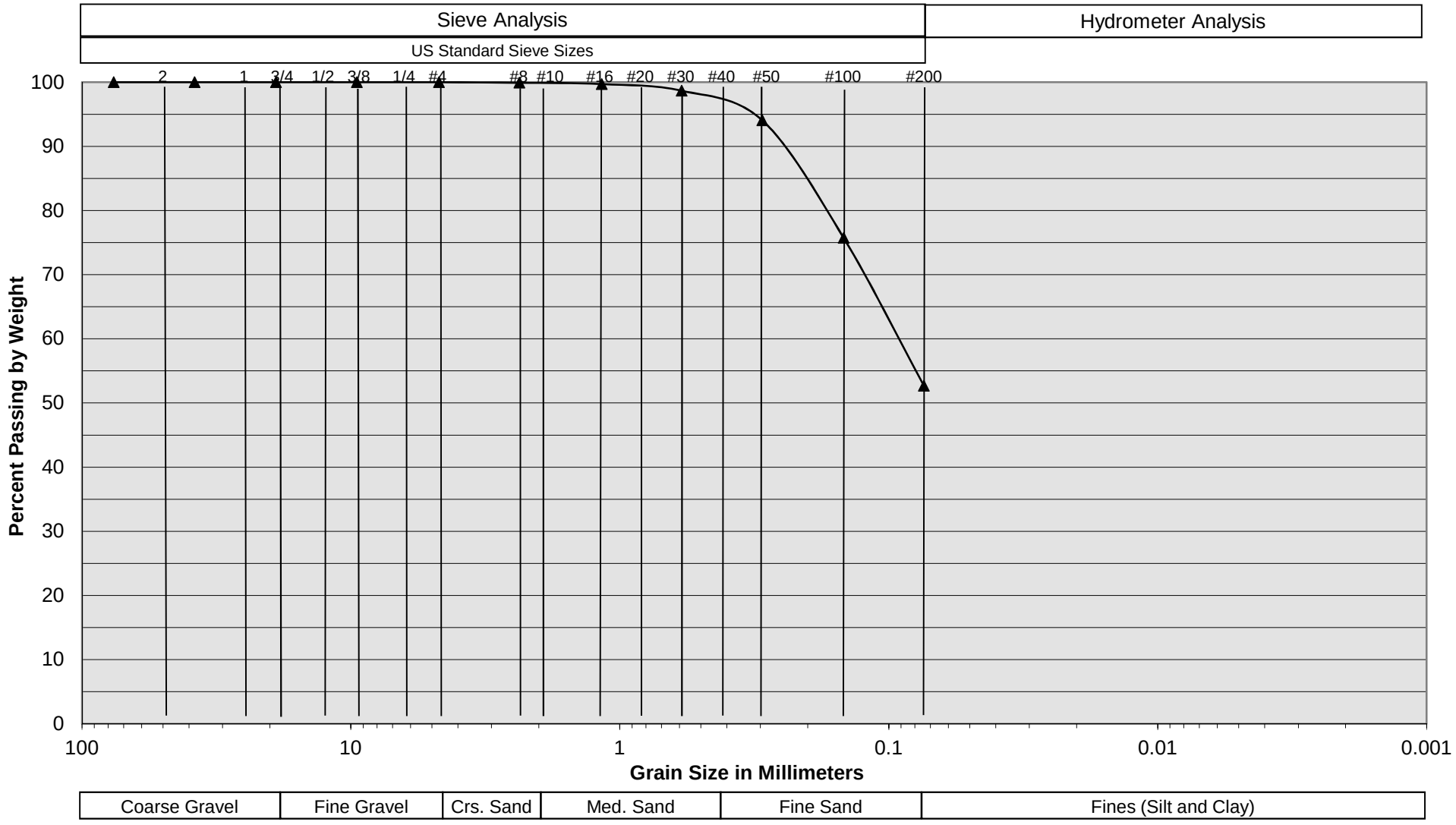
Grain Size Distribution



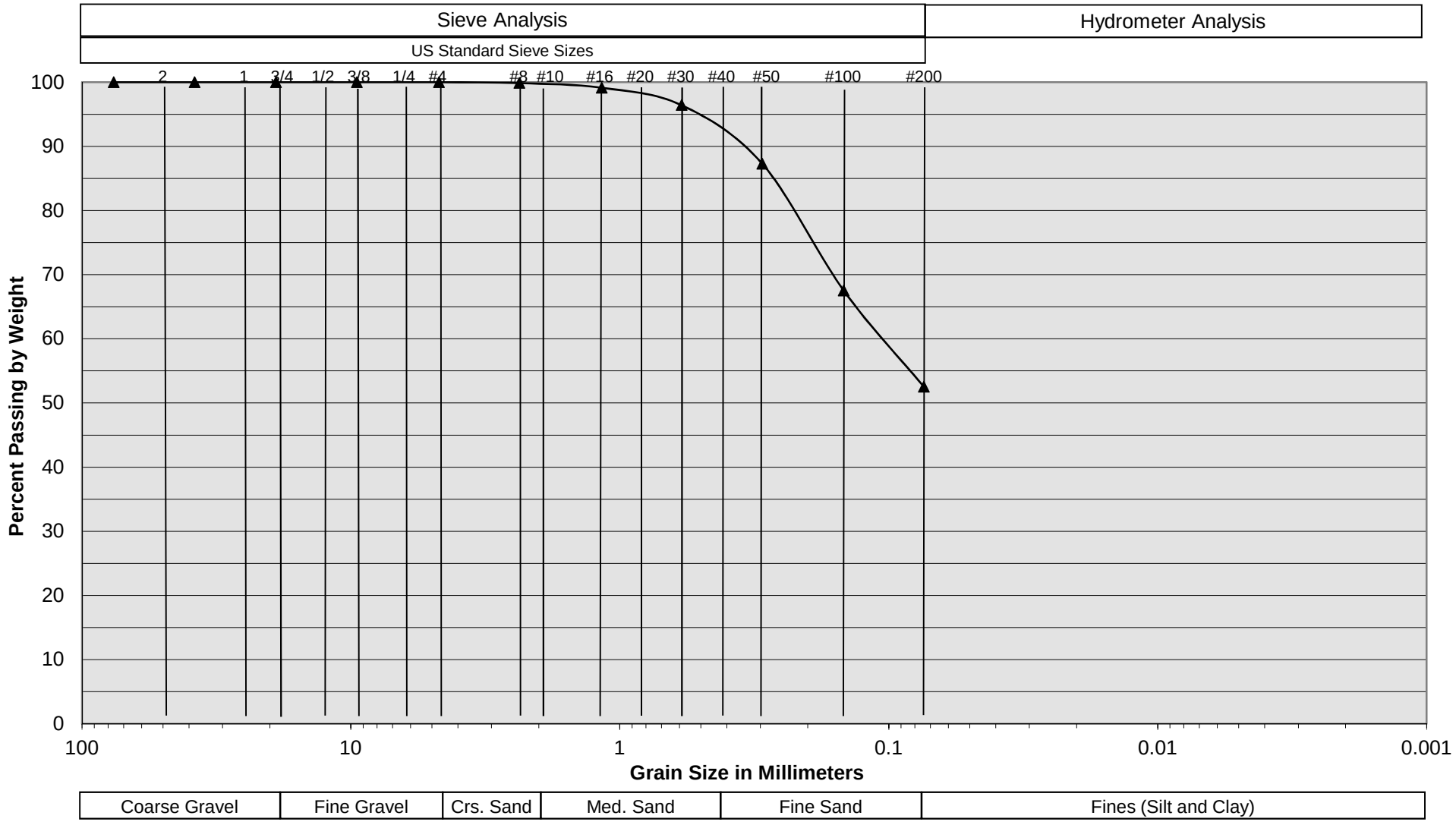
Sample Description	I-4 @ 6 to 7.5 feet
Soil Classification	Brown fine Sandy Clay, trace medium Sand

Proposed Multi-Unit Apartment Complex
Brea, CA
Project No. 18G118-2
PLATE C-8

H-140

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



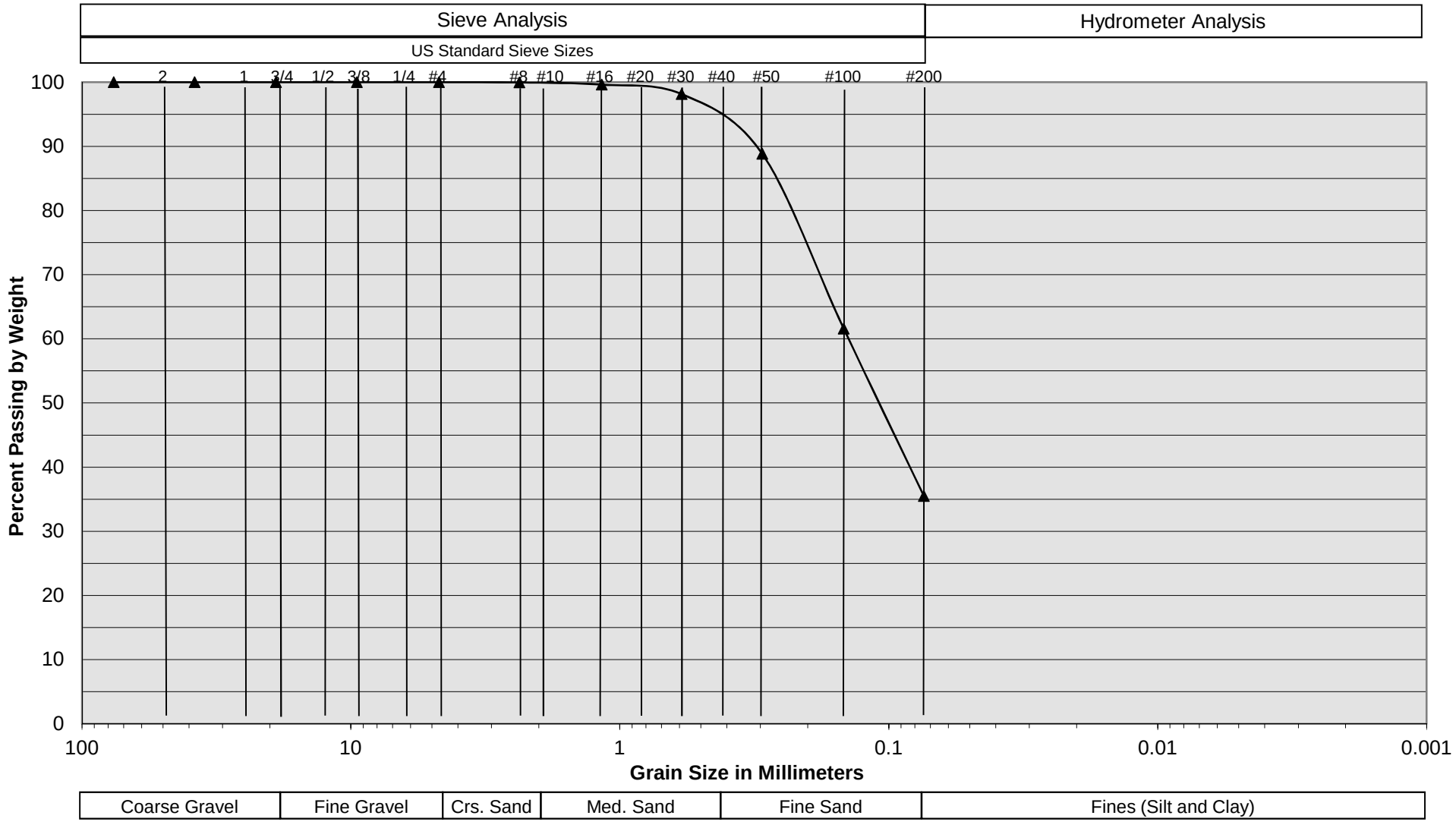
Sample Description	I-4 @ 8.5 to 10 feet
Soil Classification	Brown fine Sandy Clay, trace medium Sand

Proposed Multi-Unit Apartment Complex
Brea, CA
Project No. 18G118-2
PLATE C-9

H-141

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Sample Description	I-4 @ 13.5 to 15 feet
Soil Classification	Light Brown Clayey fine Sand, trace medium Sand, trace Silt

Proposed Multi-Unit Apartment Complex
Brea, CA
Project No. 18G118-2
PLATE C-10

H-142

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

APPENDIX G

HYDROMODIFICATION CALCULATIONS

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**************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
==========================================================================
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                          Analysis prepared by:

                            Fuscoe Engineering
                             16795 Von Karman
                                Suite 100
                             Irvine CA 92606

**************************************************************************
--------------------------------------------------------------------------

 Problem Descriptions:
  Mercury & Berry - City of Brea
  Proposed Condition Hydrograph
  2-Year Storm Event
==========================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

    TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1         1.00       20.00       69.(AMC II)     0.250       0.712

    TOTAL AREA (Acres) =      1.00

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.050

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.288
==========================================================================

 Problem Descriptions:
  Mercury & Berry - City of Brea
  Proposed Condition Hydrograph
  2-Year Storm Event  (calibration coefficient = 0.895)
--------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.89
    TOTAL CATCHMENT AREA(ACRES) =    1.00
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.050
    LOW LOSS FRACTION = 0.288
    TIME OF CONCENTRATION(MIN.) =  7.40
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05
```

```
--------------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.12
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.05

********************************************************************************
  TIME     VOLUME       Q    0.        2.5       5.0       7.5      10.0
 (HOURS)    (AF)      (CFS)
--------------------------------------------------------------------------------
  0.09      0.0001      0.02  Q         .         .         .         .
  0.21      0.0003      0.02  Q         .         .         .         .
  0.34      0.0005      0.02  Q         .         .         .         .
  0.46      0.0007      0.02  Q         .         .         .         .
  0.58      0.0009      0.02  Q         .         .         .         .
  0.71      0.0011      0.02  Q         .         .         .         .
  0.83      0.0013      0.02  Q         .         .         .         .
  0.95      0.0016      0.02  Q         .         .         .         .
  1.08      0.0018      0.02  Q         .         .         .         .
  1.20      0.0020      0.02  Q         .         .         .         .
  1.32      0.0022      0.02  Q         .         .         .         .
  1.45      0.0024      0.02  Q         .         .         .         .
  1.57      0.0026      0.02  Q         .         .         .         .
  1.69      0.0029      0.02  Q         .         .         .         .
  1.82      0.0031      0.02  Q         .         .         .         .
  1.94      0.0033      0.02  Q         .         .         .         .
  2.06      0.0035      0.02  Q         .         .         .         .
  2.19      0.0038      0.02  Q         .         .         .         .
  2.31      0.0040      0.02  Q         .         .         .         .
  2.43      0.0042      0.02  Q         .         .         .         .
  2.56      0.0044      0.02  Q         .         .         .         .
  2.68      0.0047      0.02  Q         .         .         .         .
  2.80      0.0049      0.02  Q         .         .         .         .
  2.93      0.0051      0.02  Q         .         .         .         .
  3.05      0.0054      0.02  Q         .         .         .         .
  3.17      0.0056      0.02  Q         .         .         .         .
  3.30      0.0059      0.02  Q         .         .         .         .
  3.42      0.0061      0.02  Q         .         .         .         .
  3.54      0.0063      0.02  Q         .         .         .         .
  3.67      0.0066      0.02  Q         .         .         .         .
  3.79      0.0068      0.02  Q         .         .         .         .
  3.91      0.0071      0.02  Q         .         .         .         .
  4.04      0.0073      0.02  Q         .         .         .         .
  4.16      0.0076      0.02  Q         .         .         .         .
  4.28      0.0078      0.02  Q         .         .         .         .
  4.41      0.0081      0.02  Q         .         .         .         .
  4.53      0.0083      0.02  Q         .         .         .         .
  4.65      0.0086      0.03  Q         .         .         .         .
  4.78      0.0088      0.03  Q         .         .         .         .
  4.90      0.0091      0.03  Q         .         .         .         .
  5.02      0.0093      0.03  Q         .         .         .         .
  5.15      0.0096      0.03  Q         .         .         .         .
  5.27      0.0099      0.03  Q         .         .         .         .
  5.39      0.0101      0.03  Q         .         .         .         .
  5.52      0.0104      0.03  Q         .         .         .         .
  5.64      0.0107      0.03  Q         .         .         .         .
  5.76      0.0110      0.03  Q         .         .         .         .
  5.89      0.0112      0.03  Q         .         .         .         .
  6.01      0.0115      0.03  Q         .         .         .         .
  6.13      0.0118      0.03  Q         .         .         .         .
  6.26      0.0121      0.03  Q         .         .         .         .
  6.38      0.0123      0.03  Q         .         .         .         .
```

6.50	0.0126	0.03	Q	.	.	.	.
6.63	0.0129	0.03	Q	.	.	.	.
6.75	0.0132	0.03	Q	.	.	.	.
6.87	0.0135	0.03	Q	.	.	.	.
7.00	0.0138	0.03	Q	.	.	.	.
7.12	0.0141	0.03	Q	.	.	.	.
7.24	0.0144	0.03	Q	.	.	.	.
7.37	0.0147	0.03	Q	.	.	.	.
7.49	0.0150	0.03	Q	.	.	.	.
7.61	0.0153	0.03	Q	.	.	.	.
7.74	0.0156	0.03	Q	.	.	.	.
7.86	0.0159	0.03	Q	.	.	.	.
7.98	0.0162	0.03	Q	.	.	.	.
8.11	0.0166	0.03	Q	.	.	.	.
8.23	0.0169	0.03	Q	.	.	.	.
8.35	0.0172	0.03	Q	.	.	.	.
8.48	0.0175	0.03	Q	.	.	.	.
8.60	0.0179	0.03	Q	.	.	.	.
8.72	0.0182	0.03	Q	.	.	.	.
8.85	0.0185	0.03	Q	.	.	.	.
8.97	0.0189	0.03	Q	.	.	.	.
9.09	0.0192	0.03	Q	.	.	.	.
9.22	0.0196	0.03	Q	.	.	.	.
9.34	0.0199	0.03	Q	.	.	.	.
9.46	0.0203	0.04	Q	.	.	.	.
9.59	0.0207	0.04	Q	.	.	.	.
9.71	0.0210	0.04	Q	.	.	.	.
9.83	0.0214	0.04	Q	.	.	.	.
9.96	0.0218	0.04	Q	.	.	.	.
10.08	0.0221	0.04	Q	.	.	.	.
10.20	0.0225	0.04	Q	.	.	.	.
10.33	0.0229	0.04	Q	.	.	.	.
10.45	0.0233	0.04	Q	.	.	.	.
10.57	0.0237	0.04	Q	.	.	.	.
10.70	0.0241	0.04	Q	.	.	.	.
10.82	0.0245	0.04	Q	.	.	.	.
10.94	0.0250	0.04	Q	.	.	.	.
11.07	0.0254	0.04	Q	.	.	.	.
11.19	0.0258	0.04	Q	.	.	.	.
11.31	0.0263	0.04	Q	.	.	.	.
11.44	0.0267	0.04	Q	.	.	.	.
11.56	0.0271	0.04	Q	.	.	.	.
11.68	0.0276	0.05	Q	.	.	.	.
11.81	0.0281	0.05	Q	.	.	.	.
11.93	0.0286	0.05	Q	.	.	.	.
12.05	0.0290	0.05	Q	.	.	.	.
12.18	0.0296	0.06	Q	.	.	.	.
12.30	0.0302	0.06	Q	.	.	.	.
12.42	0.0308	0.06	Q	.	.	.	.
12.55	0.0315	0.06	Q	.	.	.	.
12.67	0.0321	0.06	Q	.	.	.	.
12.79	0.0328	0.07	Q	.	.	.	.
12.92	0.0334	0.07	Q	.	.	.	.
13.04	0.0341	0.07	Q	.	.	.	.
13.16	0.0348	0.07	Q	.	.	.	.
13.29	0.0356	0.07	Q	.	.	.	.
13.41	0.0363	0.07	Q	.	.	.	.
13.53	0.0370	0.07	Q	.	.	.	.
13.66	0.0378	0.08	Q	.	.	.	.
13.78	0.0386	0.08	Q	.	.	.	.
13.90	0.0394	0.08	Q	.	.	.	.

14.03	0.0403	0.08	Q	.	.	.	.
14.15	0.0412	0.09	Q	.	.	.	.
14.27	0.0421	0.09	Q	.	.	.	.
14.40	0.0431	0.10	Q	.	.	.	.
14.52	0.0441	0.10	Q	.	.	.	.
14.64	0.0451	0.11	Q	.	.	.	.
14.77	0.0462	0.11	Q	.	.	.	.
14.89	0.0474	0.12	Q	.	.	.	.
15.01	0.0487	0.13	Q	.	.	.	.
15.14	0.0500	0.14	Q	.	.	.	.
15.26	0.0515	0.15	Q	.	.	.	.
15.38	0.0531	0.17	Q	.	.	.	.
15.51	0.0548	0.16	Q	.	.	.	.
15.63	0.0566	0.20	Q	.	.	.	.
15.75	0.0588	0.23	Q	.	.	.	.
15.88	0.0618	0.35	.Q	.	.	.	.
16.00	0.0661	0.50	.Q	.	.	.	.
16.12	0.0767	1.58	.	Q	.	.	.
16.25	0.0861	0.28	.Q	.	.	.	.
16.37	0.0885	0.18	Q	.	.	.	.
16.49	0.0902	0.16	Q	.	.	.	.
16.62	0.0917	0.13	Q	.	.	.	.
16.74	0.0929	0.11	Q	.	.	.	.
16.86	0.0940	0.10	Q	.	.	.	.
16.99	0.0951	0.10	Q	.	.	.	.
17.11	0.0960	0.09	Q	.	.	.	.
17.23	0.0968	0.08	Q	.	.	.	.
17.36	0.0976	0.08	Q	.	.	.	.
17.48	0.0984	0.07	Q	.	.	.	.
17.60	0.0991	0.07	Q	.	.	.	.
17.73	0.0998	0.07	Q	.	.	.	.
17.85	0.1005	0.06	Q	.	.	.	.
17.97	0.1011	0.06	Q	.	.	.	.
18.10	0.1017	0.06	Q	.	.	.	.
18.22	0.1022	0.05	Q	.	.	.	.
18.34	0.1027	0.05	Q	.	.	.	.
18.47	0.1031	0.04	Q	.	.	.	.
18.59	0.1036	0.04	Q	.	.	.	.
18.71	0.1040	0.04	Q	.	.	.	.
18.84	0.1044	0.04	Q	.	.	.	.
18.96	0.1048	0.04	Q	.	.	.	.
19.08	0.1052	0.04	Q	.	.	.	.
19.21	0.1056	0.04	Q	.	.	.	.
19.33	0.1060	0.04	Q	.	.	.	.
19.45	0.1063	0.04	Q	.	.	.	.
19.58	0.1067	0.03	Q	.	.	.	.
19.70	0.1070	0.03	Q	.	.	.	.
19.82	0.1074	0.03	Q	.	.	.	.
19.95	0.1077	0.03	Q	.	.	.	.
20.07	0.1080	0.03	Q	.	.	.	.
20.19	0.1083	0.03	Q	.	.	.	.
20.32	0.1086	0.03	Q	.	.	.	.
20.44	0.1089	0.03	Q	.	.	.	.
20.56	0.1093	0.03	Q	.	.	.	.
20.69	0.1095	0.03	Q	.	.	.	.
20.81	0.1098	0.03	Q	.	.	.	.
20.93	0.1101	0.03	Q	.	.	.	.
21.06	0.1104	0.03	Q	.	.	.	.
21.18	0.1107	0.03	Q	.	.	.	.
21.30	0.1110	0.03	Q	.	.	.	.
21.43	0.1112	0.03	Q	.	.	.	.

21.55	0.1115	0.03	Q	.	.	.	.
21.67	0.1118	0.03	Q	.	.	.	.
21.80	0.1120	0.03	Q	.	.	.	.
21.92	0.1123	0.02	Q	.	.	.	.
22.04	0.1125	0.02	Q	.	.	.	.
22.17	0.1128	0.02	Q	.	.	.	.
22.29	0.1130	0.02	Q	.	.	.	.
22.41	0.1133	0.02	Q	.	.	.	.
22.54	0.1135	0.02	Q	.	.	.	.
22.66	0.1137	0.02	Q	.	.	.	.
22.78	0.1140	0.02	Q	.	.	.	.
22.91	0.1142	0.02	Q	.	.	.	.
23.03	0.1144	0.02	Q	.	.	.	.
23.15	0.1147	0.02	Q	.	.	.	.
23.28	0.1149	0.02	Q	.	.	.	.
23.40	0.1151	0.02	Q	.	.	.	.
23.52	0.1153	0.02	Q	.	.	.	.
23.65	0.1155	0.02	Q	.	.	.	.
23.77	0.1158	0.02	Q	.	.	.	.
23.89	0.1160	0.02	Q	.	.	.	.
24.02	0.1162	0.02	Q	.	.	.	.
24.14	0.1163	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1443.0
10%	66.6
20%	22.2
30%	14.8
40%	7.4
50%	7.4
60%	7.4
70%	7.4
80%	7.4
90%	7.4

```
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1355

                          Analysis prepared by:

                              Fuscoe Engineering
                          16795 Vona Karman Suite 100
                                  Irvine CA
                                    92606

 ************************* DESCRIPTION OF STUDY *************************
* MERCURY AND BERRY PROJECT                                             *
* EXISTING HYDROLOGY                                                    *
* 2 YEAR STORM EVENT                                                    *
 ************************************************************************

  FILE NAME: MB02EX.DAT
  TIME/DATE OF STUDY: 12:18 05/22/2018
==============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

******************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   185.00
  ELEVATION DATA: UPSTREAM(FEET) =    343.30  DOWNSTREAM(FEET) =    341.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.280
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.497
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   C        0.33      0.25     1.000    80   10.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.33   PEAK FLOW RATE(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     12.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
  ELEVATION DATA: UPSTREAM(FEET) =    343.30  DOWNSTREAM(FEET) =    337.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.847
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.380
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   C        0.67      0.25     1.000    80   11.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.68
  TOTAL AREA(ACRES) =      0.67   PEAK FLOW RATE(CFS) =      0.68

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================
```

```
  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        0.68   11.85    1.380  0.25( 0.25) 1.00       0.7      10.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     320.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        0.37   10.28    1.497  0.25( 0.25) 1.00       0.3      10.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     185.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.02   10.28    1.497  0.25( 0.25) 1.00       0.9      10.00
      2        1.02   11.85    1.380  0.25( 0.25) 1.00       1.0      10.00
    TOTAL AREA(ACRES) =         1.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        1.02  Tc(MIN.) =   10.280
  EFFECTIVE AREA(ACRES) =      0.91  AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.0
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     320.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.0  TC(MIN.) =     10.28
  EFFECTIVE AREA(ACRES) =      0.91  AREA-AVERAGED Fm(INCH/HR)=  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       1.02

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.02   10.28    1.497  0.25( 0.25) 1.00       0.9      10.00
      2        1.02   11.85    1.380  0.25( 0.25) 1.00       1.0      10.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1355

                          Analysis prepared by:

                              Fuscoe Engineering
                          16795 Vona Karman Suite 100
                                  Irvine CA
                                    92606

 ************************* DESCRIPTION OF STUDY *************************
* MERCURY & BERRY PROJECT                                                *
* PROPOSED HYDROLOGY                                                     *
* 2 YEAR STORM EVENT                                                     *
 **************************************************************************

  FILE NAME: MB02PR.DAT
  TIME/DATE OF STUDY: 09:16 05/30/2018
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   230.00
  ELEVATION DATA: UPSTREAM(FEET) =    343.40  DOWNSTREAM(FEET) =    340.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.992
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.867
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                 C        0.49      0.25     0.200    50    6.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      0.80

********************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   338.00  DOWNSTREAM(FEET) =   336.00
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.011
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO  8.000
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.90
  ESTIMATED PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.80
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    7.40
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     350.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    7.40
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.808
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 C        0.51      0.25     0.200    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.51      SUBAREA RUNOFF(CFS) =    0.81
  EFFECTIVE AREA(ACRES) =      1.00   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       1.58
================================================================================
  END OF STUDY SUMMARY:
```

```
                                    MB02PR
  TOTAL AREA(ACRES)     =        1.0  TC(MIN.) =      7.40
  EFFECTIVE AREA(ACRES) =      1.00  AREA-AVERAGED Fm(INCH/HR)=  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 0.200
  PEAK FLOW RATE(CFS)   =       1.58
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
==========================================================================
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                          Analysis prepared by:

                            Fuscoe Engineering
                             16795 Von Karman
                                Suite 100
                             Irvine CA 92606

**************************************************************************
--------------------------------------------------------------------------

 Problem Descriptions:
  Mercury & Berry - City of Brea
  Existing Condition Hydrograph
  2-Year Storm Event
==========================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

    TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1          1.00      100.00       91.(AMC II)     0.250       0.289

    TOTAL AREA (Acres) =      1.00

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.250

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.711
==========================================================================

 Problem Descriptions:
  Mercury & Berry - City of Brea
  Existing Condition Hydrograph
  2-Year Storm Event
--------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.82
    TOTAL CATCHMENT AREA(ACRES) =    1.00
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.250
    LOW LOSS FRACTION = 0.711
    TIME OF CONCENTRATION(MIN.) = 10.28
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05
```

```
--------------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.05
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.12

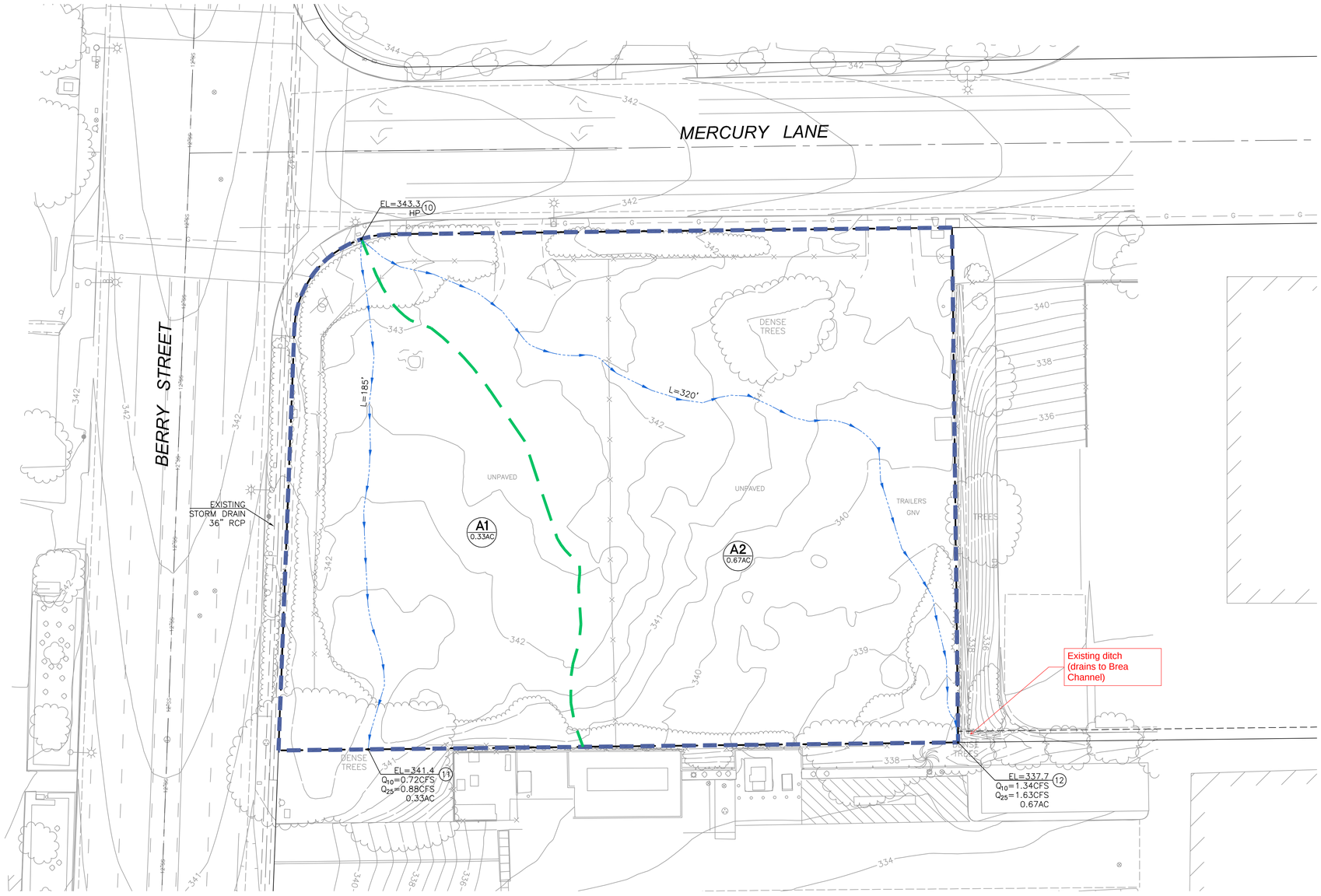
********************************************************************************
  TIME     VOLUME       Q    0.        2.5       5.0       7.5      10.0
 (HOURS)    (AF)      (CFS)
--------------------------------------------------------------------------------
  0.07      0.0000      0.01  Q         .         .         .         .
  0.24      0.0001      0.01  Q         .         .         .         .
  0.41      0.0002      0.01  Q         .         .         .         .
  0.58      0.0003      0.01  Q         .         .         .         .
  0.75      0.0005      0.01  Q         .         .         .         .
  0.92      0.0006      0.01  Q         .         .         .         .
  1.09      0.0007      0.01  Q         .         .         .         .
  1.27      0.0008      0.01  Q         .         .         .         .
  1.44      0.0009      0.01  Q         .         .         .         .
  1.61      0.0010      0.01  Q         .         .         .         .
  1.78      0.0011      0.01  Q         .         .         .         .
  1.95      0.0012      0.01  Q         .         .         .         .
  2.12      0.0014      0.01  Q         .         .         .         .
  2.29      0.0015      0.01  Q         .         .         .         .
  2.46      0.0016      0.01  Q         .         .         .         .
  2.64      0.0017      0.01  Q         .         .         .         .
  2.81      0.0018      0.01  Q         .         .         .         .
  2.98      0.0020      0.01  Q         .         .         .         .
  3.15      0.0021      0.01  Q         .         .         .         .
  3.32      0.0022      0.01  Q         .         .         .         .
  3.49      0.0023      0.01  Q         .         .         .         .
  3.66      0.0024      0.01  Q         .         .         .         .
  3.84      0.0026      0.01  Q         .         .         .         .
  4.01      0.0027      0.01  Q         .         .         .         .
  4.18      0.0028      0.01  Q         .         .         .         .
  4.35      0.0030      0.01  Q         .         .         .         .
  4.52      0.0031      0.01  Q         .         .         .         .
  4.69      0.0032      0.01  Q         .         .         .         .
  4.86      0.0034      0.01  Q         .         .         .         .
  5.03      0.0035      0.01  Q         .         .         .         .
  5.21      0.0036      0.01  Q         .         .         .         .
  5.38      0.0038      0.01  Q         .         .         .         .
  5.55      0.0039      0.01  Q         .         .         .         .
  5.72      0.0040      0.01  Q         .         .         .         .
  5.89      0.0042      0.01  Q         .         .         .         .
  6.06      0.0043      0.01  Q         .         .         .         .
  6.23      0.0045      0.01  Q         .         .         .         .
  6.41      0.0046      0.01  Q         .         .         .         .
  6.58      0.0048      0.01  Q         .         .         .         .
  6.75      0.0049      0.01  Q         .         .         .         .
  6.92      0.0051      0.01  Q         .         .         .         .
  7.09      0.0052      0.01  Q         .         .         .         .
  7.26      0.0054      0.01  Q         .         .         .         .
  7.43      0.0055      0.01  Q         .         .         .         .
  7.60      0.0057      0.01  Q         .         .         .         .
  7.78      0.0058      0.01  Q         .         .         .         .
  7.95      0.0060      0.01  Q         .         .         .         .
  8.12      0.0062      0.01  Q         .         .         .         .
  8.29      0.0063      0.01  Q         .         .         .         .
  8.46      0.0065      0.01  Q         .         .         .         .
  8.63      0.0067      0.01  Q         .         .         .         .
  8.80      0.0068      0.01  Q         .         .         .         .
```

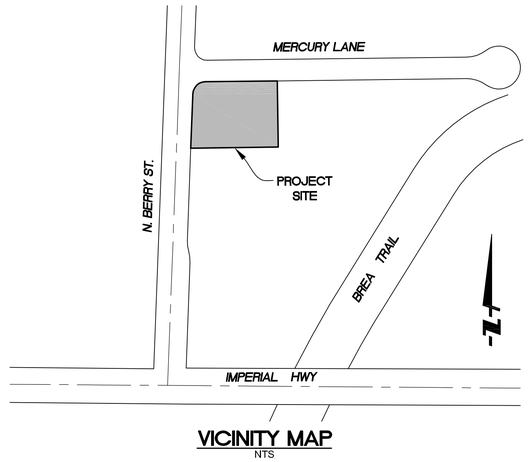
8.98	0.0070	0.01	Q	.	.	.	.
9.15	0.0072	0.01	Q	.	.	.	.
9.32	0.0074	0.01	Q	.	.	.	.
9.49	0.0076	0.01	Q	.	.	.	.
9.66	0.0078	0.01	Q	.	.	.	.
9.83	0.0079	0.01	Q	.	.	.	.
10.00	0.0081	0.01	Q	.	.	.	.
10.17	0.0083	0.01	Q	.	.	.	.
10.35	0.0085	0.01	Q	.	.	.	.
10.52	0.0087	0.01	Q	.	.	.	.
10.69	0.0089	0.01	Q	.	.	.	.
10.86	0.0092	0.02	Q	.	.	.	.
11.03	0.0094	0.02	Q	.	.	.	.
11.20	0.0096	0.02	Q	.	.	.	.
11.37	0.0098	0.02	Q	.	.	.	.
11.55	0.0101	0.02	Q	.	.	.	.
11.72	0.0103	0.02	Q	.	.	.	.
11.89	0.0105	0.02	Q	.	.	.	.
12.06	0.0108	0.02	Q	.	.	.	.
12.23	0.0111	0.02	Q	.	.	.	.
12.40	0.0114	0.02	Q	.	.	.	.
12.57	0.0117	0.02	Q	.	.	.	.
12.74	0.0120	0.02	Q	.	.	.	.
12.92	0.0124	0.02	Q	.	.	.	.
13.09	0.0127	0.03	Q	.	.	.	.
13.26	0.0131	0.03	Q	.	.	.	.
13.43	0.0135	0.03	Q	.	.	.	.
13.60	0.0139	0.03	Q	.	.	.	.
13.77	0.0143	0.03	Q	.	.	.	.
13.94	0.0147	0.03	Q	.	.	.	.
14.12	0.0151	0.03	Q	.	.	.	.
14.29	0.0156	0.03	Q	.	.	.	.
14.46	0.0161	0.04	Q	.	.	.	.
14.63	0.0167	0.04	Q	.	.	.	.
14.80	0.0172	0.04	Q	.	.	.	.
14.97	0.0178	0.04	Q	.	.	.	.
15.14	0.0185	0.05	Q	.	.	.	.
15.31	0.0192	0.05	Q	.	.	.	.
15.49	0.0199	0.05	Q	.	.	.	.
15.66	0.0207	0.06	Q	.	.	.	.
15.83	0.0218	0.09	Q	.	.	.	.
16.00	0.0239	0.20	Q	.	.	.	.
16.17	0.0326	1.02	.	Q	.	.	.
16.34	0.0404	0.07	Q	.	.	.	.
16.51	0.0412	0.06	Q	.	.	.	.
16.69	0.0420	0.05	Q	.	.	.	.
16.86	0.0426	0.04	Q	.	.	.	.
17.03	0.0431	0.04	Q	.	.	.	.
17.20	0.0436	0.03	Q	.	.	.	.
17.37	0.0440	0.03	Q	.	.	.	.
17.54	0.0444	0.03	Q	.	.	.	.
17.71	0.0448	0.03	Q	.	.	.	.
17.88	0.0451	0.02	Q	.	.	.	.
18.06	0.0454	0.02	Q	.	.	.	.
18.23	0.0457	0.02	Q	.	.	.	.
18.40	0.0459	0.02	Q	.	.	.	.
18.57	0.0462	0.02	Q	.	.	.	.
18.74	0.0464	0.02	Q	.	.	.	.
18.91	0.0466	0.01	Q	.	.	.	.
19.08	0.0468	0.01	Q	.	.	.	.
19.26	0.0470	0.01	Q	.	.	.	.

19.43	0.0472	0.01	Q	.	.	.	.
19.60	0.0474	0.01	Q	.	.	.	.
19.77	0.0476	0.01	Q	.	.	.	.
19.94	0.0477	0.01	Q	.	.	.	.
20.11	0.0479	0.01	Q	.	.	.	.
20.28	0.0481	0.01	Q	.	.	.	.
20.45	0.0482	0.01	Q	.	.	.	.
20.63	0.0484	0.01	Q	.	.	.	.
20.80	0.0485	0.01	Q	.	.	.	.
20.97	0.0487	0.01	Q	.	.	.	.
21.14	0.0488	0.01	Q	.	.	.	.
21.31	0.0490	0.01	Q	.	.	.	.
21.48	0.0491	0.01	Q	.	.	.	.
21.65	0.0493	0.01	Q	.	.	.	.
21.83	0.0494	0.01	Q	.	.	.	.
22.00	0.0495	0.01	Q	.	.	.	.
22.17	0.0497	0.01	Q	.	.	.	.
22.34	0.0498	0.01	Q	.	.	.	.
22.51	0.0499	0.01	Q	.	.	.	.
22.68	0.0500	0.01	Q	.	.	.	.
22.85	0.0501	0.01	Q	.	.	.	.
23.02	0.0503	0.01	Q	.	.	.	.
23.20	0.0504	0.01	Q	.	.	.	.
23.37	0.0505	0.01	Q	.	.	.	.
23.54	0.0506	0.01	Q	.	.	.	.
23.71	0.0507	0.01	Q	.	.	.	.
23.88	0.0508	0.01	Q	.	.	.	.
24.05	0.0509	0.01	Q	.	.	.	.
24.22	0.0510	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1449.5
10%	20.6
20%	20.6
30%	10.3
40%	10.3
50%	10.3
60%	10.3
70%	10.3
80%	10.3
90%	10.3





VICINITY MAP
NTS

EXISTING CONDITION SUMMARY TABLE

	Q_{10} (CFS)	Q_{25} (CFS)	AREA (ACRES)
TOTAL	2.00	2.44	1.0

LEGEND

- PROPERTY LINE
- HYDROLOGIC FLOWPATH/DIRECTION OF FLOW
- MAJOR/PROJECT BOUNDARY
- MINOR/SUB BOUNDARY
- A1 / 0.33AC — DRAINAGE AREA DESIGNATION
- ACRES
- 11 — HYDROLOGIC NODE
- EL — SURFACE ELEVATION

NOTE: SOIL TYPE C THROUGHOUT PROJECT SITE

REGISTERED PROFESSIONAL ENGINEER
SARAMA A. SLASOR
NO. C63451
Exp. 09/30/18
CIVIL
STATE OF CALIFORNIA

N

20' 0' 10' 20'
SCALE: 1" = 20'

F:\Projects\17431\001\Exhibits\Hydrology Exhibits\Mercury and Berry Existing Hydrology.dwg (5/29/2018 3:47 PM) Plotted by: Dom Pista

811 Know what's below. Call before you dig.

REVISIONS

REV.	DATE	BY	DESCRIPTION	APP'V'D	REV.	DATE	BY	DESCRIPTION	APP'V'D

PREPARED UNDER THE SUPERVISION OF:

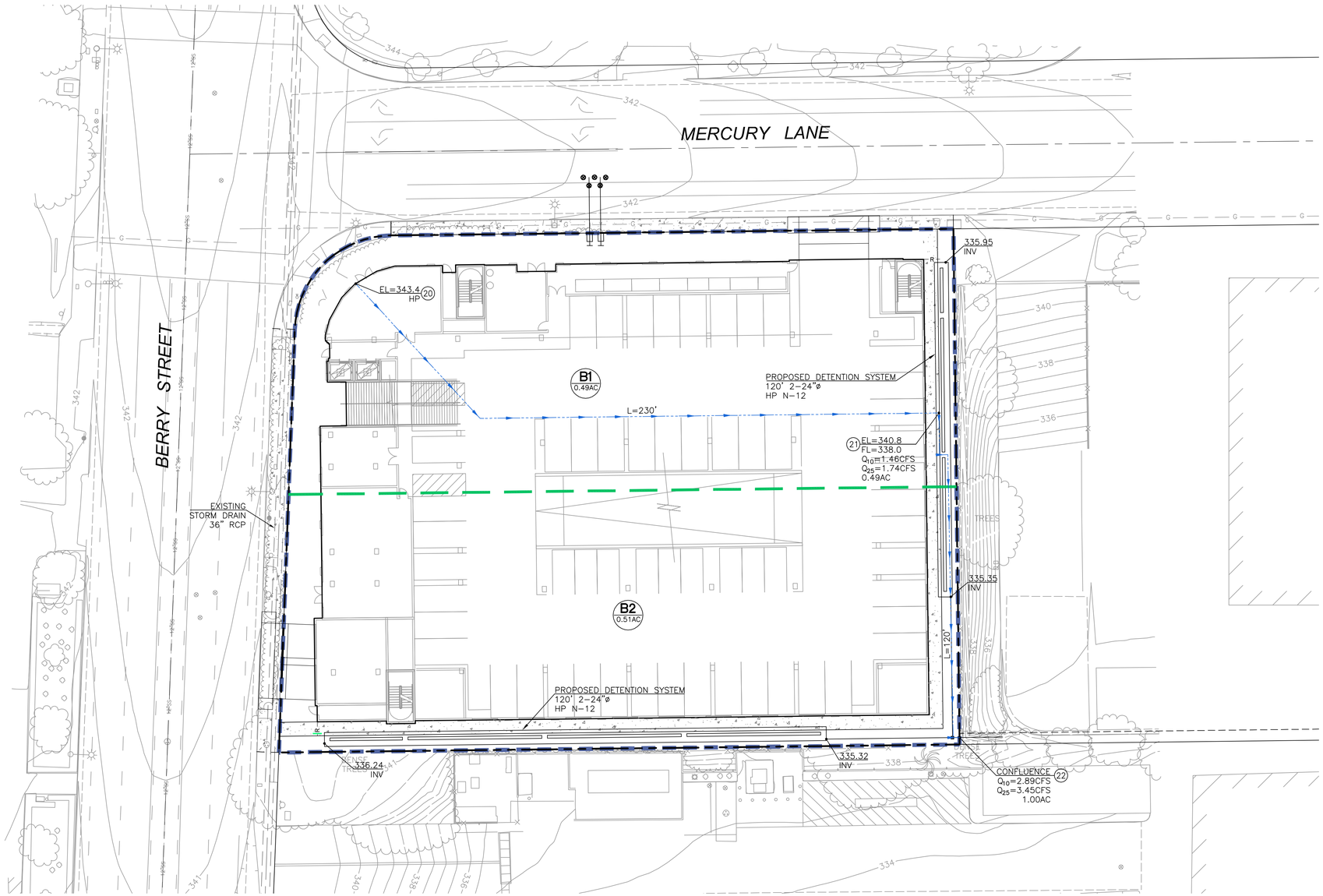
JOHN OLIVIER DATE
R.C.E. NO. 044568

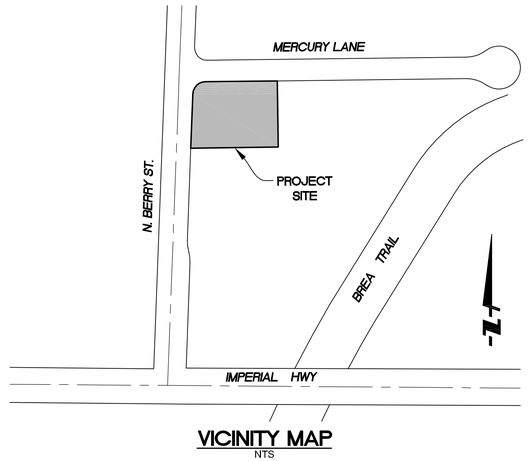
FUSCOE ENGINEERING
16795 Von Karman, Suite 100
Irvine, California 92606
tel 949.474.1960 ◦ fax 949.474.5315
www.fuscoe.com

CITY OF BREA
PUBLIC WORKS DEPARTMENT

MERCURY AND BERRY

SHEET 1 OF 1





VICINITY MAP
NTS

PROPOSED CONDITION SUMMARY TABLE

	Q_{10} (CFS)	Q_{25} (CFS)	AREA (ACRES)
TOTAL	2.89	3.45	1.0

LEGEND

- PROPERTY LINE
- HYDROLOGIC FLOWPATH/DIRECTION OF FLOW
- MAJOR/PROJECT BOUNDARY
- MINOR/SUB BOUNDARY
- A1 / 0.33AC — DRAINAGE AREA DESIGNATION / ACRES
- (21) — HYDROLOGIC NODE
- EL — SURFACE ELEVATION
- FL — FLOWLINE ELEVATION

NOTE: SOIL TYPE C THROUGHOUT PROJECT SITE

REGISTERED PROFESSIONAL ENGINEER — DIANA A. SLASOR — NO. C63451 — Exp. 09/30/18 — CIVIL — STATE OF CALIFORNIA

N

20' 0' 10' 20'

SCALE: 1" = 20'

Know what's below. Call before you dig.

REVISIONS

REV.	DATE	BY	DESCRIPTION	APP'V'D	REV.	DATE	BY	DESCRIPTION	APP'V'D

PREPARED UNDER THE SUPERVISION OF:

JOHN OLIVIER — DATE
R.C.E. NO. 044568

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BREA CALIFORNIA

CITY OF BREA
PUBLIC WORKS DEPARTMENT

MERCURY AND BERRY

PROPOSED HYDROLOGY MAP

SHEET 1 OF 1

APPENDIX H

BREA PROJECT SPECIFIC WQMP SUMMARY REPORT

City of Brea
Project Specific WQMP Summary Report

INSTRUCTIONS: Project applicant, please fill out and check all that apply.

Project Name: Mercury and Berry	Project Address: Mercury Lane and Berry Street
WQMP Application Number (DS or CD): TBD	APN(s): 296-141-05
Watershed: San Gabriel River Watershed	Project Size (Acres): 1.01 ac
New Development or Redevelopment: New Development	Design Capture Volume (ft^3): 2,574 ft^3 Only DMA 1 & 2 require treatment, with a total 80% capture efficiency DCV of 588 ft^3
Land Use Type (check one): ☐ Industrial (SIC Code):_____ ☐ Commercial (SIC Code):_____ ☐ Mixed Use ☒ Residential ☐ Municipal (i.e. CIP) ☐ Other (specify): _____	Total BMP Treatment Capacity (ft^3): 1,960 ft^3
	Hydromodification (Yes/No): Yes
	Owner/Company Name: Manley Fanticola Holdings, LLC
	Owner Address: 330 West Birch Street, Brea CA 92821
	Contact Name: Dwight Manley
	Contact Phone: 714.990.2405
	HOA/POA (Yes/No): No

LID BMP SUMMARY TABLE

Provide an itemized list of each LID BMP for each DMA proposed on the project. Expand table as needed.

LID BMP Description (i.e. HSC-1, BIO-2, include manufacturer and model number if possible)	DMA ID (as noted on BMP Plot Plan)	DMA Acres	DCV (indicate units)	BMP Treatment Capacity (indicate units)	BMP GPS Coordinates
1. BIO-1: Bioretention Planter w/ Underdrain	DMA 1	0.53	367 ft^3	934 ft^3	33.919400, -117.905967
2. BIO-1: Bioretention Planter w/ Underdrain	DMA 2	0.28	221 ft^3	1,028 ft^3	33.919422, -117.906493
3. HSC-2: Impervious Area Dispersion	DMA 3	0.20	N/A	N/A	33.919436, -117.906735
	TOTAL	1.01	588 ft^3	1,960 ft^3	
	Does BMP Capacity Exceed DCV (Y/N)?			Yes	

Non-Structural Source Control BMP's (check all that apply):

- [x] N1 Owner, Tenant, Occupant Education
- [x] N2 Activity Restrictions
- [x] N3 Common Area Landscape Mgmt
- [ ] N4 BMP Maintenance
- [ ] N5 Title 22 CCR Compliance
- [ ] N6 Local Water Quality Permit
- [ ] N7 Spill Contingency Plan
- [ ] N8 Underground Storage Tank
- [ ] N9 Hazardous Materials Disclosure
- [ ] N10 Uniform Fire Code
- [x] N11 Common Area Litter Control
- [x] N12 Employee Training
- [ ] N13 Loading Dock Good Housekeeping
- [ ] N14 Common Area Catch Basin Inspection
- [x] N15 Street Sweeping Private Streets & Parking Lots
- [ ] N16 Retail Gasoline Outlets

Structural Source Control BMP's (check all that apply):

- [ ] S1 Storm Drain System Stenciling/Signage
- [ ] S2 Outdoor Material Storage Areas
- [ ] S3 Trash Storage Areas
- [x] S4 Efficient Irrigation Systems & Landscape Design
- [ ] S5 Protect Slopes & Channels
- [ ] S6 Loading Dock Areas
- [ ] S7 Maintenance Bays
- [ ] S8 Vehicle Wash Areas
- [ ] S9 Outdoor Process Areas
- [ ] S10 Equipment Wash Areas
- [ ] S11 Fueling Areas
- [ ] S12 Hillside Landscaping
- [ ] S13 Wash Water Controls for Food Prep Areas
- [ ] S14 Community Car Wash Racks