



*WATER QUALITY MANAGEMENT PLAN (WQMP)*

# **MOIOLA PARK RESIDENCES**

*FOUNTAIN VALLEY, CA*

*PREPARED FOR  
BROOKFIELD HOMES*

*FUSCOE ENGINEERING, INC.  
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*PROJECT MANAGER  
JOHN OLIVIER, PE*

*DATE PREPARED: JANUARY 17, 2020*

*PROJECT NUMBER: [0380-084-01]*



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*JANUARY 17, 2020*



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*JANUARY 17, 2020*

# **PRELIMINARY WATER QUALITY MANAGEMENT PLAN (WQMP)**

## **MOIOLA PARK RESIDENTIAL**

Finch Avenue, Fountain Valley, CA 92708, County of Orange

Tract No. 19069  
APN: 157-033-15

Prepared for:

BROOKFIELD RESIDENTIAL  
3200 Park Center Drive, Suite 1000  
Costa Mesa, CA 92626  
714.200.1671

Prepared by:

FUSCOE ENGINEERING, INC.  
16795 Von Karman, Suite 100  
Irvine, CA 92618  
949.474.1960  
John Olivier, P.E.

Date Prepared: January 17, 2020

PROJECT OWNER'S CERTIFICATION			
Permit/Application No.:	Pending	Grading Permit No.:	Pending
Tract/Parcel Map and Lot(s)No.:	Tract No. 19069	Building Permit No.:	Pending
Address of Project Site and APN:	Finch Avenue, Fountain Valley, CA 92708 APN: 157-033-15		

This Water Quality Management Plan (WQMP) has been prepared for BROOKFIELD RESIDENTIAL 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.

<b>OWNER:</b>			
<b>Name:</b>	Glen Land		
<b>Title:</b>	VP Land Development		
<b>Company:</b>	Brookfield Residential		
<b>Address:</b>	3200 Park Center Drive, Suite 1000, Costa Mesa, CA 92626		
<b>Email:</b>	<a href="mailto:Glen.Land@brookfieldrp.com">Glen.Land@brookfieldrp.com</a>		
<b>Telephone #:</b>	714.200.1671		
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.			
<b>Owner Signature:</b>		<b>Date:</b>	



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## EXHIBITS & BMP DETAILS (INCLUDED IN SECTION VI)

- Vicinity Map
- Tentative Tract Map
- WQMP Exhibit
- Typical Cross Sections
- BIO-7: Proprietary Biotreatment
- HU-2: Underground Detention
- Bioclean Modular Wetlands System

## EDUCATIONAL MATERIALS (INCLUDED IN APPENDIX C)

- The Ocean Begins at Your Front Door
- Household Tips
- Proper Disposal of Household Hazardous Waste
- Recycle Waste Oil in North OC
- Tips for Landscaping and Gardening
- Tips for Pet Care
- Tips for Residential Pool, Landscape and Hardscape Drains
- Tips for Protecting your Watershed
- DF-1 Drainage System Operation & Maintenance
- R-5 Disposal of Pet Waste
- R-6 Disposal of Green Waste
- R-8 Water Conservation
- SD-10 Site Design & Landscape Planning
- SD-12 Efficient Irrigation

- SD-13 Storm Drain Signage

## 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:	Tract No. 19069 APN: 157-033-15		
WATER QUALITY CONDITIONS OF APPROVAL OR ISSUANCE			
Discretionary Permit(s):	TBD		
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?	N/A – this is the conceptual WQMP		
WATERSHED-BASED PLAN CONDITIONS			
Applicable conditions from watershed - based plans including WIHMPs and TMDLs:	None		

## SECTION II PROJECT DESCRIPTION

### II.1 PROJECT DESCRIPTION

The proposed Moiola Park Residential project site encompasses approximately 13.04 acres in the City of Fountain Valley. The project site is bounded by Finch Avenue to the north, Redwood Street to the west and the Fountain Valley Channel to the south. A Vicinity Map is included in Section VI.

Under existing conditions, the project site is currently occupied by a vacant building that was formerly an elementary school. Adjacent land uses include commercial to the east, residential to the south, residential to the west, and residential, commercial, and a small farm to the north.

The table below summarizes the proposed project.

DESCRIPTION OF PROPOSED PROJECT				
<b>Development Category</b> (Model WQMP, Table 7.11-2; or 7.11-3):	<p>8. All significant redevelopment projects, where significant redevelopment is defined as the addition or replacement of 5,000 or more square feet of impervious surface on an already developed site. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of the facility, or emergency redevelopment activity required to protect public health and safety.</p> <p>If the redevelopment results in the addition or replacement of less than 50 percent of the impervious area on-site and the existing development was not subject to WQMP requirement, the numeric sizing criteria discussed in Section 7.II-2.0 only applies to the addition or replacement area. If the addition or replacement accounts for 50 percent or more of the impervious area, the Project WQMP requirements apply to the entire development.</p>			
<b>Project Area (ft<sup>2</sup>):</b>	566,251.3 ft <sup>2</sup> (13.00 acres)			
<b># of Dwelling Units:</b>	74			
<b>SIC Code:</b>	N/A			
<b>Narrative Project Description:</b>	Under existing conditions, the project site is occupied by a vacant building that was formerly an elementary school. The proposed residential development will include demolishing the existing vacant building and constructing 74 single-family lots, associated residential streets and a 1.02-acre community park.			
<b>Project Area:</b>	<b>Pervious Area</b>	<b>Pervious Area Percentage</b>	<b>Impervious Area</b>	<b>Impervious Area Percentage</b>
<b>Pre-Project Conditions:</b>	8.10 ac	62%	4.90 ac	38%
<b>Post-Project Conditions:</b>	5.71 ac	44%	7.29 ac	56%

DESCRIPTION OF PROPOSED PROJECT	
<b>Drainage Patterns/Connections:</b>	<p>Under existing conditions, the drainage pattern through the site is from north-to-south, and the entire site is tributary to the OCFCD D05 Channel, which is a concrete-lined trapezoidal channel. The conveyance of the channel is from east-to-west along the southerly boundary of the site.</p> <p>There is an existing 36" City of Fountain Valley storm drain that collects drainage from Finch Avenue to the north, conveys it through the site within an easement, and discharges it into the D05 Channel. In addition, the record drawings (as-builts) of the channel also show two 18" connections, to the east of the 36" connections. The 18" inlets are private drains servicing the existing school site, while the 36" inlet is public (City of Fountain Valley). The site drainage currently either discharges into the 36" City storm drain, or into either of the two existing 18" connections, and then into the D05Channel.</p> <p>The proposed development will require realignment of the existing 36" storm drain that runs through the site and currently connects to the channel. The existing 36" channel connection will be abandoned, along with the two 18" private lines; and two new connections into the channel will be proposed.</p>

PROJECT FEATURES	
<b>Building Summary:</b>	The proposed development consists of 74 single family lots with building footprints ranging from 1,772 square feet to 2,908 square feet.
<b>Amenities:</b>	In addition to the single-family lots, the proposed development will include a 1.02-acre community park.
<b>Landscaped Areas:</b>	The proposed development will include a community park of 1.02 acres and landscaped areas adjacent to the proposed street. Additionally, each single-family residential lot will include yards consisting of low water use landscaping.
<b>Parking Facilities:</b>	Each single-family residential lot will include a driveway and garage. Street parking will also be provided along the proposed streets.
<b>Other Project Features:</b>	The property will not include any outdoor trash enclosures, outdoor storage areas, vehicle/community car wash racks, vehicle/equipment wash areas, or commercial kitchens/food preparation areas.
<b>Outdoor Activities:</b>	Outdoor areas throughout the site, including the 1.02-acre park in the northwest corner of the site, will be used for recreational and open space purposes. Each residence will have a private yard. All other outdoor areas will be used for walkways, common areas and landscaping, and other recreational purposes.

PROJECT FEATURES	
<b>Materials Stored:</b>	Materials anticipated to be stored on-site include those associated with residential developments (i.e., cleaning products, storage, etc.); however, no hazardous wastes will be stored on-site. No outdoor storage of materials is anticipated.
<b>Wastes Generated:</b>	The project is not anticipated to generate any wastes other than landscape clippings, typical trash, debris and refuse from the tenants. 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 (December 2013), summarizes the categories of land use or project features of concern and the general pollutant categories associated with them.

ANTICIPATED & POTENTIAL POLLUTANTS GENERATED BY LAND USE TYPE								
Priority Project Categories and/or Project Features	General Pollutant Categories							
	Suspended Solid/ Sediments	Nutrients	Heavy Metals	Pathogens (Bacteria/ Virus)	Pesticides	Oil & Grease	Toxic Organic Compounds	Trash & Debris
Detached Residential Development	E	E	N	E	E	E	N	E
Attached Residential Development	E	E	N	E	E	E <sup>(2)</sup>	N	E
Commercial/Industrial Development	E <sup>(1)</sup>	E <sup>(1)</sup>	E <sup>(5)</sup>	E <sup>(3)</sup>	E <sup>(1)</sup>	E	E	E
Automotive Repair Shops	N	N	E	N	N	E	E	E
Restaurants	E <sup>(1)(2)</sup>	E <sup>(1)</sup>	E <sup>(2)</sup>	E	E <sup>(1)</sup>	E	N	E
Hillside Development >5,000 ft <sup>2</sup>	E	E	N	E	E	E	N	E
Parking Lots	E	E <sup>(1)</sup>	E	E <sup>(4)</sup>	E <sup>(1)</sup>	E	E	E
Streets, Highways, & Freeways	E	E <sup>(1)</sup>	E	E <sup>(4)</sup>	E <sup>(1)</sup>	E	E	E
Retail Gasoline Outlets	N	N	E	N	N	E	E	E

ANTICIPATED & POTENTIAL POLLUTANTS GENERATED BY LAND USE TYPE								
Priority Project Categories and/or Project Features	General Pollutant Categories							
	Suspended Solid/ Sediments	Nutrients	Heavy Metals	Pathogens (Bacteria/ Virus)	Pesticides	Oil & Grease	Toxic Organic Compounds	Trash & Debris
<p>Notes:</p> <p>E = expected to be of concern N = not expected to be of concern</p> <p>(1) Expected pollutant if landscaping exists on-site, otherwise not expected.</p> <p>(2) Expected pollutant if the project includes uncovered parking areas, otherwise not expected.</p> <p>(3) Expected pollutant if land use involves food or animal waste products, otherwise not expected.</p> <p>(4) Bacterial indicators are routinely detected in pavement runoff.</p> <p>(5) Expected if outdoor storage or metal roofs, otherwise not expected.</p> <p>Source: County of Orange. (2013, December 20). Technical Guidance Document for the Preparation of Conceptual/ Preliminary and/or Project Water Quality Management Plans (WQMPs). Table 2.1.</p>								

**Priority Project Categories and/or Features:** Detached 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	
Heavy Metals	N	
Pathogens (Bacteria/Virus)	E	
Pesticides	E	
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 (HCO) 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)**

According to Figure XVI-3a within the Technical Guidance Document, the proposed project falls within an area **not** susceptible to hydromodification impacts. All runoff from the site ultimately drains to the D05 Channel, which is improved and maintained by the Orange County Flood Control District. A copy of Figure XVI-3a is included in Appendix A.

## II.4 POST DEVELOPMENT DRAINAGE CHARACTERISTICS

Under proposed conditions, runoff will surface flow south along the proposed streets, where new on-site storm drains will collect the runoff and connect to the Orange County Flood Control Channel that flows along the southern boundary of the site. The existing 36" City of Fountain Valley storm drain that collects off-site drainage from Finch Avenue to the north of the site will be realigned.

## II.5 PROPERTY OWNERSHIP/MANAGEMENT

PROPERTY OWNERSHIP/MANAGEMENT	
<b>Public Streets:</b>	City of Fountain Valley
<b>Private Streets:</b>	HOA

PROPERTY OWNERSHIP/MANAGEMENT	
<b>Landscaped Areas:</b>	HOA
<b>Easements:</b>	City of Fountain Valley
<b>Parks:</b>	HOA
<b>Buildings:</b>	HOA
<b>Structural BMPs:</b>	HOA

A Home Owners Association (HOA) will be formed upon project completion. The HOA will be responsible for inspecting and maintaining all BMPs prescribed for Moiola Park Residential. Until a HOA is formally established, Brookfield Residential 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

<b>Planning Area/ Community Name:</b>	Moiola Park Residential
<b>Address:</b>	Finch Avenue, Fountain Valley, CA 92708
<b>Project Area Description:</b>	The project is bounded by Finch Avenue to the north, residential homes to the east, commercial buildings to the north and west, and the Orange County Flood Control Channel to the south.
<b>Land Use:</b>	Public Facilities & Open Space and Parks
<b>Zoning:</b>	PI – Public Institution
<b>Acreage:</b>	13.00
<b>Predominant Soil Type:</b>	HSG Type C (see TGD Figure XVI-2a in Appendix A)
<b>Impervious Conditions:</b>	Existing Impervious: 38% (62% Pervious) Proposed Impervious: 56% (44% Pervious)

### III.2 SITE CHARACTERISTICS

<b>Precipitation Zone:</b>	0.75 inches
<b>Topography:</b>	The project site is relatively flat and general drains south towards the Orange County Flood Control Channel (OCFCD D05).
<b>Existing Drainage Patterns/ Connections:</b>	<p>Under existing conditions, the drainage pattern through the site is from north-to-south, and the entire site is tributary to the OCFCD D05 Channel.</p> <p>There is an existing 36" City of Fountain Valley storm drain that collects drainage from Finch Avenue to the north, which is conveyed through the site within an easement and discharged into the D05 Channel. In addition, the record drawings (as-builts) of the channel also show two 18" connections to the east of the 36" connection. The 18" inlets are private drains servicing the existing vacant school site. The site drainage currently either discharges into the 36" City storm drain, or into either of the two existing 18" connections, and then into the D05 Channel.</p>

<b>Proposed Drainage Patterns/ Connections:</b>	<p>Under proposed conditions, the drainage pattern through the site will remain north-to-south, and the entire site will still be tributary to the OCFCD D05 Channel.</p> <p>Runoff will surface flow south along the proposed streets, where new on-site storm drains will collect the runoff and connect to the D05 Channel. The existing 36" City of Fountain Valley storm drain that collects off-site drainage from Finch Avenue to the north of the site will be realigned.</p>
<b>Soil Type, Geology, and Infiltration Properties:</b>	A Custom Soil Resource Report for the project site was created in January, 2020 using the NRCS Web Soil Survey tool. The report shows primarily Bolsa silt loam soils (HSG Type C) on the project site.
<b>Hydrogeologic (Groundwater) Conditions:</b>	The project site is located in an area with shallow groundwater levels, approximately less than 5 feet below ground surface as illustrated in the TGD Figure XVI-2e (see Appendix A).
<b>Geotechnical Conditions (relevant to infiltration):</b>	Due to shallow groundwater at this site, direct infiltration to the subsurface is not recommended. See TGD Figure XVI-2e in Appendix A.
<b>Off-Site Drainage:</b>	Under existing conditions, the project site receives off-site runoff from approximately 6.1 acres to the north of the site via Finch Avenue. This runoff will be intercepted prior to entering the site under proposed conditions, and discharge to a relocated catch basin along Finch Avenue. The runoff will then be conveyed through the site and discharge to the D05 Channel via the relocated 36" City of Fountain Valley drain.
<b>Utility and Infrastructure Information:</b>	There is an existing 36" City of Fountain Valley storm drain located on the project site that conveys drainage from Finch Avenue to the north through the site within an easement to be discharged into the OCFCD D05 Channel. This storm drain will be realigned during this project and will continue to convey drainage from north of the site to the OCFCD D05 Channel. Stormwater from the project site will not comingle with offsite flow in the realigned 36" pipe until after the site flow has been treated by the proposed Modular Wetland Systems.

### III.3 WATERSHED DESCRIPTION

<b>Receiving Waters:</b>	Fountain Valley Channel, Talbert Channel
<b>303(d) Listed Impairments:</b>	<p><u>Fountain Valley Channel</u></p> <ul style="list-style-type: none"> <li>• None</li> </ul> <p><u>Talbert Channel</u></p> <ul style="list-style-type: none"> <li>• Toxicity</li> </ul>
<b>Applicable TMDLs:</b>	None

<b>Pollutants of Concern for the Project:</b>	<ul style="list-style-type: none"><li>• Suspended Solid/Sediments</li><li>• Nutrients</li><li>• Pathogens/Bacteria/Virus</li><li>• Pesticides</li><li>• Oil &amp; Grease</li><li>• Trash and Debris</li></ul>
<b>Hydrologic Conditions of Concern (HCOCs):</b>	None. Refer to Section II/3
<b>Environmentally Sensitive and Special Biological Significant Areas:</b>	There are no Environmentally Sensitive Areas (ESAs) or Areas of Special Biological Significance (ASBS) within the project site or within the project's vicinity.

## 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	
<b>Hydromodification Control Performance Criteria:</b> <b>(Model WQMP Section 7.II-2.4.2.2)</b>	<p>If a hydrologic condition of concern (HCO) exists, priority projects shall implement onsite or regional hydromodification controls such that:</p> <ul style="list-style-type: none"> <li>Post-development runoff volume for the two-year frequency storm does not exceed that of the predevelopment condition by more than five percent, and</li> <li>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.</li> </ul> <p>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 HCOs, the project shall implement on-site or regional hydromodification controls to:</p> <ul style="list-style-type: none"> <li>Retain the excess volume from the two-year runoff event to the MEP, and</li> <li>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.</li> </ul>
<b>LID Performance Criteria:</b> <b>(Model WQMP Section 7.II-2.4.3)</b>	<p>Infiltrate, harvest and use, evapotranspire, or biotreat/biofilter, the 85<sup>th</sup> percentile, 24-hour storm event (Design Capture Volume).</p> <p>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.</p>
<b>Treatment Control BMP Performance Criteria:</b> <b>(Model WQMP Section 7.II-3.2.2)</b>	<p>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.</p>

PROJECT PERFORMANCE CRITERIA	
<b>LID Design Storm Capture Volume:</b>	$DCV = C \times d \times A \times 43560 \text{ sf/ac} \times 1/12 \text{ in/ft}$
	Where:
	$DCV = \text{design storm capture volume, cu-ft}$
	$C = \text{runoff coefficient} = (0.75 \times \text{imp} + 0.15)$
	$\text{Imp} = \text{impervious fraction of drainage area (ranges from 0 to 1)}$
	$d = \text{storm depth (inches)}$
	$A = \text{tributary area (acres)}$
	$\text{Imp} = 0.56$
	$d = 0.75 \text{ inches}$
	$A = 13.00 \text{ acres}$
	$DCV = (0.75 \times 0.56 + 0.15) \times 0.75 \text{ inches} \times 13.00 \text{ ac} \times 43560 \text{ sf/ac} \times 1/12 \text{ in/ft}$
	$= 20,208 \text{ ft}^3$
	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. Landscaping will be provided throughout the site as private yards for each single-family lot and a 1.02-acre community park.

#### Maximize Natural Infiltration Capacity

Infiltration is not recommended for the project site due to proximity to groundwater. Refer to Section IV.3.2 for details.

#### Preserve Existing Drainage Patterns and Time of Concentration

Runoff from the site will continue to flow south towards the Orange County Flood Control Channel, similar to existing conditions. Low flows and first-flush runoff will either be captured and reused to irrigate the community park or will drain to landscaped Modular Wetland Systems for water quality treatment via bio-filtration.

### Disconnect Impervious Areas

Landscaping will be provided adjacent to sidewalks, surrounding the single-family homes as private yards, and as a community park. Low-flows and first-flush runoff will either be captured and reused to irrigate the community park or will drain to landscaped Modular Wetland Systems 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 natural 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 ( $Q_{\text{Design}}$ ) 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.3.3 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 <sup>(1)</sup>	Tributary Drainage Area (ft <sup>2</sup> )	Tributary Drainage Area (ac)	% Imp.	Design Storm Depth <sup>(2)</sup> (in)	Estimated Tc (min)	Rainfall Intensity <sup>(3)</sup> (in/hr)	Simple Method DCV <sup>(4)</sup> (ft <sup>3</sup> )	$Q_{\text{Design}}$ <sup>(5)</sup> (cfs)
DMA A	251,025.5	5.76	49%	0.75	5	0.26	8,143.0	0.778
DMA B	31,521.9	0.72	55%	0.75	5	0.26	1,113.7	0.106
DMA C1	126,601.8	2.91	63%	0.75	5	0.26	4,905.2	0.468
DMA C2	44,625.3	1.02	62%	0.75	5	0.26	1,722.9	0.165
DMA C3	112,505.3	2.58	62%	0.75	5	0.26	4,317.8	0.412



Notes:

1. Refer to exhibits in Section VI for locations of each DMA.
2. Per Figure XVI-1 of the Technical Guidance Document, dated December 20, 2013. See also Appendix A.
3. Per Figure III.4 of the Technical Guidance Document, dated December 20, 2013. 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 4<sup>th</sup> 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	<input type="checkbox"/>
HSC-2	Impervious area dispersion (e.g. roof top disconnection)	<input type="checkbox"/>
HSC-3	Street trees (canopy interception)	<input type="checkbox"/>
HSC-4	Residential rain barrels (not actively managed)	<input type="checkbox"/>
HSC-5	Green roofs/Brown roofs	<input type="checkbox"/>
HSC-6	Blue roofs	<input type="checkbox"/>
HSC-7	Impervious area reduction (e.g. permeable pavers, site design)	<input type="checkbox"/>

HSCs were not incorporated into the project's design at this stage in the project's development. Any HSCs will be accounted for during final design and the cumulative volume of the HSCs will be subtracted from the required treatment volume in the Final WQMP.

### 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	<input type="checkbox"/>
	Rain Gardens	<input type="checkbox"/>
	Porous Landscaping	<input type="checkbox"/>
	Infiltration Planters	<input type="checkbox"/>
	Retention Swales	<input type="checkbox"/>
INF-2	Infiltration Trenches	<input type="checkbox"/>
INF-1	Infiltration Basins	<input type="checkbox"/>
INF-5	Drywells	<input type="checkbox"/>
INF-7	Subsurface Infiltration Galleries	<input type="checkbox"/>
--	French Drains	<input type="checkbox"/>
INF-6	Permeable Asphalt	<input type="checkbox"/>
	Permeable Concrete	<input type="checkbox"/>
	Permeable Concrete Pavers	<input type="checkbox"/>
	Other:	<input type="checkbox"/>

No infiltration BMPs are proposed within the redevelopment project. As discussed in Section III.2, the project site is located within an area with shallow groundwater levels (<5 feet below ground surface, per the TGD Figure XIV-2e). Therefore, direct or concentrated infiltration of runoff is not considered feasible for the project. See also Appendices A and F for further details.

### 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	<input type="checkbox"/>
--	Surface-based infiltration BMPs	<input type="checkbox"/>
--	Biotreatment BMPs, see Section VI.3.4	<input checked="" type="checkbox"/>
	Other:	<input type="checkbox"/>

Proprietary Biotreatment BMPs are proposed, which utilize evapotranspiration as a 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	<input type="checkbox"/>
HU-2	Underground detention	<input checked="" type="checkbox"/>
--	Other:	<input type="checkbox"/>

The feasibility of harvest and reuse for the total site was assessed and found to be infeasible based on the minimum irrigation area required assuming that the landscaping throughout the site would be a blend of high-use turf landscaping and low-use conservation landscaping (see Worksheet J in Appendix A).

The feasibility of harvest and reuse was also assessed for the use of the DCV from DMA B for irrigation of the community park located near the northwest corner of the project site. In order to quantify harvested water demand for the park, the Modified Estimated Applied Water Use (EAWU) method was used, consistent with Appendix X of the Model WQMP's Technical Guidance Document (TGD), dated December 20, 2013.

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:

$$\text{Modified EAWU} = \frac{(ETo_{wet} \times K_L \times LA \times 0.015)}{IE}$$

Where:

*Modified EAWU* = estimated daily average water use during wet season

*ETo<sub>wet</sub>* = average reference ET from November through April (inches per month) per Table X.2 of the TGD

*K<sub>L</sub>* = 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
<b>0.75</b>	<b>610</b>
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 community park located near the northwest corner of the project site. The tributary impervious area is the impervious area in DMA B. The landscaping in the park was assumed to high-use turf landscaping.

ESTIMATED APPLIED WATER USE (EAWU) FOR COMMON AREA LANDSCAPING									
Landscape Type	Total Area (ac)	% Impervious	Impervious Tributary (ac)	Irrigated LS Area (ac)	ET <sub>owet</sub> <sup>(1)</sup> (in/mo)	K <sub>L</sub> <sup>(2)</sup>	Modified EAWU (gpd)	Modified EAWU per impervious acre (gpd/ac)	Minimum Capture Threshold <sup>(3)</sup> (gpd/ac)
Turf	1.02	0%	0.40	1.02	2.93	0.7	1,513.59	3,801.07	610
Design Capture Volume (gal)				8,330	Drawdown (days)				5.5
Notes:									
1 Per Table X.2 for Santa Ana Region (similar climate type), Model WQMP Technical Guidance Document, dated December 20, 2013.									
2 Per Table X.4 of the Model WQMP Technical Guidance Document, dated December 20, 2013.									
3 Per Table X.6 of Model WQMP Technical Guidance Document, dated December 20, 2013.									

As shown above, the community park does have sufficient water demand during the wet season to support harvest and reuse of the DCV from DMA B. The park meets the minimum capture threshold of 610 gallons per day/acre with its Modified EAWU based on irrigation of the proposed turf landscaping. Drawdown of the DCV is anticipated to take approximately 5.5 days by the landscape water demand usage, which is less than the maximum drawdown time of 30 days. Therefore, water reuse is deemed feasible for DMA B.

### Stormwater Reuse Sizing and Design Details

The stormwater harvest and reuse system will consist of one plastic underground cistern (i.e., RainHarvest Systems or similar, to be determined in the Final WQMP) installed in the community park along with an irrigation system and pump to distribute the captured stormwater to the landscaped areas of the park. The stormwater harvest and reuse system will be designed following all public health requirements. The water quality DCV of DMA B (8,330 gallons) has a capture efficiency of approximately 65%. In order to achieve the required 80% capture efficiency to account for subsequent rain events, the cistern capacity will be upsized by a factor of approximately 1.5 to 12,500 gallons.

An important part of harvest and reuse cistern system design is the incorporation of proper pretreatment to remove solids and fines from entering the storm water detention gallery. In order to provide filtration, a pre-treatment BMP (i.e., a vegetated swale) will be located upstream of the proposed cistern in the park. The treatment level will be consistent with the treatment standards required in the Technical Guidance Document for removal of pollutants prior to discharge into the storm water detention system.

Low flows from DMA B will be pretreated and diverted into the park cistern, while high flows beyond the DCV of 8,330 gallons will bypass treatment and enter the realigned 36" City of Fountain Valley storm drain to be conveyed to the Orange County Flood Control Channel that runs along the southern boundary of the site. Refer to the Harvest & Reuse Irrigation Demand Calculations in Appendix A for further information and calculations of the DCV and the multiplier needed to meet the 80% capture efficiency.

#### 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	<input type="checkbox"/>
	Storm Water planter boxes with underdrains	<input type="checkbox"/>
	Rain gardens with underdrains	<input type="checkbox"/>
BIO-5	Constructed wetlands	<input type="checkbox"/>
BIO-2	Vegetated swales	<input type="checkbox"/>
BIO-3	Vegetated filter strips	<input type="checkbox"/>
BIO-7	Proprietary vegetated biotreatment systems	<input checked="" type="checkbox"/>
BIO-4	Wet extended detention basin	<input type="checkbox"/>
BIO-6	Dry extended detention basins	<input type="checkbox"/>
--	Other:	<input type="checkbox"/>

#### Modular Wetland Systems

Modular Wetlands by Modular Wetlands Systems, Inc. are proprietary biotreatment systems that utilize multi-stage treatment processes including screening media filtration, settling, and biofiltration. The pre-treatment chamber contains the first three stages of treatment, and includes a catch basin inlet filter to capture trash, debris, gross solids and sediments, a settling chamber for separating out larger solids, and a media filter cartridge for capturing fine TSS, metals, nutrients, and bacteria. Runoff then flows through the wetland chamber where treatment is achieved through a variety of physical, chemical, and biological processes. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded and sequestered by the soil and plants, functioning similar to bioretention systems. The discharge chamber at the end of the unit collects treated flows and discharges back into the storm drain system.

Five Modular Wetland Systems will be installed within DMAs A, C1, C2 and C3. Runoff from these areas will drain towards proposed catch basins that will intercept flows into the MWS unit, where low flows will be treated. Treated runoff will then flow through a proposed pipe connecting to the proposed and realigned public storm drain lines while all high flows will bypass treatment in the MWS units and flow directly into the public storm drains.

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). Since Modular Wetlands are sized based on flow rate, they were sized utilizing the methodology for flow based BMPs (TGD Section III.1.2 and Worksheet D). Locations and tributary drainage areas are shown on the WQMP Exhibit included in Section VI. BMP details are also included in Section VI. Detailed calculations and associated TGD Worksheets are included in Appendix A. Operation and maintenance details are included in Section V and Appendix D (O&M Plan).

MODULAR WETLAND SYSTEM DESIGN SUMMARY							
DMA ID <sup>(1)</sup>	Area (ac)	% Imp.	2-Year Tc (min)	Rainfall Intensity (in/hr)	Q <sub>Design</sub> <sup>(3)</sup> (cfs)	Size/Model <sup>(4)</sup>	Combined Treatment Capacity (cfs)
DMA A	5.76	49%	5	0.26	0.778	MWS-L-8-16 MWS-L-8-12	0.808
DMA C1	2.91	63%	5	0.26	0.468	MWS-L-4-19 MWS-L-4-19	0.474
DMA C2	1.02	62%	5	0.26	0.165	MWS-L-4-15	0.175
DMA C3	2.58	62%	5	0.26	0.412	MWS-L-8-16	0.462
Notes: (1) See also Section IV.2.2. (2) Refer to WQMP Exhibit in Section VI for locations of each drainage area and BMP. (3) Detailed calculations and worksheets are included in Appendix A. (4) Unit details and specifications are included in Section VI. (5) Treatment capacities of each unit are based on wetland media design loading rate (controlled by downstream orifice) and perimeter surface area of wetland media provided. Individual unit sizing calculations provided by the manufacturer are included on each cut sheet/detail included in Section VI.							

### IV.3.5 Hydromodification Control BMPs

HYDROMODIFICATION CONTROLS	
BMP Name	BMP Description
N/A	N/A

Not applicable. Refer to Section II.3 for further information.

### IV.3.6 Regional/Sub-Regional LID BMPs

Not applicable. LID BMPs (HU-2: Harvest and Reuse Underground Detention & BIO-7: Proprietary Vegetated Biotreatment Systems) 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	<input type="checkbox"/>
TRT-2	Cartridge Media Filter	<input type="checkbox"/>
PRE-1	Hydrodynamic Separation Device	<input type="checkbox"/>
PRE-2	Catch Basin Insert	<input type="checkbox"/>
	Other:	<input type="checkbox"/>

Not applicable. LID BMPs (HU-2: Harvest and Reuse Underground Detention & BIO-7: Proprietary Vegetated Biotreatment Systems) 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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N2	Activity Restrictions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N3	Common Area Landscape Management	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N4	BMP Maintenance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N5	Title 22 CCR Compliance (How development will comply)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No hazardous materials
N6	Local Water Quality Permit Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The City of Fountain Valley does not issue water quality permits.
N7	Spill Contingency Plan	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No hazardous materials



NON-STRUCTURAL SOURCE CONTROL BMPs				
ID	Name	Included?	Not Applicable?	If Not Applicable, Provide Brief Reason
N8	Underground Storage Tank Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No underground storage tanks are proposed
N9	Hazardous Materials Disclosure Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Hazardous materials will not be stored on-site
N10	Uniform Fire Code Implementation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No hazardous materials
N11	Common Area Litter Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N12	Employee Training	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N13	Housekeeping of Loading Docks	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No loading docks are proposed
N14	Common Area Catch Basin Inspection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N15	Street Sweeping Private Streets and Parking Lots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N16	Retail Gasoline Outlets	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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 (<http://www.cabmphandbooks.com/>).

### **N2, Activity Restrictions**

The HOA 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 HOA 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 HOA 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 HOA 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 HOA 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.

#### **N14, Common Area Catch Basin Inspection**

All on-site catch basin inlets and drainage facilities shall be inspected and maintained by the HOA at least once a year, prior to the rainy season, no later than October 1st of each year.

#### **N15, Street Sweeping Private Streets and Parking Lots**

The HOA shall be responsible for sweeping all on-site streets within the project on a monthly 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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
S2 SD-34	Design and construct outdoor material storage areas to reduce pollution introduction	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No outdoor storage areas are proposed
S3 SD-32	Design and construct trash and waste storage areas to reduce pollution introduction	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No outdoor trash storage areas are proposed

STRUCTURAL SOURCE CONTROL BMPs				
ID	Name	Included?	Not Applicable?	If Not Applicable, Provide Brief Reason
S4 SD-12	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
S5	Protect slopes and channels and provide energy dissipation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	There are no slopes or channels on the project site
S6 SD-31	Properly Design: Dock areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No loading docks are proposed
S7 SD-31	Properly Design: Maintenance bays	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No maintenance bays are proposed
S8 SD-33	Properly Design: Vehicle wash areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No vehicle wash areas are proposed
S9 SD-36	Properly Design: Outdoor processing areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No outdoor processing areas are proposed
S10	Properly Design: Equipment wash areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No equipment wash areas are proposed
S11 SD-30	Properly Design: Fueling areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No fueling areas are proposed
S12 SD-10	Properly Design: Hillside landscaping	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The project is not located in a hillside area
S13	Properly Design: Wash water control for food preparation areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No food preparation areas are proposed
S14	Properly Design: Community car wash racks	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No community car wash racks are proposed

**S1/SD-13, Provide storm drain system stenciling and signage**

The phrase "NO DUMPING! DRAINS TO OCEAN", or an equally effective phrase approved by the City, will be stenciled on all major storm drain inlets within the project site to alert the public to the destination of pollutants discharged into storm water. Stencils shall be in place prior to release of certificate of occupancy. Stencils shall be inspected for legibility on an annual basis and re-stenciled as necessary.

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

The HOA 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 HOA 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.	<input type="checkbox"/>
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.	<input type="checkbox"/>
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)	<input type="checkbox"/>
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).	<input type="checkbox"/>
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	<input type="checkbox"/>
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).	<input type="checkbox"/>
Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.	<input type="checkbox"/>
Developments in a city center area.	<input type="checkbox"/>

WATER QUALITY CREDITS	
Credit	Applicable?
Developments in historic districts or historic preservation areas.	<input type="checkbox"/>
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.	<input type="checkbox"/>
In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.	<input type="checkbox"/>

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 (HU-2: Harvest and Reuse Underground Detention & BIO-7: Proprietary Vegetated Biotreatment Systems) 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 Brookfield Residential shall assume all BMP inspection and maintenance responsibilities for the Moiola Park Residential project.

<b>Contact Name:</b>	Glen Land
<b>Title:</b>	VP Land Development
<b>Company:</b>	Brookfield Residential
<b>Address:</b>	3200 Park Center Drive, Suite 1000, Costa Mesa, CA 92626
<b>Phone:</b>	714.200.1671
<b>Email:</b>	<a href="mailto:Glen.Land@brookfieldrp.com">Glen.Land@brookfieldrp.com</a>

Should the maintenance responsibility be transferred at any time during the operational life of Moiola Park Residential, such as when an HOA or POA is formed for a project, a formal notice of transfer shall be submitted to the City of Fountain Valley 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 HOA 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 Fountain Valley 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 HOA 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 shall be funded through fees paid into the HOA. Brookfield Residential, which will set up the HOA, shall oversee that adequate funding for BMP maintenance is included within the HOA fee structure, including annual maintenance fees and long-term maintenance reserve funds.

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
<b>HARVEST &amp; USE BMPs</b>				
HU-2	Harvest and Reuse Cistern	Inspect system via the maintenance port for drawdown after major rain events and at least semi-annually, once prior to the rainy season and once after the rainy season. Should drawdown times get significantly reduced due to sediment buildup, flush system by injecting high pressure water via the maintenance port and remove sediment laden water via sump pump.	2x per year inspections  Cleanout annually (min.)	Brookfield Residential/HOA
<b>BIOTREATMENT BMPs</b>				

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
BIO-7	Modular Wetland Systems	<p>The system shall be maintained per manufacturer's specifications. The system shall be inspected at a minimum once every six months, prior to the start of the rainy season (October 1) each year, and after major storm events.</p> <p>Typical Maintenance includes:</p> <ul style="list-style-type: none"> <li>• Removing trash and debris from the catch basin screening filter (by hand)</li> <li>• Removal of sediment and solids in the settlement chamber (vacuum truck)</li> <li>• Replacement of the filter cartridge</li> <li>• Replacement of the drain down filter (if equipped)</li> </ul> <p>In addition, plants within the wetland chamber will require trimming as needed in conjunction with routine landscape maintenance activities. No fertilizer shall be used in this chamber. The wetland chamber should be inspected during rain events to verify flow through the system. If little to no flow is observed from the lower valve or orifice plate, the wetland media may require replacement. If prior treatment stages are properly maintained, the life of the wetland media can be up to 20 year.</p>	2x per year	Brookfield Residential/HOA
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 annually. Materials to be distributed are found in Appendix C. Tenants will be provided these materials by the Owner prior to occupancy and periodically thereafter.	Annually	Brookfield Residential/HOA
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	Brookfield Residential/HOA
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) as well as local requirements. 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 drain inlets.	Monthly	Brookfield Residential/HOA

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 (Appendix D). Records of inspections and BMP maintenance shall be kept by the Owner and shall be available for review upon request.	Ongoing	Brookfield Residential/HOA
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	Brookfield Residential/HOA
N12	Employee Training	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.	Annually	Brookfield Residential/HOA
N13	Housekeeping of Loading Docks	Not Applicable		

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
N14	Common Area Catch Basin Inspection	Catch basin inlets and other drainage facilities shall be inspected after each storm event and once per year. Inlets and other facilities shall be cleaned prior to the rainy season, by October 1 each year.	Annually	Brookfield Residential/HOA
N15	Street Sweeping Private Streets and Parking Lots	Drive aisles & parking areas must be swept monthly, including prior to the start of the rainy season (October 1).	Monthly	Brookfield Residential/HOA
N16	Retail Gasoline Outlets	Not Applicable		
STRUCTURAL SOURCE CONTROL BMPs				
S1 SD-13	Provide storm drain system stenciling and signage	Storm drain stencils shall be inspected for legibility, at minimum, once prior to the storm season, no later than October 1 each year. Those determined to be illegible will be re-stenciled as soon as possible.	Annually	Brookfield Residential/HOA
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		

**BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX**

	<b>BMP</b>	<b>Inspection/Maintenance Activities</b>	<b>Minimum Frequency</b>	<b>Responsible Party</b>
S4 SD-12	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	In conjunction with routine maintenance activities, verify that landscape design continues to function properly by adjusting properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather, and day or night time 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	Brookfield Residential/HOA
S5	Protect slopes and channels and provide energy dissipation	Not Applicable		
S6 SD-31	Properly Design: Dock areas	Not Applicable		
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		

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
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.

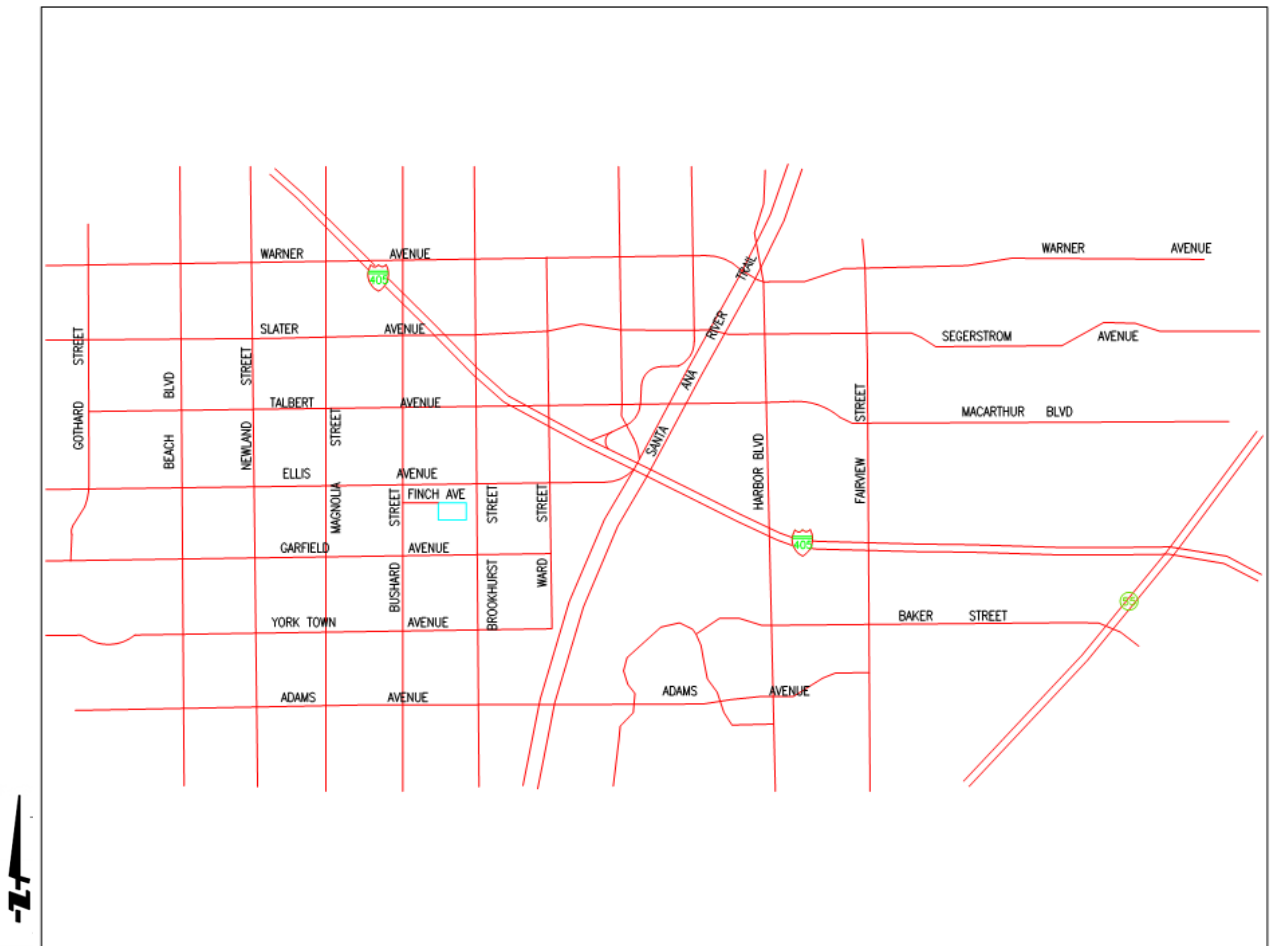
### EXHIBITS

- Vicinity Map
- Tentative Tract Map
- WQMP Exhibit

### BMP DETAILS & FACT SHEETS

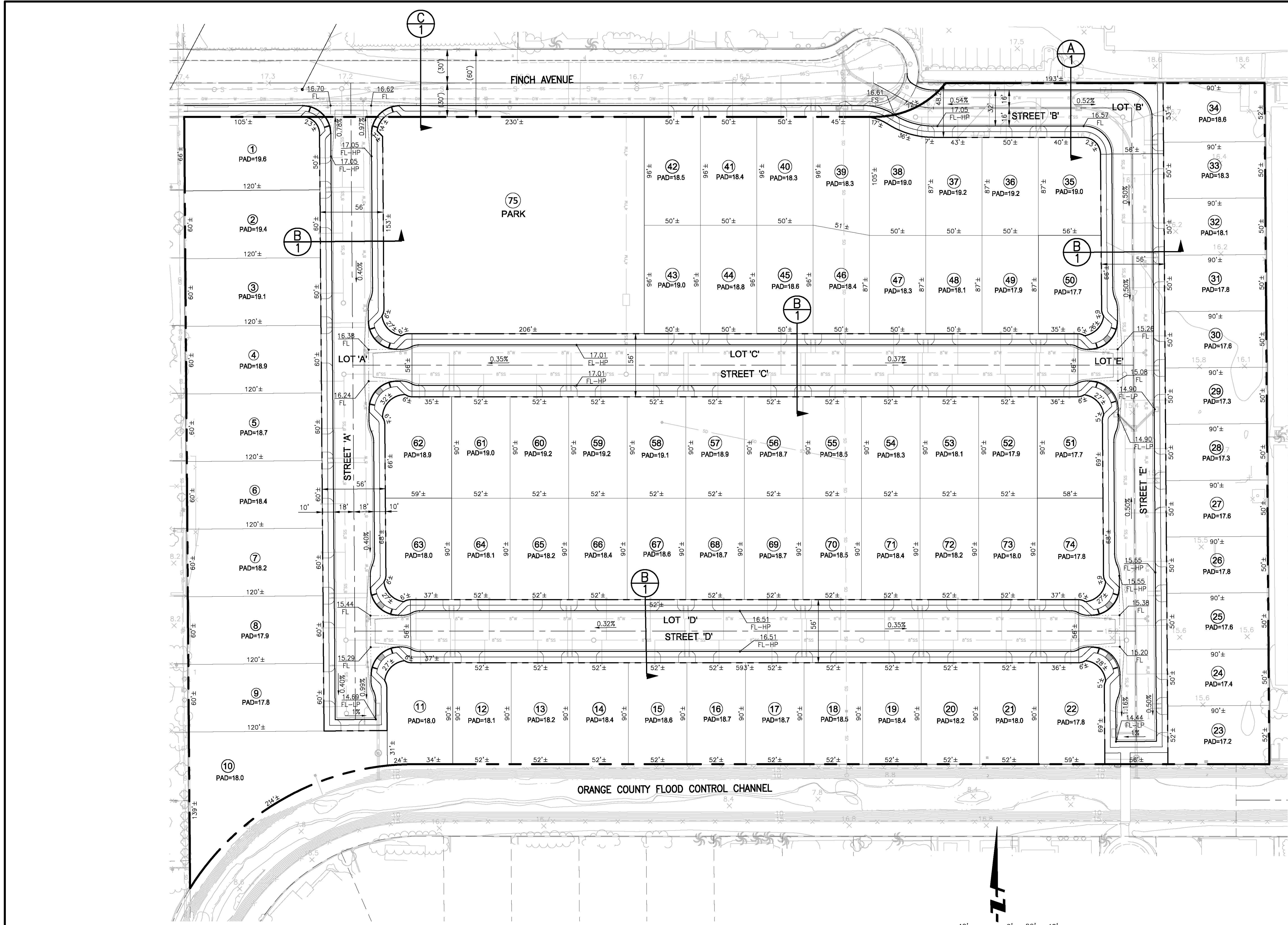
- Typical Cross Sections
- BIO-7: Proprietary Biotreatment
- HU-2: Underground Detention
- Bioclean Modular Wetlands System

## VICINITY MAP



N.T.S.





NON-RESIDENTIAL LOT SUMMARY		
LOT	AREA SF	AREA AC.
LOT 'A'	33,126 SF	0.76 AC.
LOT 'C'	33,101 SF	0.76 AC.
LOT 'E'	32,842 SF	0.75 AC.
LOT 'B'	11,569 SF	0.27 AC.
LOT 'D'	33,193 SF	0.76 AC.
PARK	44,530 SF	1.02 AC.
TOTAL	188,362 SF	4.32 AC

RESIDENTIAL LOT SUMMARY		
LOT NO.	SQ. FT.	ACRES
1	7779	0.18
2	7200	0.17
3	7200	0.17
4	7200	0.17
5	7200	0.17
6	7200	0.17
7	7200	0.17
8	7200	0.17
9	7200	0.17
10	11618	0.27
11	5243	0.12
12	4680	0.11
13	4680	0.11
14	4680	0.11
15	4680	0.11
16	4680	0.11
17	4680	0.11
18	4680	0.11
19	4680	0.11
20	4680	0.11
21	4680	0.11
22	5259	0.12
23	4673	0.11
24	4500	0.10
25	4500	0.10
26	4500	0.10
27	4500	0.10
28	4500	0.10
29	4500	0.10
30	4500	0.10
31	4500	0.10
32	4500	0.10
33	4500	0.10
34	4709	0.11
35	4768	0.11
36	4350	0.10
37	4351	0.10

38	4755	0.11
39	5035	0.12
40	4810	0.11
41	4810	0.11
42	4810	0.11
43	4800	0.11
44	4800	0.11
45	4800	0.11
46	4575	0.11
47	4350	0.10
48	4350	0.10
49	4350	0.10
50	4852	0.11
51	5191	0.12
52	4680	0.11
53	4680	0.11
54	4680	0.11
55	4680	0.11
56	4680	0.11
57	4680	0.11
58	4680	0.11
59	4680	0.11
60	4680	0.11
61	4680	0.11
62	5313	0.12
63	5242	0.12
64	4680	0.11
65	4680	0.11
66	4680	0.11
67	4680	0.11
68	4680	0.11
69	4680	0.11
70	4680	0.11
71	4680	0.11
72	4680	0.11
73	4680	0.11
74	5263	0.12
TOTAL	377855	8.67

LEGEND

- TRACT BOUNDARY
- PROPOSED LOT LINE
- EXISTING LOT LINE
- PROPOSED R/W
- ACCESSIBLE PATH
- EASEMENTS
- GRADING CONTOUR
- LOT NUMBER

NO.	DATE	REVISIONS	APP'D

VESTING TENTATIVE TRACT MAP NO. 19069



PREPARED BY:  
**FUSCOE ENGINEERING**  
16795 Van Korman, Suite 100  
Irvine, California 92606  
tel 949.474.1960 fax 949.474.5315  
www.fuscoec.com

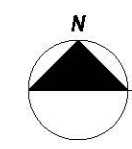
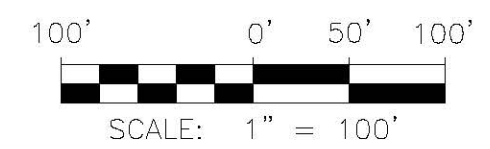
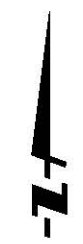
DEVELOPER:  
**Brookfield Residential**  
DATE: January 20, 2020





# LEGEND

- PROPERTY LINE
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN TO BE REMOVED
- PROPOSED STORM AREA DRAIN
- BMP DRAINAGE AREA BOUNDARY
- PROPOSED COMMON AREA LANDSCAPING
- PROPOSED BUILDING
- STREET SWEEPING PRIVATE STREETS & PARKING LOTS
- CATCH BASIN STENCILING & MAINTENANCE
- PROPOSED MODULAR WETLAND SYSTEM (BIO-7)
- PROPOSED HARVEST AND REUSE CISTERN (HU-2)
- DIRECTION OF FLOW
- IRRIGATION PUMP SYSTEM
- DRAINAGE MANAGEMENT AREA AND ACREAGE



Scale: 1" = 80'  
Exhibit Date: 00/00/2016

## WATER QUALITY MANAGEMENT PLAN MOIOLA PARK RESIDENTIAL FOUNTAIN VALLEY, CA

MODULAR WETLAND SYSTEM DESIGN SUMMARY

DMA	DRAINAGE AREA	IMPERVIOUSNESS	Q DESIGN	SIZE / MODEL	COMBINED TREATMENT CAPACITY	GPS COORDINATES
DMA A	5.76 AC	49%	0.778 CFS	MWS-L-8-16; MWS-L-8-12	0.808 CFS	33.690589, -117.956494
DMA C1	2.91 AC	63%	0.468 CFS	MWS-L-4-19; MWS-L-4-19	0.474 CFS	33.69135, -117.955822
DMA C2	1.02 AC	62%	0.165 CFS	MWS-L-4-15	0.175 CFS	33.691364, -117.955597
DMA C3	2.58 AC	62%	0.412 CFS	MWS-L-8-16	0.462 CFS	33.690608, -117.955800

UNDERGROUND GALLERY FOR HARVERST & REUSE PARK IRRIGATION

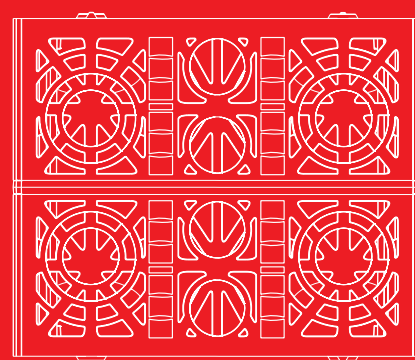
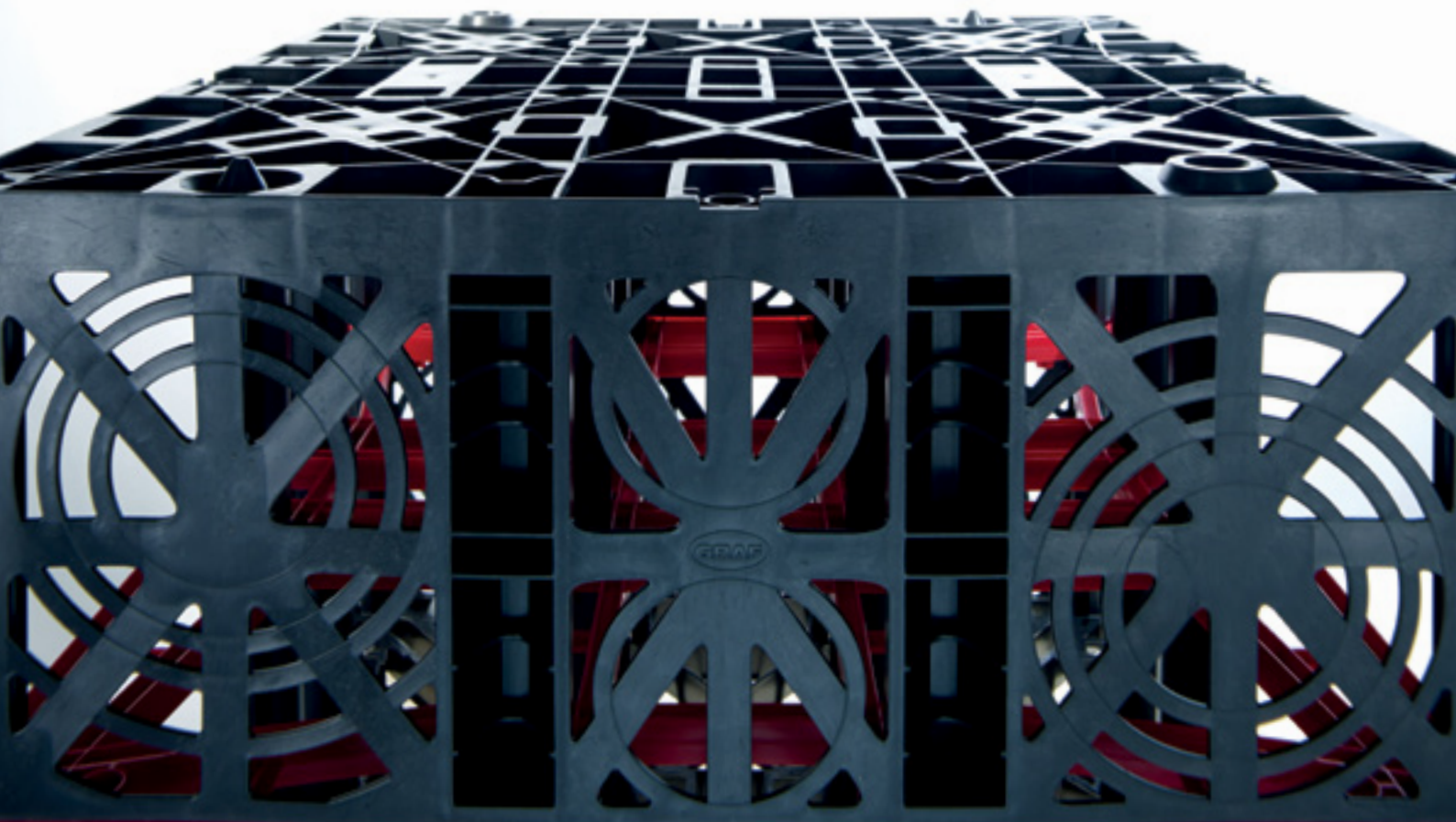
DMA	DRAINAGE AREA	IMPERVIOUSNESS	DCV	DCV REQUIRED TO MEET 80% CAPTURE EFFICIENCY	MODULAR STORAGE WIDTH	MODULAR STORAGE LENGTH	TOTAL MODULAR STORAGE CAPACITY	GPS COORDINATES
DMA B	0.724 AC	55%	8,330 GAL	12,500 GAL	35 FT	42 FT	12,525 GAL	33.692069, -117.957461





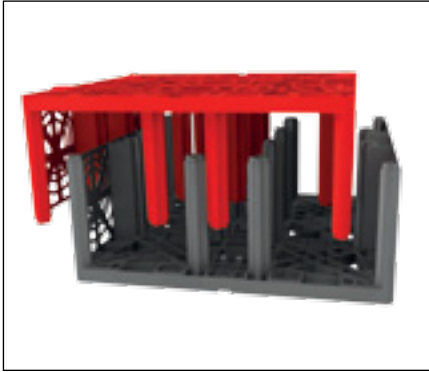
# GRAF EcoBloc Inspect flex

## Stormwater management and Rainwater storage



# GRAF EcoBloc Inspect flex

The third generation of GRAF infiltration and attenuation system



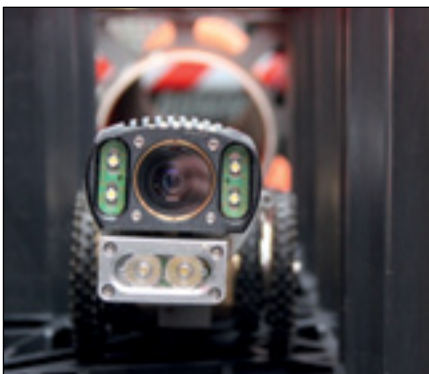
## Twice the volume per truck

To save space during transport, two EcoBloc Inspect flex modules are stacked one inside the other. This halves transport costs and CO<sub>2</sub> emissions.



## Easy to install

GRAF EcoBloc Inspect flex modules are easy to transport and install. The modular system structure requires few accessories.



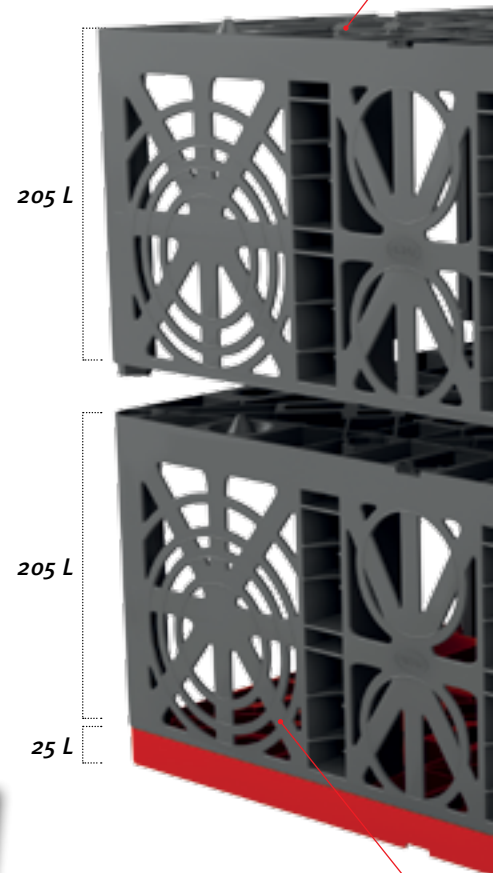
## Easy to inspect

The standard inspection channel allows the entire percolation system to be effectively monitored. The ability of the EcoBloc Inspect system allow access by inspection cameras that are commonly found on the market. This has been confirmed, by several independent testing authorities.



## Can be cleaned by high pressure jetting

GRAF EcoBloc Inspect system can be easily cleaned by high pressure jetting.



### Highly flexible

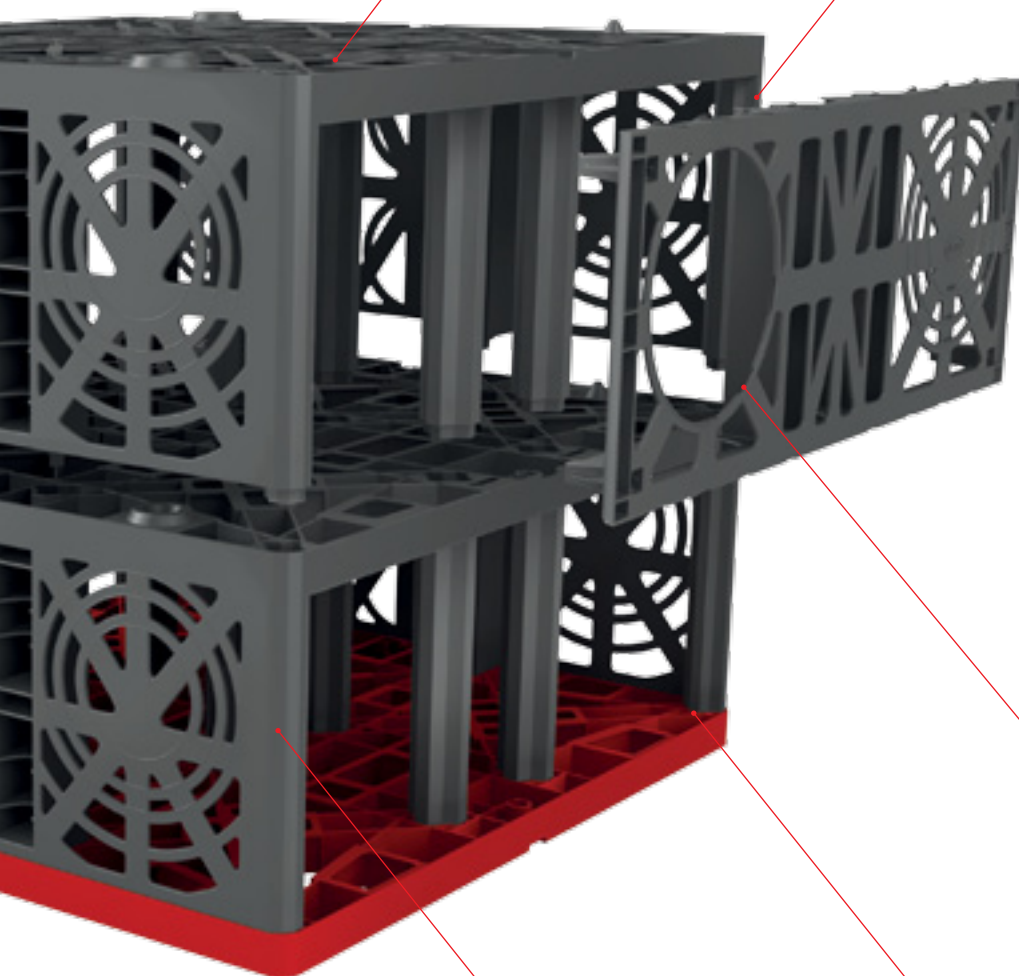
Each EcoBloc Inspect flex module has a volume of 205 l, a area of 800 x 800 mm and a height of 320 mm. The system size and load-bearing can be adjusted individually to suit requirements of traffic and of non-traffic area.

### Lorry-bearing

The GRAF EcoBloc Inspect has a heavy-duty lorry-bearing capacity of 60 tons with a 800 mm earth covering.

### Installation depth of up to 5 metres

Even under very heavy loads, GRAF EcoBloc Inspect system can be installed at a depth of up to 5 metres. This means that up to 14 layers are possible.



### Connection up to DN 200

Large percolation volumes require large pipe cross-sections. This isn't a problem for GRAF EcoBloc Inspect: it has DN 100, 150 and 200 connections on all sides. DN 100 connections are positioned eccentrically at the side for complete deaeration.

### Designed for decades of use

A durable product design ensures sustainability. Built to offer double safety, the GRAF EcoBloc Inspect is designed for a **service life of over 50 years.**

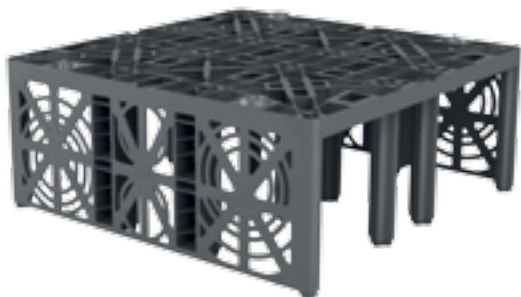
### Universal use

For rainwater infiltration, retention or rainwater harvesting

### High percolation rate

The GRAF EcoBloc Inspect system is designed to have high rate of percolation and barrier-free inspection.

# The system at a glance

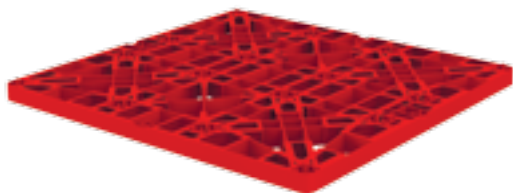


## GRAF EcoBloc Inspect flex

For large storage volumes  
DN 100/150/200 connecting faces

Volume [litres]	Length [mm]	Width [mm]	Height [mm]	Weight [kg]	Colour	Order no.
205	800	800	320	8	grey	402005

 **Webcode** G4105

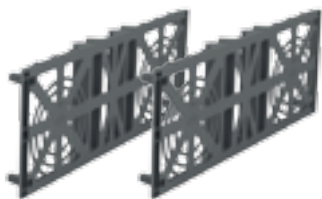


## GRAF EcoBloc Inspect baseplate

Forms the foundation of the EcoBloc Inspect flex system

Volume [litres]	Length [mm]	Width [mm]	Height [mm]	Weight [kg]	Colour	Order no.
25	800	800	40	4	grey	402006

 **Webcode** G4106



## GRAF EcoBloc Inspect end plates

The front ends of an EcoBloc Inspect flex system are sealed with end plates  
DN 100/150/200 contact surfaces

Item	Colour	Order no.
EcoBloc Inspect end plates (Set 2 units)	grey	402002

## EcoBloc Inspect accessories

### EcoBloc Inspect connectors

For horizontal connection



Order no. 402010	Set 4 units
Order no. 402015	Set 10 units
Order no. 402018	Set 25 units
Order no. 402020	Set 50 units
Order no. 402025	Set 200 units

### Deaeration end

DN 100

Order no. 369017



### GRAF-Tex geotextile

For an EcoBloc Inspect,  
size of 2.50 x 2.50 m

Order no. 231006

Sold by the metre, roll width 5 m

Order no. 231002





# Flexible, stackable, easy assembly

Benefits of the EcoBloc Inspect System



**DOUBLE STORAGE  
VOLUME PER TRUCK**

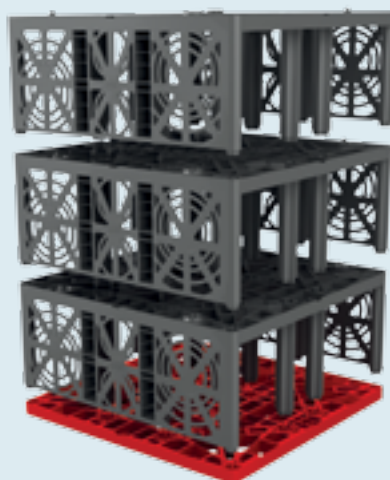


## 1. Stackable



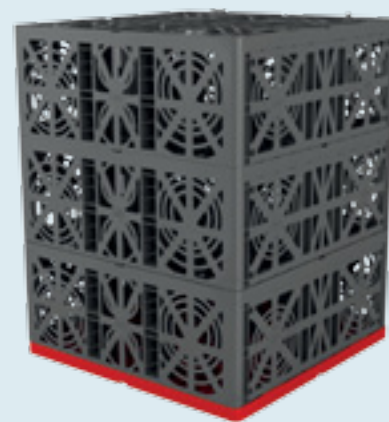
To save space during transport, two EcoBloc Inspect flex modules are stacked one inside the other. This halves transport costs and CO<sub>2</sub> emissions.

## 2. Easy assembly



The EcoBloc Inspect ground plate forms the foundations of the system. Up to 14 EcoBloc Inspect flex modules with a storage volume of 195 litres each can be fitted on one ground plate. The front ends are sealed with EcoBloc Inspect end plates.

## 3. Ready



The EcoBloc Inspect flex system can now be adjusted individually to suit the requirements and can be connected to DN 100, 150 or 200 pipes.



# Benefits and application

**CAN HOLD 3 TIMES THE VOLUME OF  
A CONVENTIONAL GRAVEL DITCH**



## High storage volume

GRAF percolation modules have three times the storage volume of a standard gravel infiltration ditch. One module therefore takes the place of around 1300 kg of gravel or a 50 m drainage pipe.

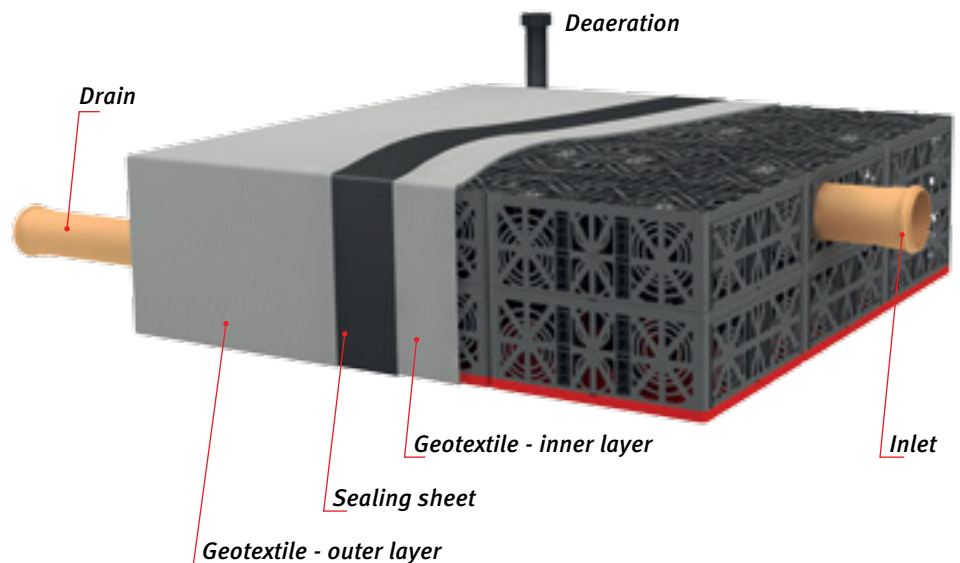
Since you don't have to excavate so much soil and enjoy great value for money compared with a standard gravel infiltration ditch, the GRAF modules save you hard-earned cash!

## Easy to install

The modules are fitted simply, at speed and in various ways. They can be installed without heavy machinery – one EcoBloc Inspect flex module weighs just 8 kg.

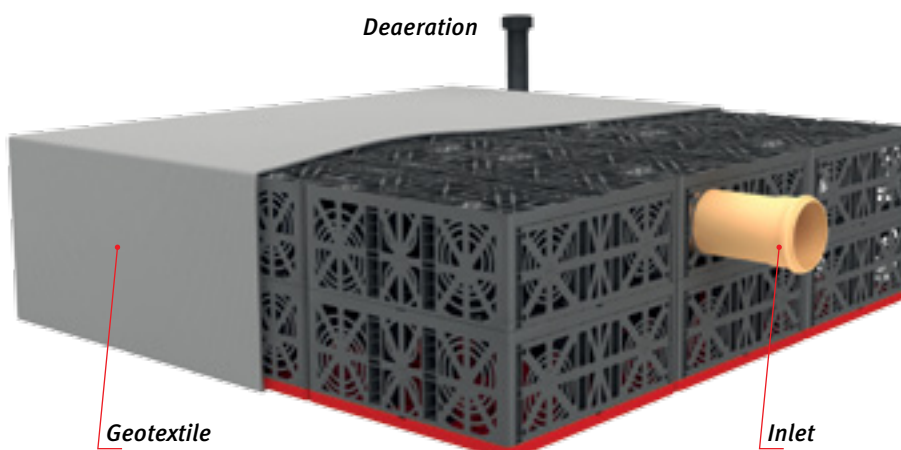
## Rain retention

The controlled discharge of rainwater is increasingly important during heavy rain. The GRAF EcoBloc Inspect is also surrounded by a sealing sheet, which prevents water from escaping from the system unchecked. Restricted drainage allows the water to be discharged into the sewage system in a controlled manner.



## Rainwater percolation

Local percolation of rainwater is gaining in importance. As we cover over more and more ground with concrete, we are interrupting the natural water cycle. The GRAF EcoBloc Inspect combines environmental management of rainwater with the opportunity to protect against flooding. It stores rainwater and gradually releases it back into groundwater reserves.





# Technical data

## Load-bearing capacity and dimensions



### Installation window

EcoBloc Inspect flex	Without traffic load	Vehicle	Lorry 12	Lorry 30	Lorry 40	Lorry 60
min. earth covering	250 mm	250 mm	500 mm	500 mm	500 mm	800 mm
max. earth covering	2750 mm	2750 mm	2750 mm	2500 mm	2250 mm	2000 mm
max. installation depth	5000 mm	5000 mm	5000 mm	5000 mm	5000 mm	5000 mm
max. number of layers	14	14	13	13	13	13

#### Technical data for EcoBloc Inspect flex

Weight	8 kg
Gross volume	205 L
Net volume	195 L
Storage coefficient	96%

#### Technical data for EcoBloc Inspect baseplate

Weight	4 kg
Gross volume	25 L
Net volume	20 L
Storage coefficient	95%



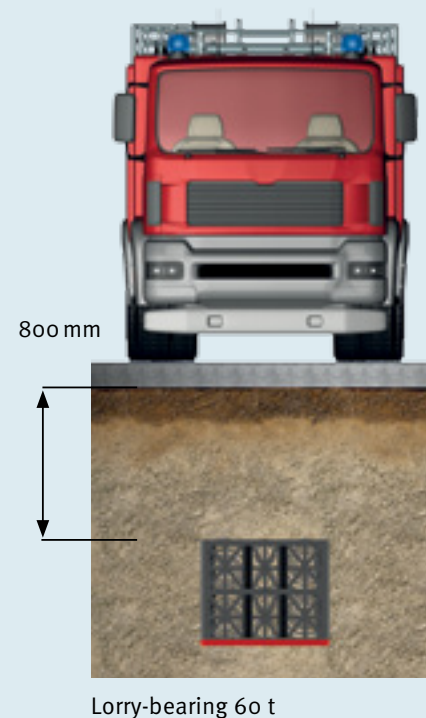
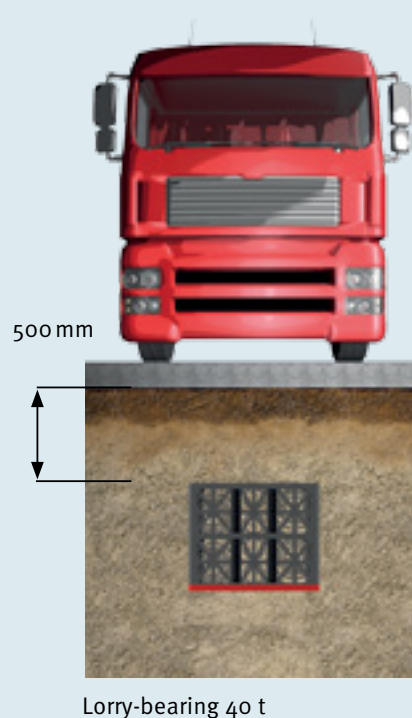
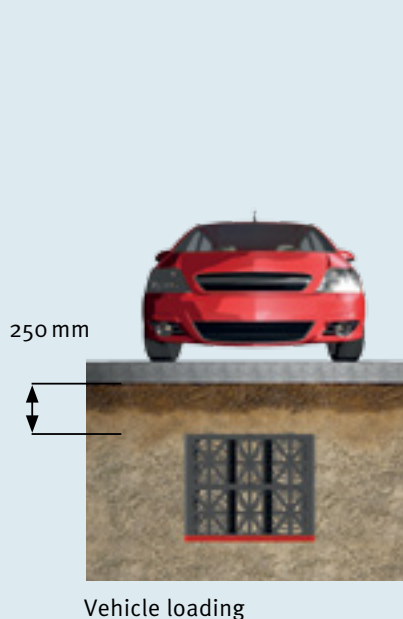
Percolating rainwater with GRAF EcoBloc Inspect

GRAF TV  
www.graf.info

An EcoBloc Inspect system can be installed without any special tools or unreasonable effort. The video „Percolating rainwater with GRAF EcoBloc Inspect“ on GRAF TV provides a rough overview of how an EcoBloc infiltration ditch system works and is installed.

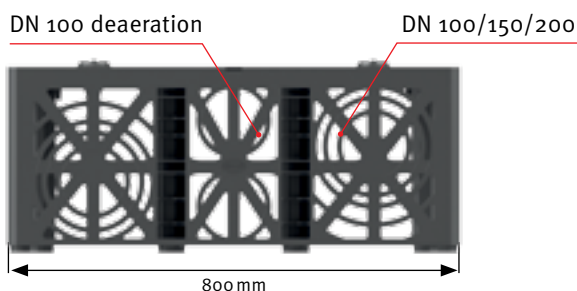
### Load capacity

Short-term	max. 10 t/m <sup>2</sup>
Long-term	max. 5 t/m <sup>2</sup>

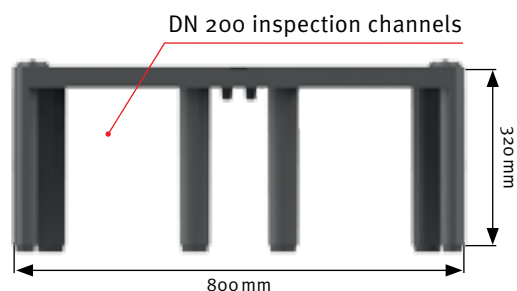


# Technical data

## Side view



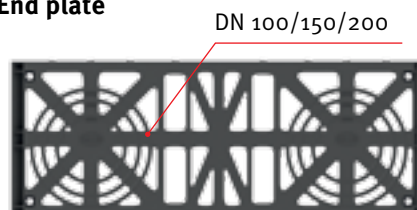
## Front view



## Baseplate



## End plate



## Rainwater harvesting solutions

For more information about our rainwater harvesting solutions, ask for our catalogue.



[www.graf.info](http://www.graf.info)

## RAINWATER HARVESTING



## STORMWATER MANAGEMENT



## WASTEWATER TREATMENT SOLUTIONS



## MULTIPURPOSE CONTAINERS



### Prices:

A price list with our export conditions is available on request.

### Warranty clause:

The warranty mentioned in this brochure only refers to the tank in question and not to the accessories. Within the warranty period we grant free replacement of the material. Further benefits are excluded. Pre-condition for warranty benefits are proper handling, assembly and installation according to the mounting guidelines.

N.B. Protect tanks from frost when installed above-ground! In case of groundwater installation, please contact us for further information previous to the purchase!

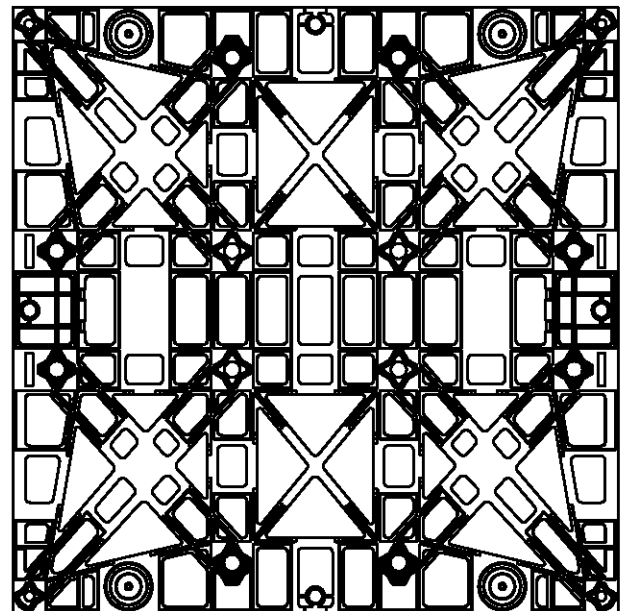
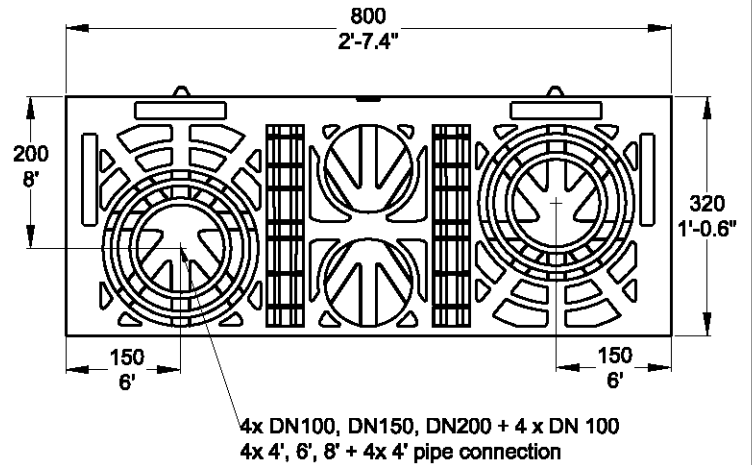
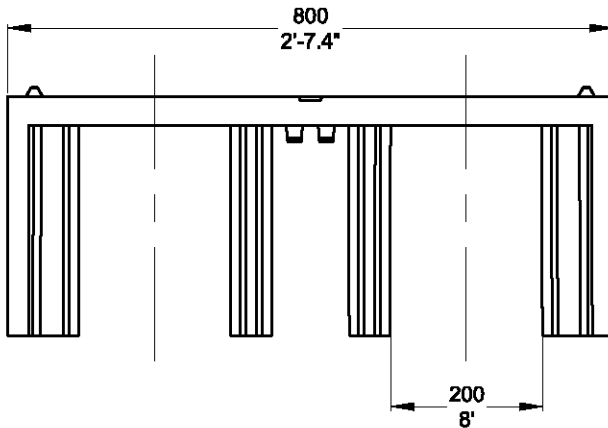
For all indications of measurements in this brochure we reserve a tolerance of +/- 3 %. The useful volume of the tanks may be up to 10 % lower than the tank capacity, according to the connecting option.

Technical modifications and further development of the different products are subject to change. Errors excepted.

For all our offers and conclusions of contract are only valid our General Terms and Conditions of Business dated 01/10/2012 which we will send to you on request.



D		GRAF EcoBloc Inspect flex 205	Artikel-Nr. artikel no. 402005
GB	GRAF EcoBloc Inspect flex 205	ES	GRAF EcoBloc Inspect flex 205
FR	GRAF EcoBloc Inspect flex 205		



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 DE-79331 Teningen  
 Germany  
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 www.graf.info

#### Zeichnungsinformation drawing information

gezeichnet drawn	OEI
Datum date	13.05.2013
Toleranz tolerance	+/- 3 %

#### Artikelinformation artikel information

Gewicht weight	8
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#### Hinweise notes

Alle Maßangaben in mm  
all dimension in mm

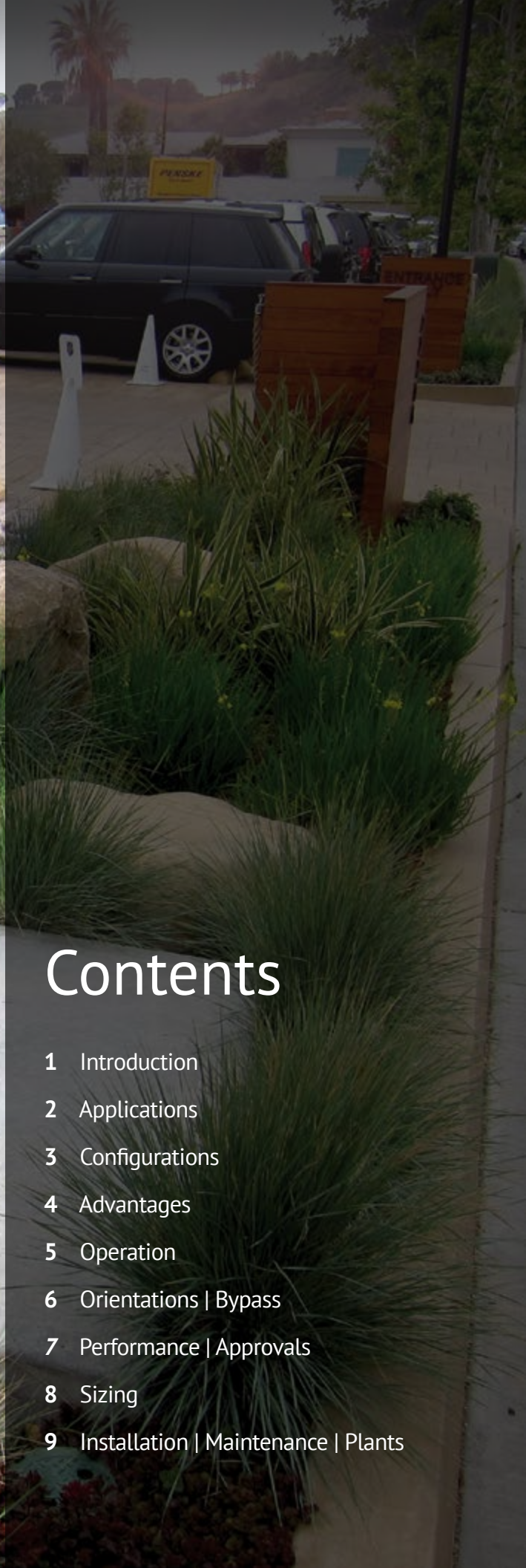


*Advanced **Stormwater** Biofiltration*



**MWS Linear**





# Contents

- 1 Introduction
- 2 Applications
- 3 Configurations
- 4 Advantages
- 5 Operation
- 6 Orientations | Bypass
- 7 Performance | Approvals
- 8 Sizing
- 9 Installation | Maintenance | Plants



# The Urban Impact

For hundreds of years natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as our cities grow and develop, these natural wetlands have perished under countless roads, rooftops, and parking lots.



## Plant A Wetland

Without natural wetlands our cities are deprived of water purification, flood control, and land stability. Modular Wetlands and the MWS Linear re-establish nature's presence and rejuvenate water ways in urban areas.



## MWS Linear

The Modular Wetland System Linear represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint and higher treatment capacity. While most biofilters use little or no pre-treatment, the MWS Linear incorporates an advanced pre-treatment chamber that includes separation and pre-filter cartridges. In this chamber sediment and hydrocarbons are removed from runoff before it enters the biofiltration chamber, in turn reducing maintenance costs and improving performance.

# Applications

The MWS Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.



## Industrial

Many states enforce strict regulations for discharges from industrial sites. The MWS Linear has helped various sites meet difficult EPA mandated effluent limits for dissolved metals and other pollutants.



## Residential

Low to high density developments can benefit from the versatile design of the MWS Linear. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.



## Streets

Street applications can be challenging due to limited space. The MWS Linear is very adaptable, and offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.



## Parking Lots

Parking lots are designed to maximize space and the MWS Linear's 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.



## Commercial

Compared to bioretention systems, the MWS Linear can treat far more area in less space - meeting treatment and volume control requirements.



## Mixed Use

The MWS Linear can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

**More applications** are available on our website: [www.ModularWetlands.com/Applications](http://www.ModularWetlands.com/Applications)

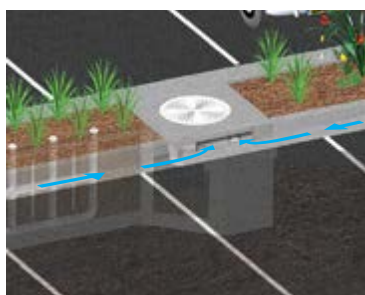
- Agriculture
- Low Impact Development
- Reuse
- Waste Water





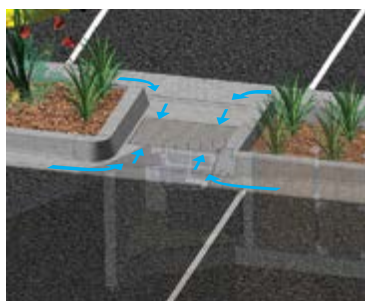
## Configurations

The MWS Linear is the preferred biofiltration system of Civil Engineers across the country due to its versatile design. This highly versatile system has available “pipe-in” options on most models, along with built-in curb or grated inlets for simple integration into your stormdrain design.



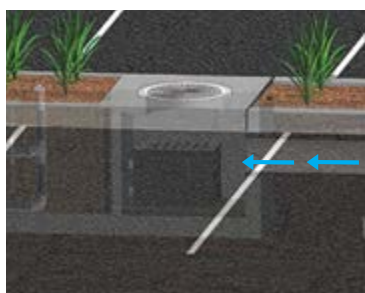
### Curb Type

The *Curb Type* configuration accepts sheet flow through a curb opening and is commonly used along road ways and parking lots. It can be used in sump or flow by conditions. Length of curb opening varies based on model and size.



### Grate Type

The *Grate Type* configuration offers the same features and benefits as the *Curb Type* but with a grated/drop inlet above the systems pre-treatment chamber. It has the added benefit of allowing for pedestrian access over the inlet. ADA compliant grates are available to assure easy and safe access. The *Grate Type* can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



### Vault Type

The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pre-treatment chamber, meaning the MWS Linear can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/bioretention systems. Another benefit of the “pipe in” design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.



### Downspout Type

The *Downspout Type* is a variation of the *Vault Type* and is designed to accept a vertical downspout pipe from roof top and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.



# Advantages & Operation

The MWS Linear is the most efficient and versatile biofiltration system on the market, and the only system with horizontal flow which improves performance, reduces footprint, and minimizes maintenance. Figure-1 and Figure-2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

## Featured Advantages

- Horizontal Flow Biofiltration
- Greater Filter Surface Area
- Pre-Treatment Chamber
- Patented Perimeter Void Area
- Flow Control
- No Depressed Planter Area

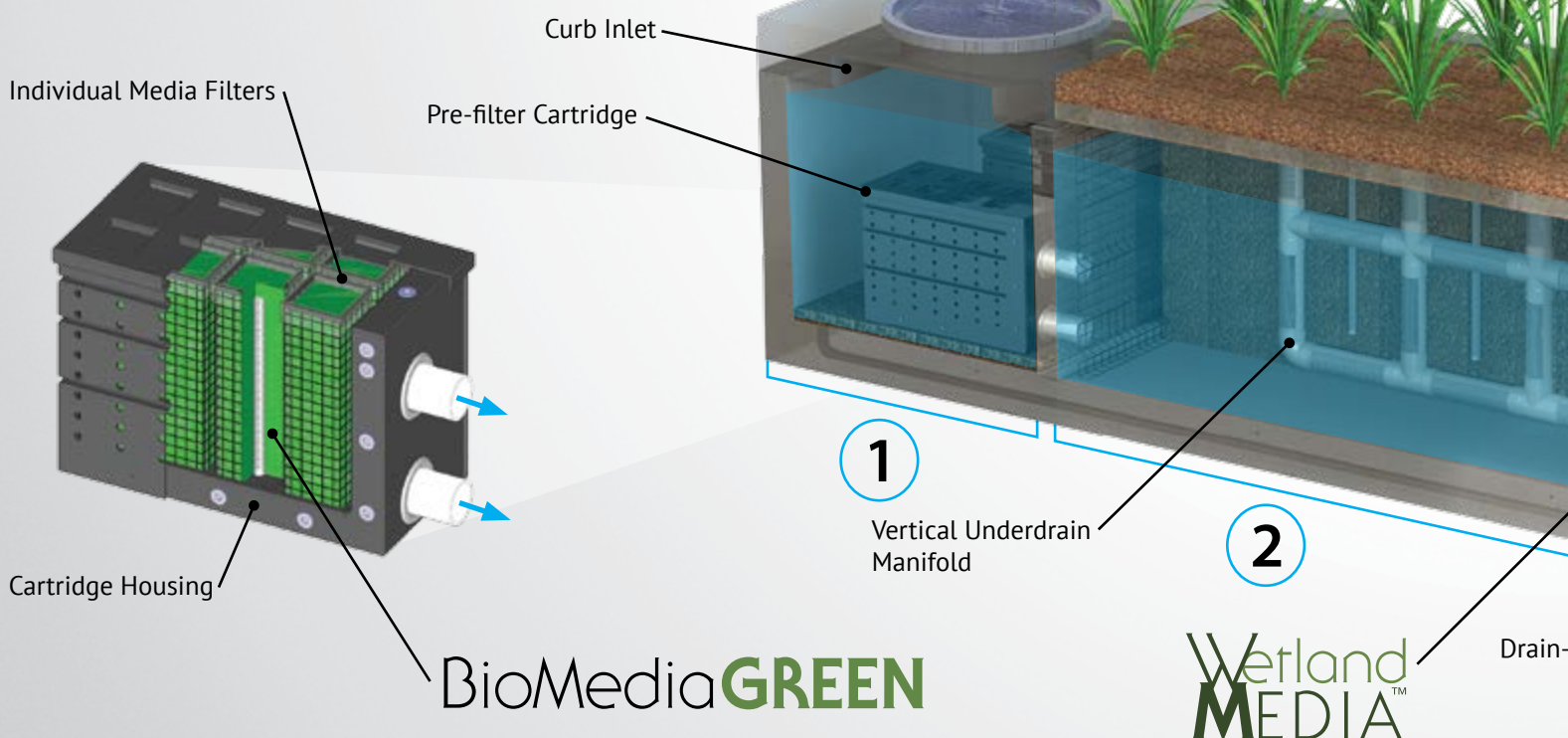
## 1 Pre-Treatment

### Separation

- Trash, sediment, and debris are separated before entering the pre-filter cartridges
- Designed for easy maintenance access

### Pre-Filter Cartridges

- Over 25 ft<sup>2</sup> of surface area per cartridge
- Utilizes BioMediaGREEN filter material
- Removes over 80% of TSS & 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber



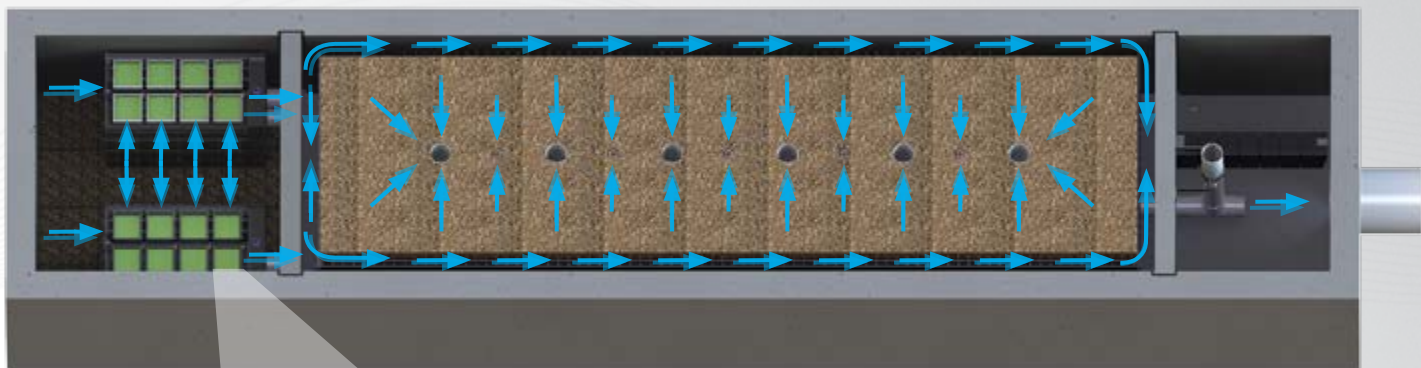


Fig. 2 - Top View

**2x to 3x More Surface Area** Than Traditional Downward Flow Bioretention Systems.

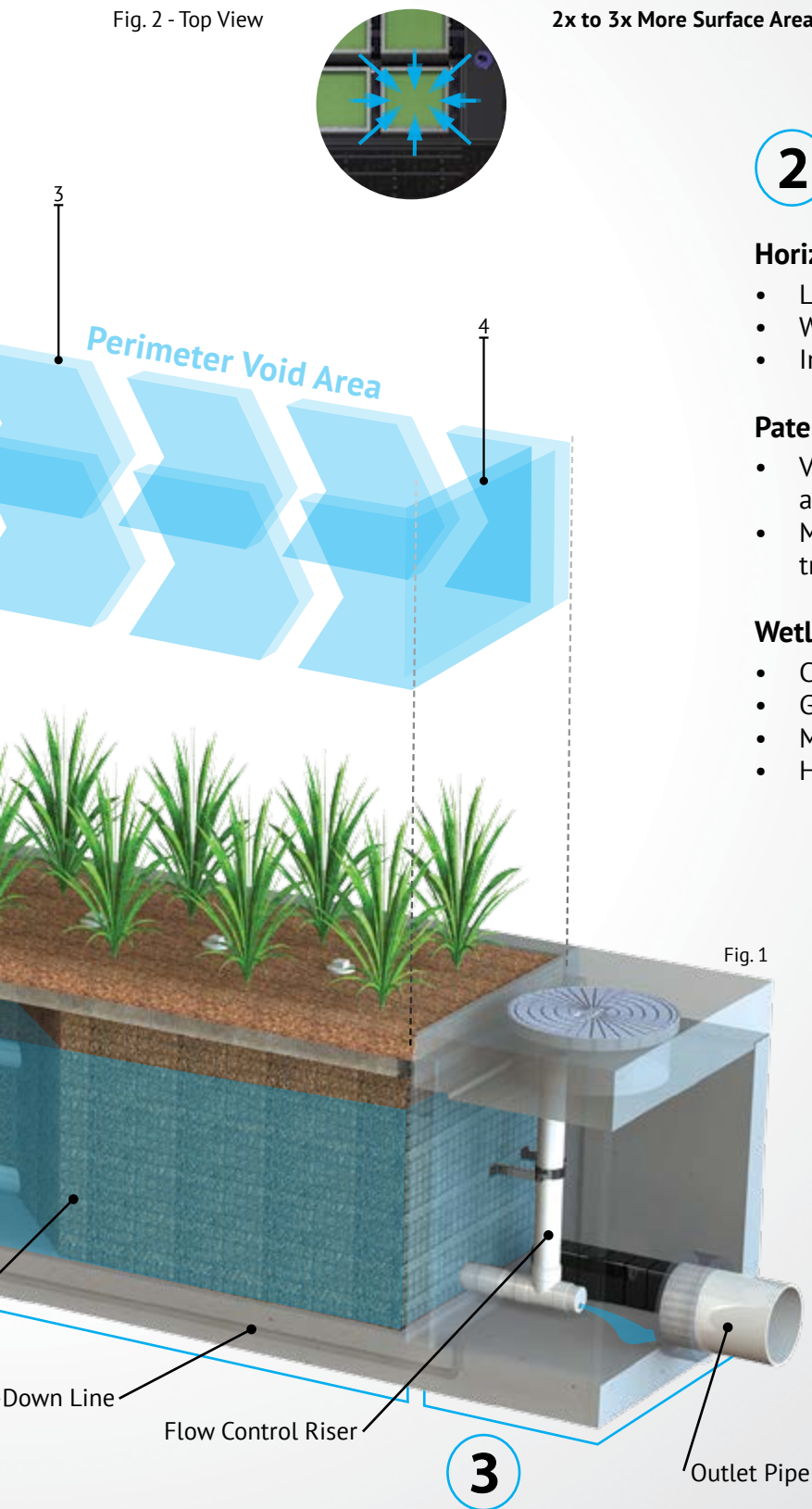


Fig. 1

## 2 Biofiltration

### Horizontal Flow

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

### Patented Perimeter Void Area

- Vertically extends void area between the walls and the WetlandMEDIA on all four sides.
- Maximizes surface area of the media for higher treatment capacity

### WetlandMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and light weight

## 3 Discharge

### Flow Control

- Orifice plate controls flow of water through WetlandMEDIA to a level lower than the media's capacity.
- Extends the life of the media and improves performance

### Drain-Down Filter

- The Drain-Down is an optional feature that completely drains the pre-treatment chamber
- Water that drains from the pre-treatment chamber between storm events will be treated

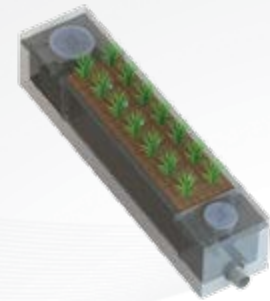


# Orientations



## Side-By-Side

The *Side-By-Side* orientation places the pre-treatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.



## End-To-End

The *End-To-End* orientation places the pre-treatment and discharge chambers on opposite ends of the biofiltration chamber therefore minimizing the width of the system to 5 ft (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is bypass must be external.

# Bypass

## Internal Bypass Weir (Side-by-Side Only)

The *Side-By-Side* orientation places the pre-treatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system's treatment capacity, thus allowing bypass from the pre-treatment chamber directly to the discharge chamber.

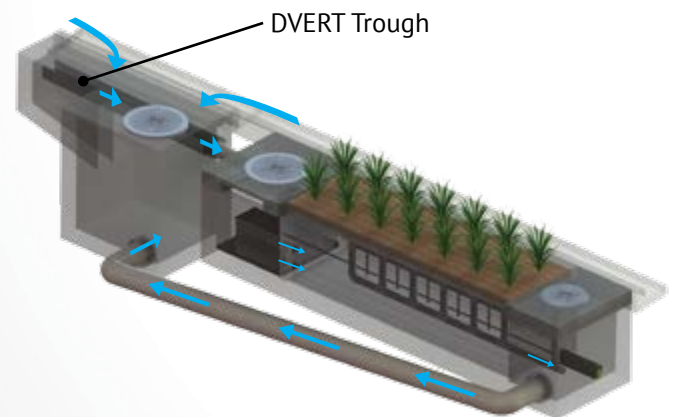
## External Diversion Weir Structure

This traditional offline diversion method can be used with the MWS Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

## Flow By Design

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

## DVERT Low Flow Diversion



This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the MWS Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allows the MWS Linear to be installed anywhere space is available.



## Performance

The MWS Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country. With it's advanced pre-treatment chamber and innovative horizontal flow biofilter, the system is able to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. With the same biological processes found in natural wetlands, the MWS Linear harnesses nature's ability to process, transform, and remove even the most harmful pollutants.

## Approvals

The MWS Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation, and perhaps the world.



### Washington State TAPE Approved

The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft<sup>2</sup> loading rate. The highest performing BMP on the market for all main pollutant categories.

TSS	Total Phosphorus	Ortho Phosphorus	Nitrogen	Dissolved Zinc	Dissolved Copper	Total Zinc	Total Copper	Motor Oil
85%	64%	67%	45%	66%	38%	69%	50%	95%



### DEQ Assignment

The Virginia Department of Environmental Quality assigned the MWS Linear, the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) Technical Criteria.



### Maryland Department Of The Environment Approved

Granted ESD (Environmental Site Design) status for new construction, redevelopment and retrofitting when designed in accordance with the Design Manual.



### MASTEP Evaluation

The University of Massachusetts at Amherst – Water Resources Research Center, issued a technical evaluation report noting removal rates up to 84% TSS, 70% Total Phosphorus, 68.5% Total Zinc, and more.



### Rhode Island DEM Approved

Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% Pathogens, 30% Total Phosphorus, and 30% Total Nitrogen.



# Flow Based Sizing

The MWS Linear can be used in stand alone applications to meet treatment flow requirements. Since the MWS Linear is the only biofiltration system that can accept inflow pipes several feet below the surface it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.



## Treatment Flow Sizing Table

Model #	Dimensions	WetlandMedia Surface Area	Treatment Flow Rate (cfs)
MWS-L-4-4	4' x 4'	23 ft <sup>2</sup>	0.052
MWS-L-4-6	4' x 6'	32 ft <sup>2</sup>	0.073
MWS-L-4-8	4' x 8'	50 ft <sup>2</sup>	0.115
MWS-L-4-13	4' x 13'	63 ft <sup>2</sup>	0.144
MWS-L-4-15	4' x 15'	76 ft <sup>2</sup>	0.175
MWS-L-4-17	4' x 17'	90 ft <sup>2</sup>	0.206
MWS-L-4-19	4' x 19'	103 ft <sup>2</sup>	0.237
MWS-L-4-21	4' x 21'	117 ft <sup>2</sup>	0.268
MWS-L-8-8	8' x 8'	100 ft <sup>2</sup>	0.230
MWS-L-8-12	8' x 12'	151 ft <sup>2</sup>	0.346
MWS-L-8-16	8' x 16'	201 ft <sup>2</sup>	0.462

# Volume Based Sizing

Many states require treatment of a water quality volume and do not offer the option of flow based design. The MWS Linear and its unique horizontal flow makes it the only biofilter that can be used in volume based design installed downstream of ponds, detention basins, and underground storage systems.



## Treatment Volume Sizing Table

Model #	Treatment Capacity (cu. ft.) @ 24-Hour Drain Down	Treatment Capacity (cu. ft.) @ 48-Hour Drain Down
MWS-L-4-4	1140	2280
MWS-L-4-6	1600	3200
MWS-L-4-8	2518	5036
MWS-L-4-13	3131	6261
MWS-L-4-15	3811	7623
MWS-L-4-17	4492	8984
MWS-L-4-19	5172	10345
MWS-L-4-21	5853	11706
MWS-L-8-8	5036	10072
MWS-L-8-12	7554	15109
MWS-L-8-16	10073	20145

# Installation

The MWS Linear is simple, easy to install, and has a space efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles pre-cast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians are available to supervise installations and provide technical support.



# Maintenance

Reduce your maintenance costs, man hours, and materials with the MWS Linear. Unlike other biofiltration systems that provide no pre-treatment, the MWS Linear is a self-contained treatment train which incorporates simple and effective pre-treatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pre-treatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pre-treatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter cartridges is required for long term operation and there is absolutely no need to replace expensive biofiltration media.



# Plant Selection

Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the MWS Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the MWS Linear, giving the plants more "contact time" so that pollutants are more successfully decomposed, volatilized and incorporated into the biomass of The MWS Linear's micro/macro flora and fauna.

A wide range of plants are suitable for use in the MWS Linear, but selections vary by location and climate. View suitable plants by selecting the list relative to your project location's hardy zone.

Please visit [www.ModularWetlands.com/Plants](http://www.ModularWetlands.com/Plants) for more information and various plant lists.







#### FLOW RATES

PEAK TREATMENT FLOW RATE  
= 0.35 CFS OR 155.49 GPM

PEAK BYPASS FLOW RATE  
= N/A

#### SPECIFICATIONS

INSTALL AT SURFACE

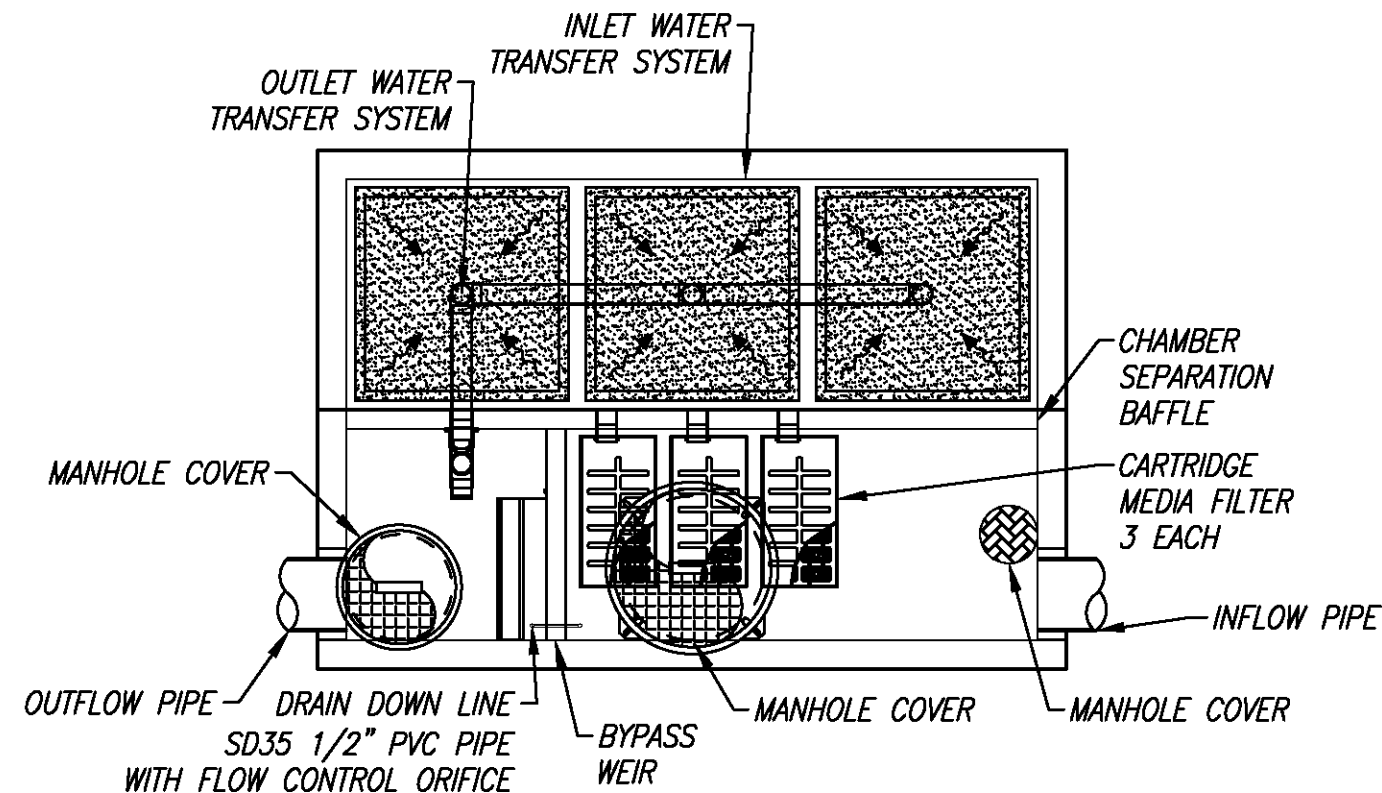
O.D. DIMENSIONS

= 13' X 9' X 4.63'

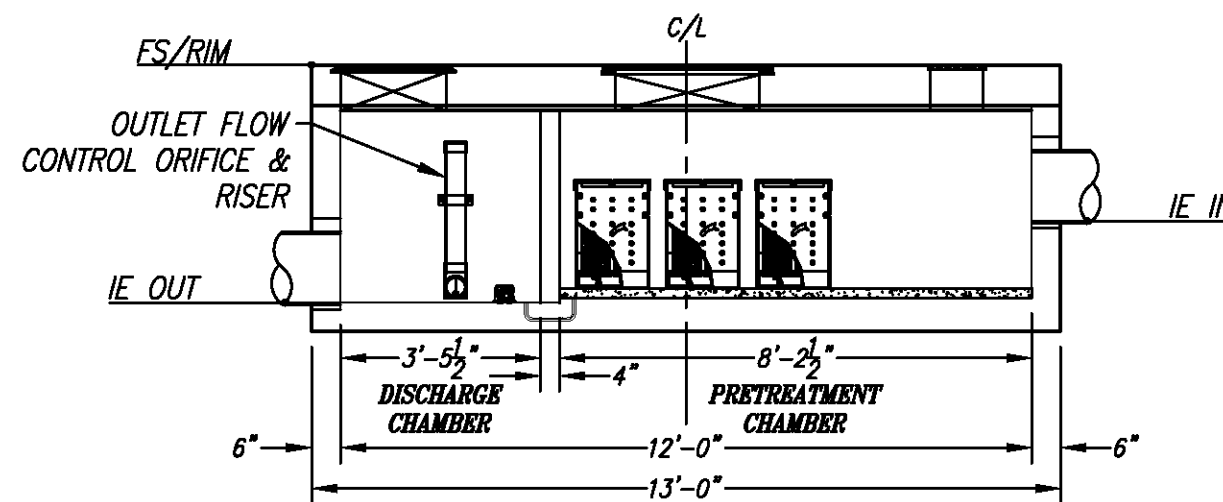
RIM ELEVATION TO IE OUT:

= 4.13'

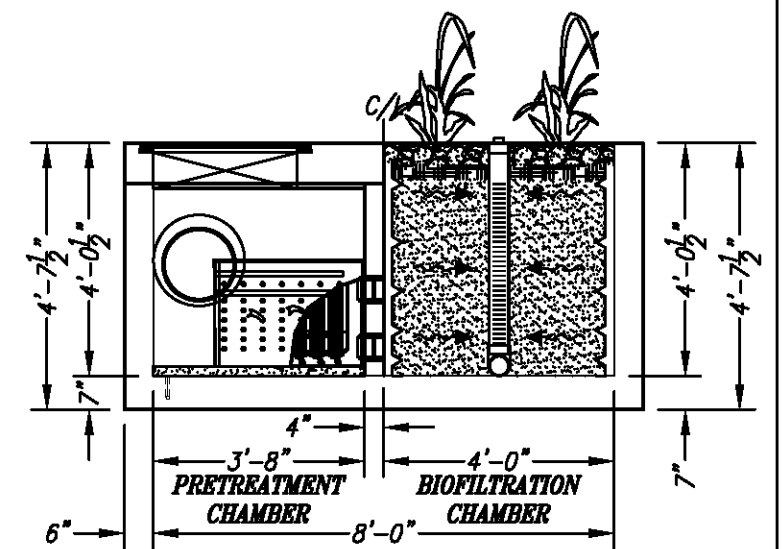
## MODULAR WETLAND SYSTEMS LINEAR 2.0 VAULT TYPE



PLAN VIEW



ELEVATION VIEW



RIGHT END VIEW

#### BIOFILTRATION CHAMBER SURFACE AREA CALCS

SIDES = 4

3.7' L x 3.4' H = 12.58 SF

12.58 SF X 4 SIDES = 50.32

CELLS = 3

50.32 X 3 CELLS = 150.96

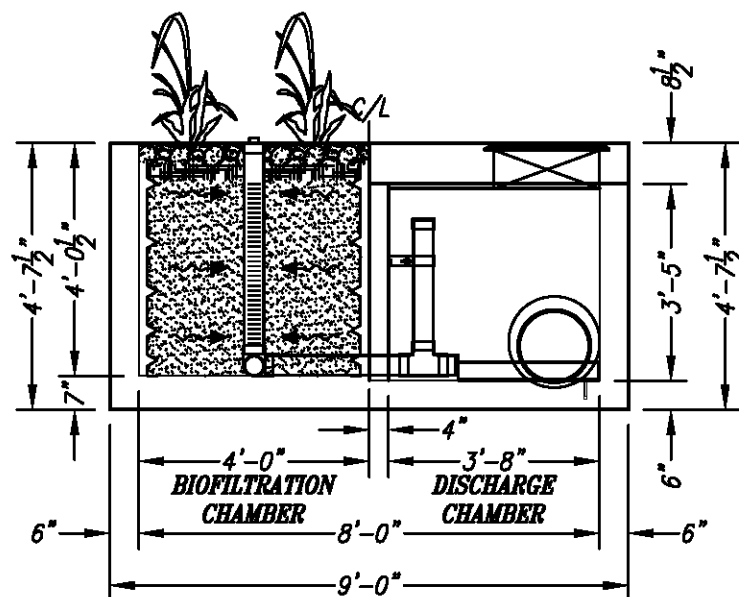
TOTAL WETLAND MEDIA SURFACE AREA  
= 150.96 SF

WETLAND MEDIA LOADING RATE  
155.49 GPM / 150.96 SF  
= 1.03 GPM/SF

#### PRETREATMENT FILTER SURFACE AREA CALCS

TOTAL PRETREATMENT SURFACE AREA  
= 75 SF

PRETREATMENT FILTER LOADING RATE  
155.49 GPM / 75 SF  
= 2.07 GPM/SF



LEFT END VIEW

#### LEGEND

-  WETLAND MEDIA
-  PLANT/ROOT  
MOISTURE RETENTION LAYER
-  MANHOLE / ACCESS HATCH

#### INSTALLATION NOTES:

- INSTALL UNIT ON LEVEL BED OF GRAVEL OF AT LEAST 6" IN DEPTH WITH 1' MINIMUM OVER EXCAVATION AROUND ENTIRE UNIT.
- CONCRETE 28 DAY COMPRESSIVE STRENGTH  $f_c=5,000$  PSI.
- REINFORCING: ASTM A-615, GRADE 60.
- RATED FOR PARKWAY LOADING 300 PSF.
- JOINT SEALANT: BUTYL RUBBER SS-S-00210

MODULAR WETLAND SYSTEMS INC.  
P.O. BOX 869  
OCEANSIDE, CA 92049

[www.ModularWetlands.com](http://www.ModularWetlands.com)

PROPRIETARY AND CONFIDENTIAL

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	NAME	DATE
DRAWN		
REVIEWED		
APPROVED		

COMMENTS:

TITLE: MWS LINEAR 2.0  
VAULT TYPE

SIZE	DWG. NO.	REV
	MWS-L-8-12-UG-V	

SCALE NTS UNITS = INCHES SHEET 1 OF 2





#### FLOW RATES

PEAK TREATMENT FLOW RATE  
= 0.462 CFS OR 207.31 GPM

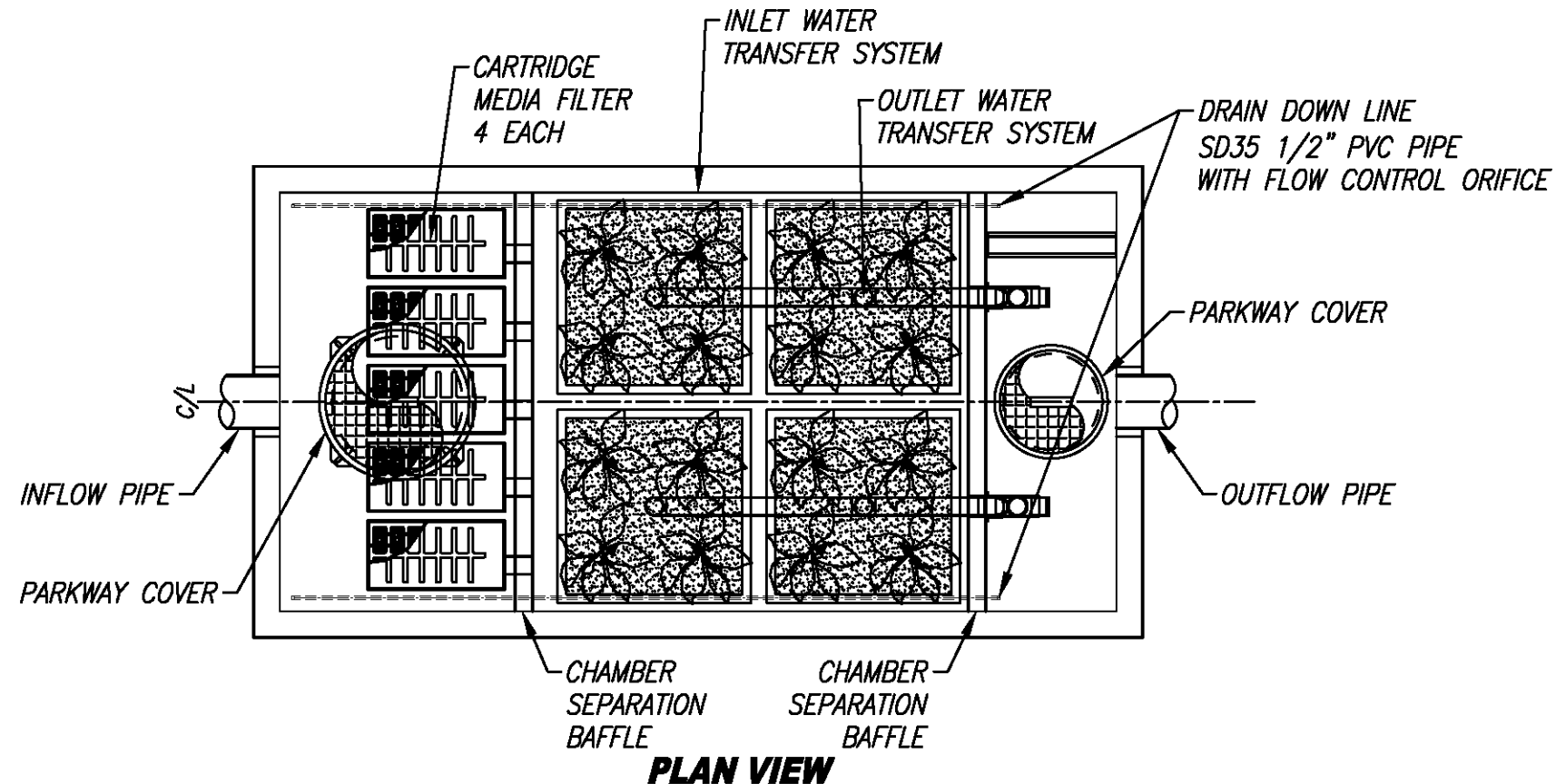
PEAK BYPASS FLOW RATE  
= N/A

#### SPECIFICATIONS

INSTALL AT SURFACE

O.D. DIMENSIONS  
= 17' X 9' X 4.7'

## MODULAR WETLAND SYSTEMS LINEAR 2.0 VAULT TYPE



#### BIOFILTRATION CHAMBER SURFACE AREA CALCS

SIDES = 4

3.7' L x 3.4' H = 12.58 SF

12.58 SF X 4 SIDES = 50.32

CELLS = 4

50.32 X 4 CELLS = 201.28

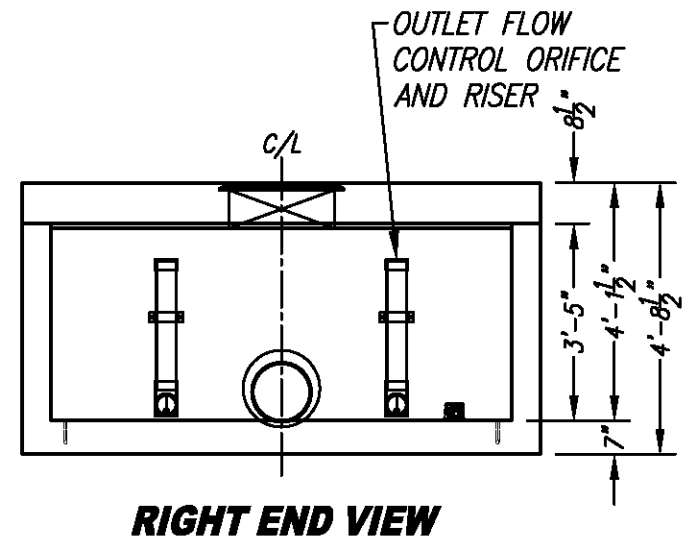
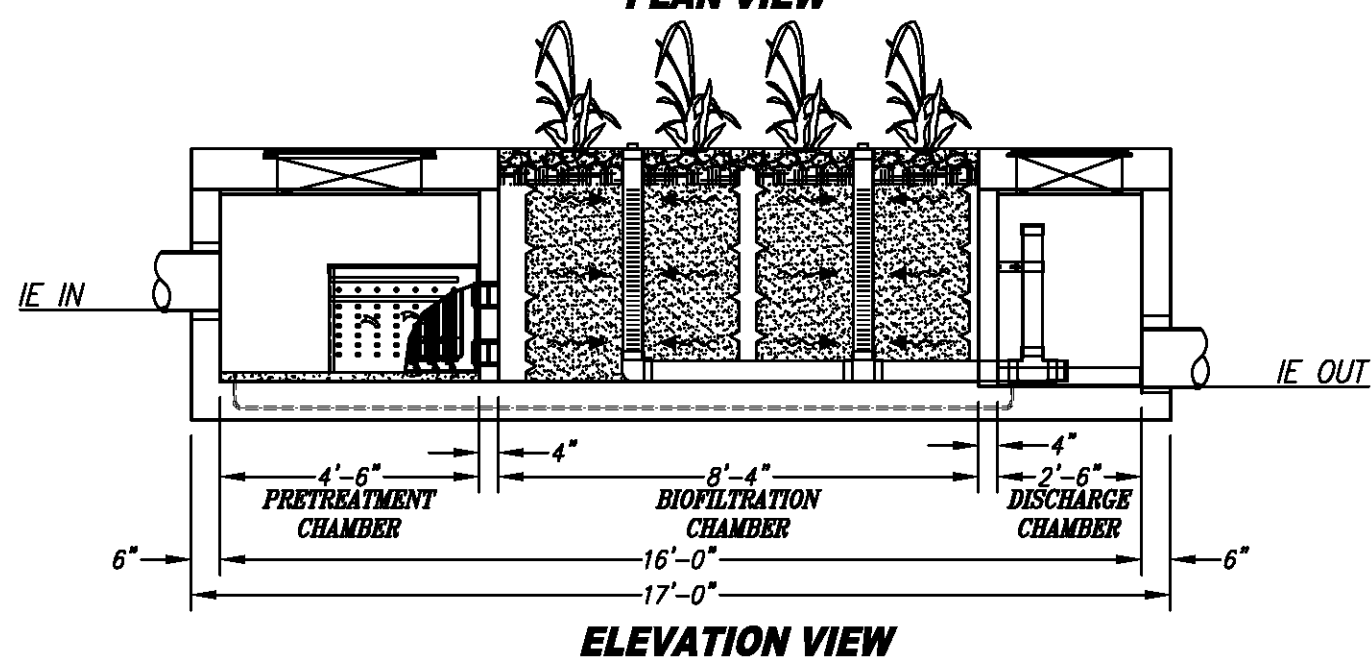
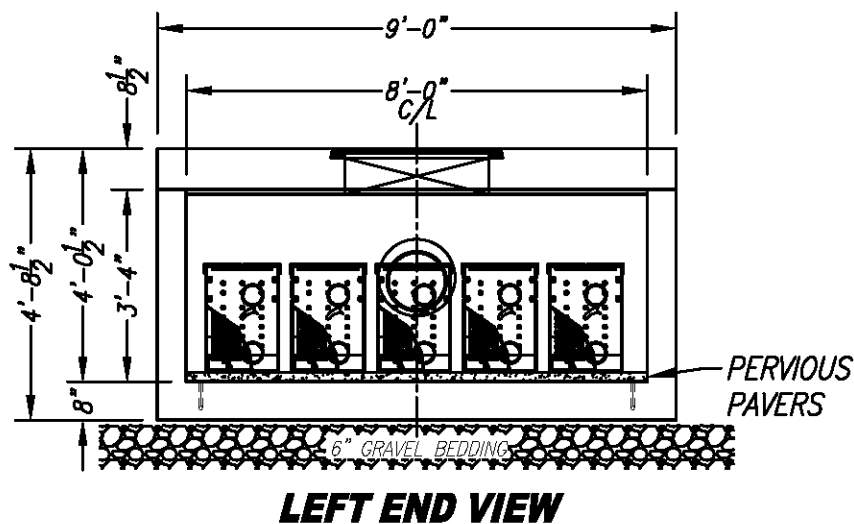
TOTAL WETLAND MEDIA SURFACE AREA  
= 201.28 SF

WETLAND MEDIA LOADING RATE  
207.31 GPM / 201.28 SF  
= 1.03 GPM/SF

#### PRETREATMENT FILTER SURFACE AREA CALCS

TOTAL PRETREATMENT SURFACE AREA  
25 SF x 5 FILTERS  
= 125.00 SF

PRETREATMENT FILTER LOADING RATE  
207.31 GPM / 125.00 SF  
= 1.66 GPM/SF



#### LEGEND



#### INSTALLATION NOTES:

1. INSTALL UNIT ON LEVEL BED OF GRAVEL OF AT LEAST 6" IN DEPTH WITH 1' MINIMUM OVER EXCAVATION AROUND ENTIRE UNIT.
2. CONCRETE 28 DAY COMPRESSIVE STRENGTH  $f_c=5,000$  PSI.
3. REINFORCING: ASTM A-615, GRADE 60.
4. RATED FOR PARKWAY LOADING 300 PSF.
5. JOINT SEALANT: BUTYL RUBBER SS-S-00210

MODULAR WETLAND SYSTEMS INC.  
P.O. BOX 869  
OCEANSIDE, CA 92049  
[www.ModularWetlands.com](http://www.ModularWetlands.com)

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	NAME	DATE
DRAWN		
REVIEWED		
APPROVED		
COMMENTS:		

TITLE: MWS LINEAR 2.0 CURB TYPE		
SIZE	DWG. NO. MWS-L-8-16-V	REV
SCALE	NTS	UNITS = INCHES
SHEET 1 OF 1		



#### FLOW RATES

PEAK TREATMENT FLOW RATE  
= .236 CFS OR 105.92 GPM

PEAK BYPASS FLOW RATE  
= OPTIONAL

#### SPECIFICATIONS

INSTALL AT SURFACE

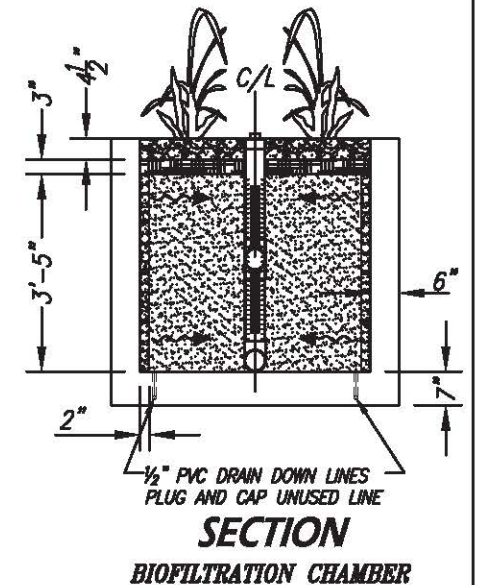
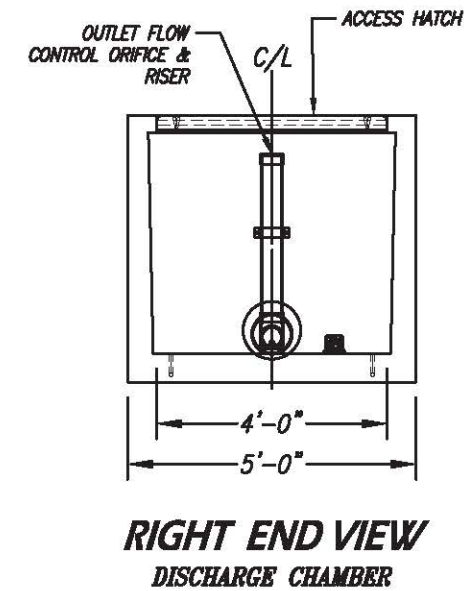
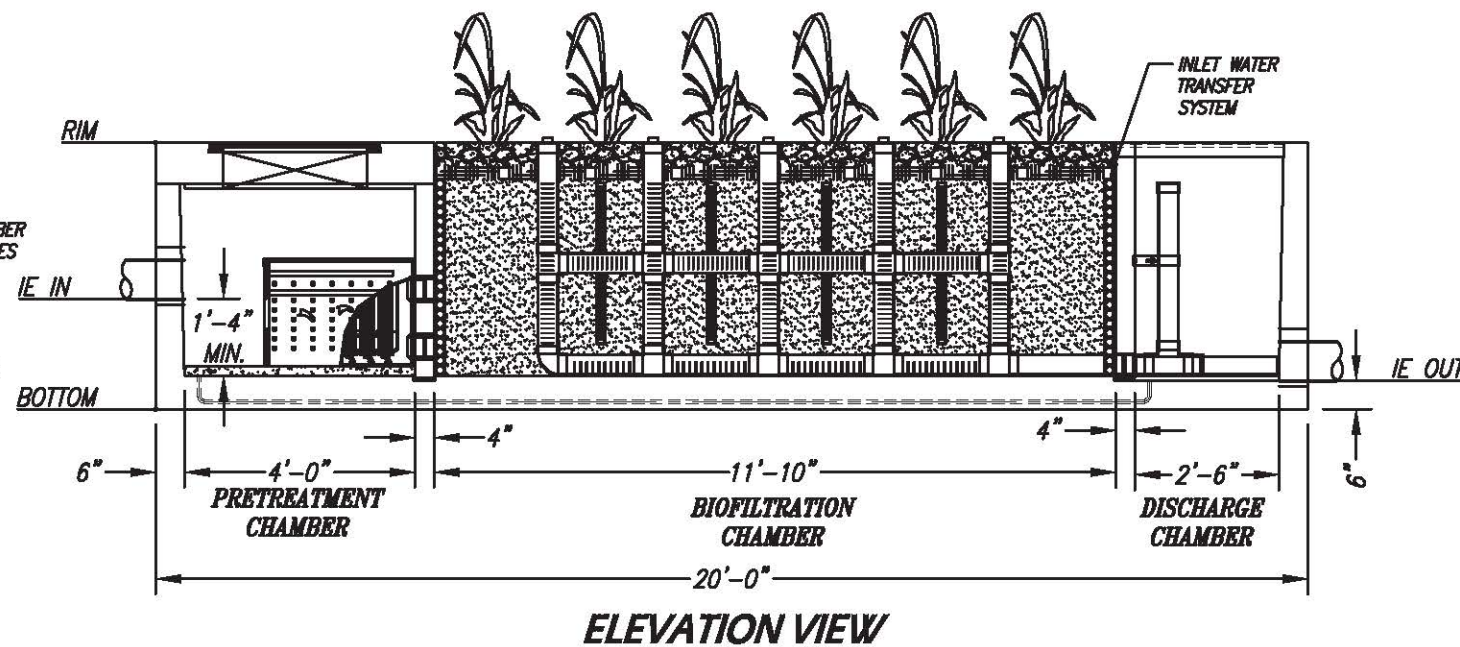
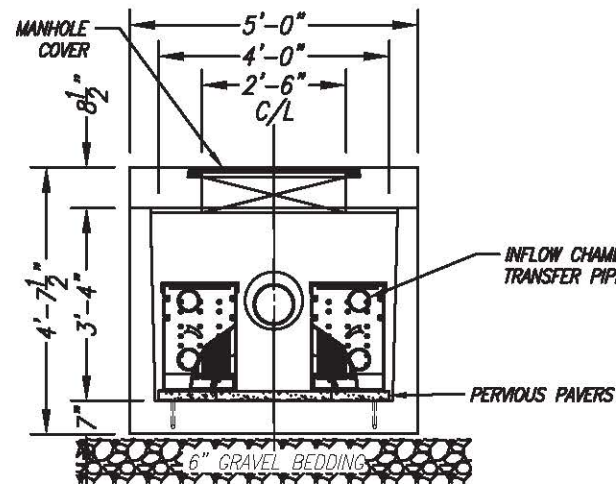
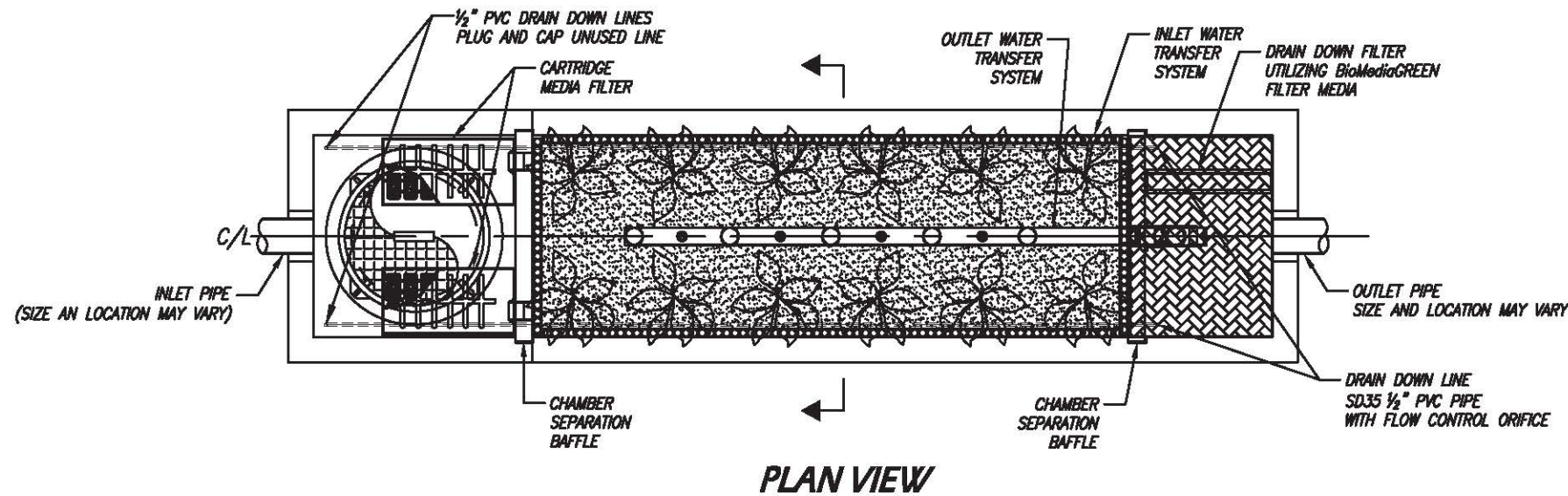
O.D. DIMENSIONS

= 20' X 5' X 4.63'

TOP OF CURB TO INVERT OUT  
= 4.13'

SEDIMENT STORAGE CAPACITY  
= 1000 LBS OR 23.5 CF

## MODULAR WETLAND SYSTEMS - LINEAR 2.0 19' VAULT TYPE



#### LEGEND

- 2" DRAIN CELL PERIMETER INLET WATER TRANSFER SYSTEM
- WETLAND MEDIA
- PLANT/ROOT MOISTURE RETENTION LAYER
- MANHOLE / ACCESS HATCH

#### INSTALLATION NOTES:

- INSTALL UNIT ON LEVEL BED OF GRAVEL OF AT LEAST 6" IN DEPTH WITH A MINIMUM ONE FOOT OVER EXCAVATION AROUND ENTIRE UNIT.
- CONCRETE 28 DAY COMPRESSIVE STRENGTH  $f_c=5,000$  PSI.
- REINFORCING: ASTM A-615, GRADE 60.
- RATED FOR PARKWAY LOADING 300 PSF.
- JOINT SEALANT: BUTYL RUBBER SS-S-00210

MODULAR WETLAND SYSTEMS INC.  
P.O. BOX 869  
OCEANSIDE, CA 92049  
[www.ModularWetlands.com](http://www.ModularWetlands.com)

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	NAME	DATE
DRAWN		
EDITED		

COMMENTS:

TITLE: MWS LINEAR 2.0 VAULT TYPE		
SIZE	DWG. NO.	REV
	MWS-L-4-19-V	
SCALE	1:40	UNITS = INCHES
SHEET 1 OF 1		

#### BIOFILTRATION CHAMBER SURFACE AREA CALCS

SIDES = 2

11.5' L x 3.4' H = 39.1 SF

SIDE SURFACE AREA = 78.2 SF

ENDS = 2

3.7' L x 3.4' H = 12.6 SF

END SURFACE AREA = 25.2 SF

TOTAL WETLAND MEDIA SURFACE AREA  
= 103.40 SF

WETLAND MEDIA LOADING RATE  
105.92 GPM / 103.4 SF  
= 1.02 GPM/SF

#### PRETREATMENT FILTER SURFACE AREA CALCS

SIDES = 2

0.50' L x 1.67' H = 0.84 SF

SIDE SURFACE AREA = 1.68 SF

ENDS = 2

0.25' L x 1.67' H = 0.42 SF

END SURFACE AREA = 0.84 SF

TOTAL PRETREATMENT SURFACE AREA  
2.52 SF x 28 FILTERS  
= 70.56 SF

PRETREATMENT FILTER LOADING RATE  
105.92 GPM / 70.56 SF  
= 1.50 GPM/SF





#### FLOW RATES

PEAK TREATMENT FLOW RATE  
= .175 CFS OR 78.5 GPM

PEAK BYPASS FLOW RATE  
= N/A

#### SPECIFICATIONS

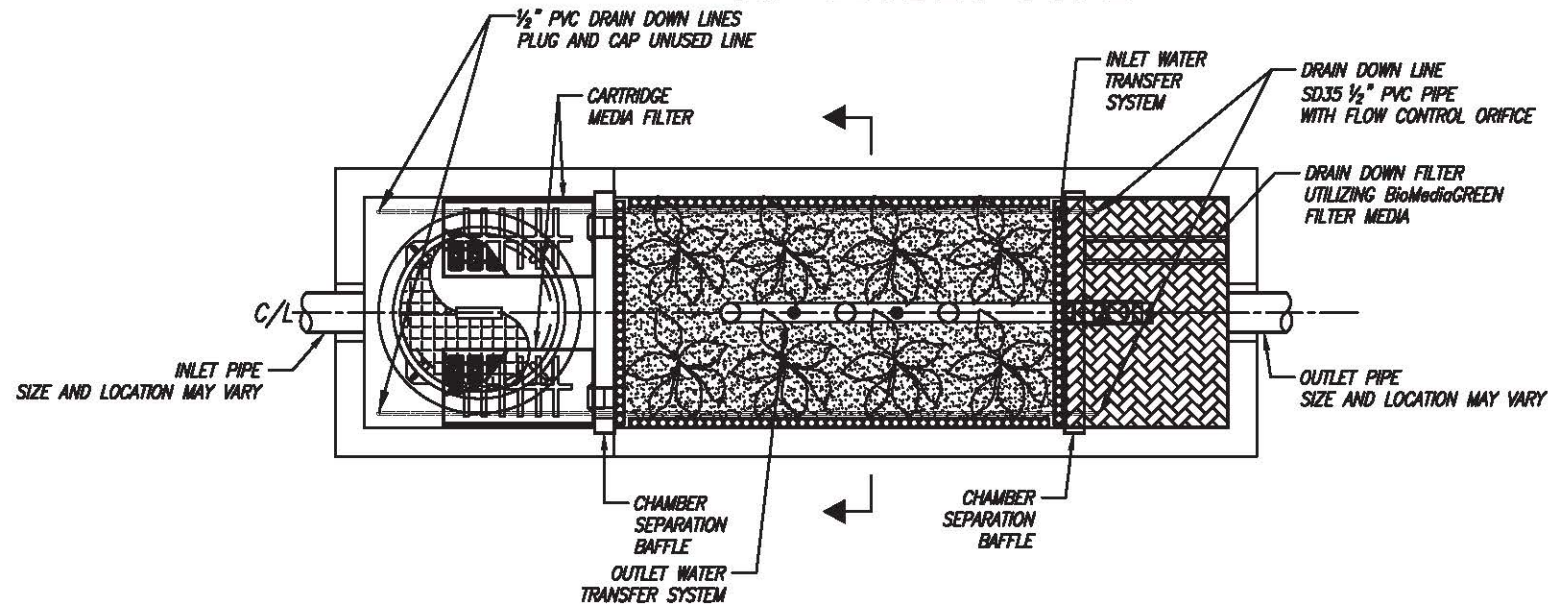
INSTALL AT SURFACE

O.D. DIMENSIONS  
= 16' X 5' X 4.7'

TOP OF VAULT TO INVERT OUT  
= 4.13'

SEDIMENT STORAGE CAPACITY  
= 1000 LBS OR 23.5 CF

## MODULAR WETLAND SYSTEMS - LINEAR 2.0 15' VAULT TYPE



#### BIOFILTRATION CHAMBER SURFACE AREA CALCS

SIDES = 2

7.5' L x 3.4' H = 25.5 SF

SIDE SURFACE AREA = 51.0 SF

ENDS = 2

3.7' L x 3.4' H = 12.6 SF

END SURFACE AREA = 25.2 SF

TOTAL WETLAND MEDIA SURFACE AREA  
= 76.2 SF

WETLAND MEDIA LOADING RATE  
78.5 GPM / 76.2 SF  
= 1.0 GPM/SF

#### PRETREATMENT FILTER SURFACE AREA CALCS

SIDES = 2

0.50' L x 1.67' H = 0.84 SF

SIDE SURFACE AREA = 1.68 SF

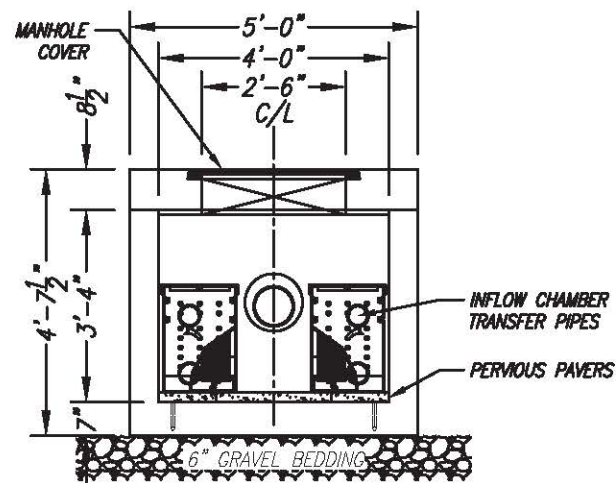
ENDS = 2

0.25' L x 1.67' H = 0.42 SF

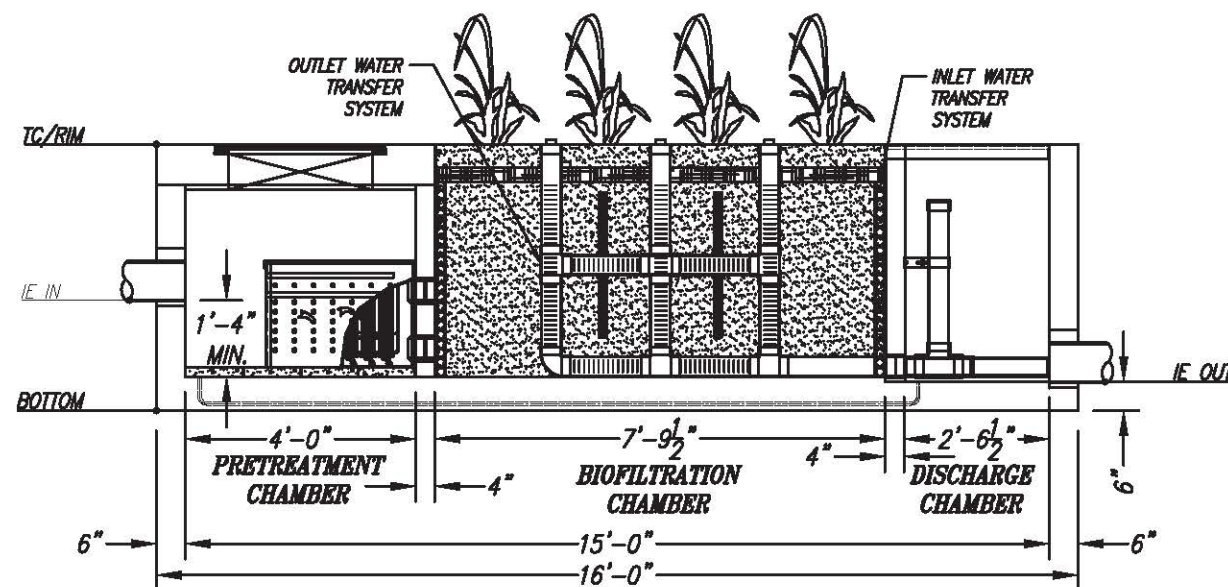
END SURFACE AREA = 0.84 SF

TOTAL PRETREATMENT SURFACE AREA  
2.52 SF x 28 FILTERS  
= 70.56 SF

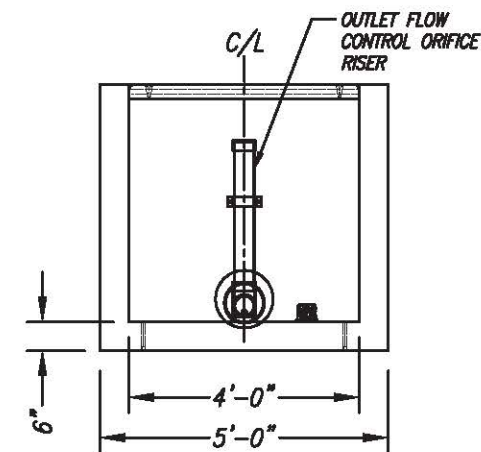
PRETREATMENT FILTER LOADING RATE  
78.5 GPM / 70.56 SF  
= 1.11 GPM/SF



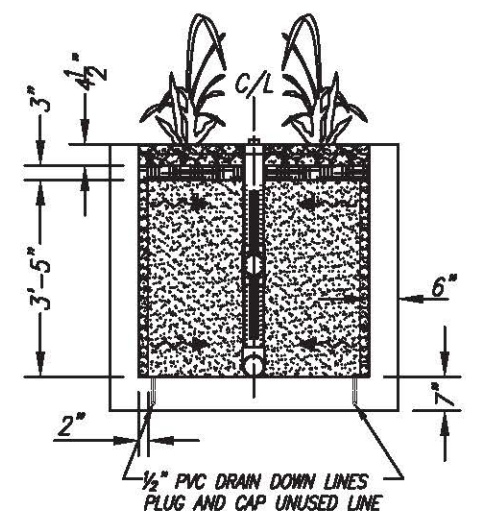
**LEFT END VIEW  
PRETREATMENT CHAMBER**



**ELEVATION VIEW**



**RIGHT END VIEW  
DISCHARGE CHAMBER**



**SECTION  
BIOFILTRATION CHAMBER**

#### LEGEND

- 
- WETLAND MEDIA
- PLANT/ROOT MOISTURE RETENTION LAYER
- MANHOLE / ACCESS HATCH

#### INSTALLATION NOTES:

- INSTALL UNIT ON LEVEL BED OF GRAVEL OF AT LEAST 6" IN DEPTH.
- CONCRETE 28 DAY COMPRESSIVE STRENGTH  $f_c$ =5,000 PSI.
- REINFORCING: ASTM A-615, GRADE 60.
- RATED FOR PARKWAY LOADING 300 PSF.
- JOINT SEALANT: BUTYL RUBBER SS-S-00210

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	NAME	DATE
DRAWN	Luis	1/25/13
EDITED		

COMMENTS:

TITLE: MWS LINEAR 2.0 VAULT TYPE		
SIZE	DWG. NO. MWS-L-4-15-V	REV
SCALE	1:40	UNITS = INCHES
SHEET 1 OF 1		

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

## APPENDICES

Appendix A .....	Supporting Calculations
Appendix B.....	Notice of Transfer of Responsibility
Appendix C .....	Educational Materials
Appendix D .....	BMP Maintenance Supplement / O&M Plan
Appendix E.....	Conditions of Approval
Appendix F .....	Custom Soil Resource Report

## APPENDIX A

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### SUPPORTING CALCULATIONS

**Table 2.7: Infiltration BMP Feasibility Worksheet**

	<b>Infeasibility Criteria</b>	<b>Yes</b>	<b>No</b>
1	<b>Would Infiltration BMPs pose significant risk for groundwater related concerns?</b> Refer to Appendix VII (Worksheet I) for guidance on groundwater-related infiltration feasibility criteria.	X	
<p>Provide basis:</p> <p>The project site is located in an area with shallow groundwater levels, approximately less than 5 feet below ground surface as illustrated in the TGD Figure XVI-2e. Due to shallow groundwater, direct infiltration into the subsurface is not recommended.</p> <p>Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</p>			
2	<p><b>Would Infiltration BMPs pose significant risk of increasing risk of geotechnical hazards that cannot be mitigated to an acceptable level?</b> (Yes if the answer to any of the following questions is yes, as established by a geotechnical expert):</p> <p>The BMP can only be located less than 50 feet away from slopes steeper than 15 percent</p> <p>The BMP can only be located less than eight feet from building foundations or an alternative setback.</p> <p>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.</p>		X
<p>Provide basis:</p> <p>Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</p>			
3	<b>Would infiltration of the DCV from drainage area violate downstream water rights?</b>		X
<p>Provide basis:</p> <p>Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</p>			

	<b>Partial Infeasibility Criteria</b>	<b>Yes</b>	<b>No</b>
4	Is proposed infiltration facility <b>located on HSG D soils</b> or the site geotechnical investigation identifies presence of soil characteristics which support categorization as D soils?		X
Provide basis:			
Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
5	Is <b>measured infiltration rate below proposed facility less than 0.3 inches per hour</b> ? This calculation shall be based on the methods described in Appendix VII.		X
Provide basis:			
Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
6	Would <b>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</b> ?		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 <b>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</b> ?		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.		
<b>Infiltration Screening Results (check box corresponding to result):</b>		
8	<p>Is there substantial evidence that infiltration from the project would result in a significant increase in I&amp;I to the sanitary sewer that cannot be sufficiently mitigated? (See Appendix XVII)</p> <p>Provide narrative discussion and supporting evidence:</p> <p>Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</p>	
9	<p>If any answer from row 1-3 is yes: infiltration of any volume is <b>not feasible</b> within the DMA or equivalent.</p> <p>Provide basis:</p> <p>The project site is located in an area with shallow groundwater levels, approximately less than 5 feet below ground surface as illustrated in the TGD Figure XVI-2e. Due to shallow groundwater, direct infiltration into the subsurface is not recommended.</p> <p>Summarize findings of infeasibility screening</p>	X
10	<p>If any answer from row 4-7 is yes, infiltration is <b>permissible but is not presumed to be feasible for the entire DCV</b>. Criteria for designing biotreatment BMPs to achieve the maximum feasible infiltration and ET shall apply.</p> <p>Provide basis:</p> <p>Summarize findings of infeasibility screening</p>	

**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.	
----	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--

## Worksheet B: Simple Design Capture Volume Sizing Method

Project: Moiola Park Residential

Date: 1/17/2020

		DMA =	Total Site	DMA A	DMA B	DMA C1	DMA C2	DMA C3	
<b>Step 1: Determine the design capture storm depth used for calculating volume</b>									
1	Enter design capture storm depth from Figure III.1, $d$ (inches)	$d =$	0.75	0.75	0.75	0.75	0.75	0.75	inches
2	Enter the effect of provided HSCs, $d_{HSC}$ (inches) (Worksheet A)	$d_{HSC} =$	0	0	0	0	0	0	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder} =$	0.75	0.75	0.75	0.75	0.75	0.75	inches
<b>Step 2: Calculate the DCV</b>									
1	Enter Project area tributary to BMP(s), $A$ (acres)	$A =$	12.999	5.763	0.724	2.906	1.024	2.583	acres
2	Enter Project Imperviousness, $imp$ (unitless)	$imp =$	56.1%	49.2%	55.3%	62.7%	62.3%	61.8%	%
3	Calculate runoff coefficient, $C = (0.75 \times imp) + 0.15$	$C =$	0.571	0.519	0.565	0.620	0.618	0.614	
4	Calculate runoff volume, $V_{design} = (C \times d_{remainder} \times A \times 43560 \times (1/12))$	$V_{design} =$	20,207.6	8,143.0	1,113.7	4,905.2	1,722.9	4,317.8	cu-ft
<b>Step 3: Design BMPs to ensure full retention of the DCV</b>									
<b>Step 3a: Determine design infiltration rate</b>									
1	Enter measured infiltration rate, $K_{measured}$ (in/hr) (Appendix VII)	$K_{measured} =$	Infiltration deemed not feasible						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
<b>Step 3b: Determine minimum BMP footprint</b>									
4	Enter drawdown time, $T$ (max 48 hours)	$T =$	Infiltration deemed not feasible						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 J: Summary of Harvested Water Demand and Feasibility

1	What demands for harvested water exist in the tributary area (check all that apply):			
2	Toilet and urinal flushing			
3	Landscape irrigation	X		
4	Other: _____			
5	What is the design capture storm depth? (Figure III.1)	d	0.75	inches
6	What is the project size?	A	13.0	ac
7	What is the acreage of impervious area?	IA	7.28	ac
<b>For projects with multiple types of demand (toilet flushing, irrigation demand, and/or other demand)</b>				
8	What is the minimum use required for partial capture? (Table X.6)	N/A	gpd	
9	What is the project estimated wet season total daily use (Section X.2)?	N/A	gpd	
10	Is partial capture potentially feasible? (Line 9 > Line 8?)	N/A		
<b>For projects with only toilet flushing demand</b>				
11	What is the minimum TUTIA for partial capture? (Table X.7)	N/A		
12	What is the project estimated TUTIA?	N/A		
13	Is partial capture potentially feasible? (Line 12 > Line 11?)	N/A		
<b>For projects with only irrigation demand</b>				
14	What is the minimum irrigation area required based on conservation landscape design? (Table X.8)	0.48	ac	
15	What is the proposed project irrigated area? (multiply conservation landscaping by 1; multiply active turf by 2)	0.63	ac	
16	Is partial capture potentially feasible? (Line 15 > Line 14?)	No		
Provide supporting assumptions and citations for controlling demand calculation:				

Table X.6: Harvested Water Demand Thresholds for Minimum Partial Capture

Design Capture Storm Depth <sup>1</sup> , 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

1- Based on isopluvial map (See XIV.1)

Table X.8: Minimum Irrigated Area for Potential Partial Capture Feasibility

General Landscape Type	Conservation Design: $K_L = 0.35$			Active Turf Areas: $K_L = 0.7$		
<i>Closest ET Station</i>	<i>Irvine</i>	<i>Santa Ana</i>	<i>Laguna</i>	<i>Irvine</i>	<i>Santa Ana</i>	<i>Laguna</i>
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	0.90	0.41	0.42	0.45
0.80	0.88	0.90	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	1.10	1.12	1.20	0.55	0.56	0.60



## Harvest & Reuse Irrigation Demand Calculations

1/17/2020

### Storm Water Design Capture 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 <sup>3</sup> )	DCV (gal)
DMA B	0.40	0.33	55%	0.565	0.75	0.724	1,113.7	8,330

	<u>Eto</u>	
Irvine	3.00	Modified
Laguna Beach	2.75	EAWU = $\frac{(Eto \times KL \times LA \times 0.015)}{IE}$
Santa Ana	2.93	
		EIATA = $\frac{LA \times KL}{(IE \times \text{Tributary Imp. Area})}$

### High-use Turf 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 (Table X.8)	Drawdown (days)	Drawdown (hours)	% Capture (Fig. III.2)
Community Park	1.0165	44,278	0%	0	44,278	2.93	0.7	1,513.59	3,801.07	610	Yes	1.99	0.42	5.5	132	65%

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

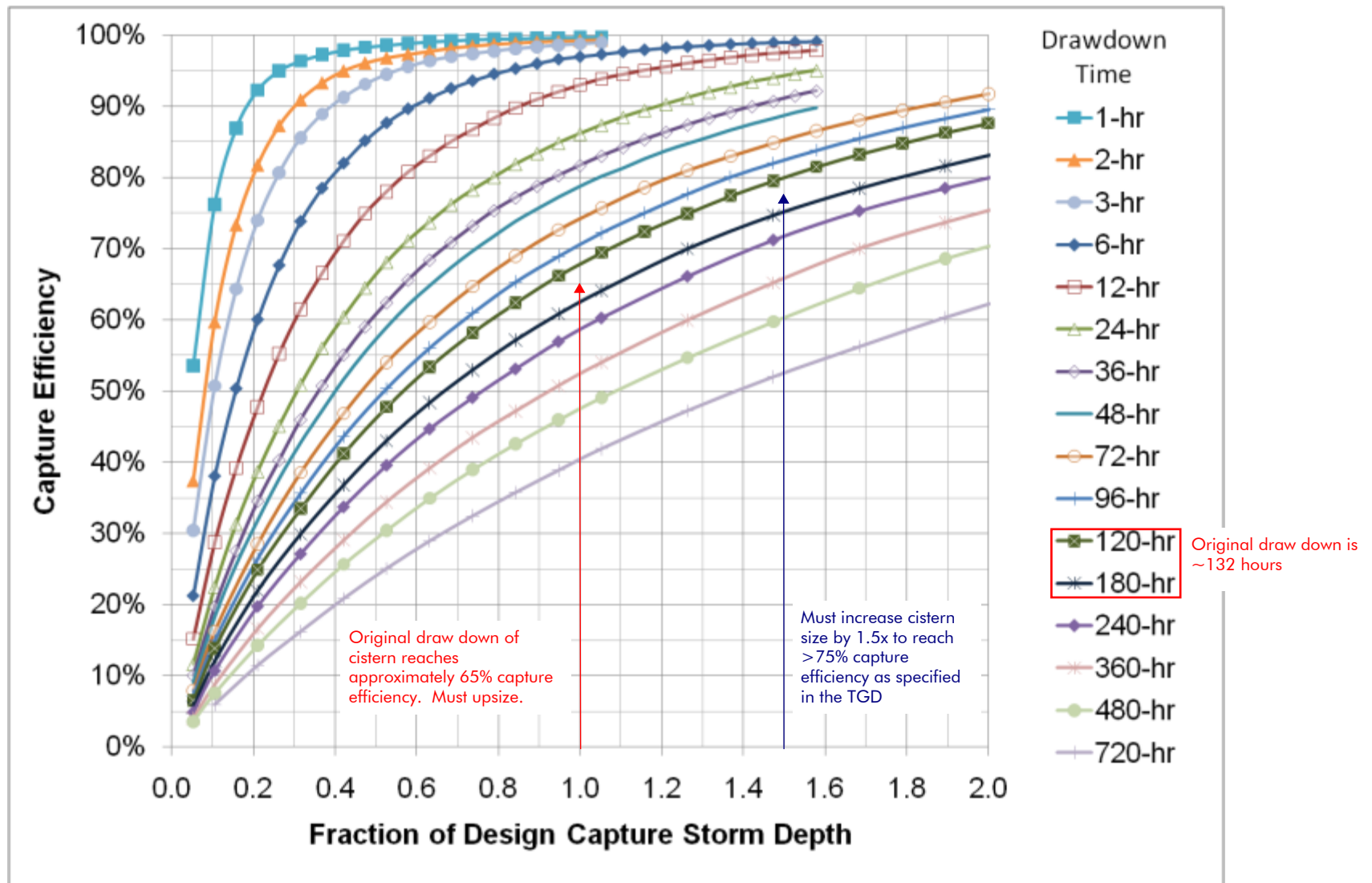
Design Capture Storm Depth, inches	Wet Season Demand Required for Minimum Partial Capture, gpd per impervious acre
0.60	490
0.65	530
0.70	570
0.75	610
0.80	650
0.85	690
0.90	730
0.95	770
1.00	810

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.

Figure III.2. Capture Efficiency Nomograph for Constant Drawdown Systems in Orange County



## Worksheet D: Capture Efficiency Method for Flow-Based BMPs

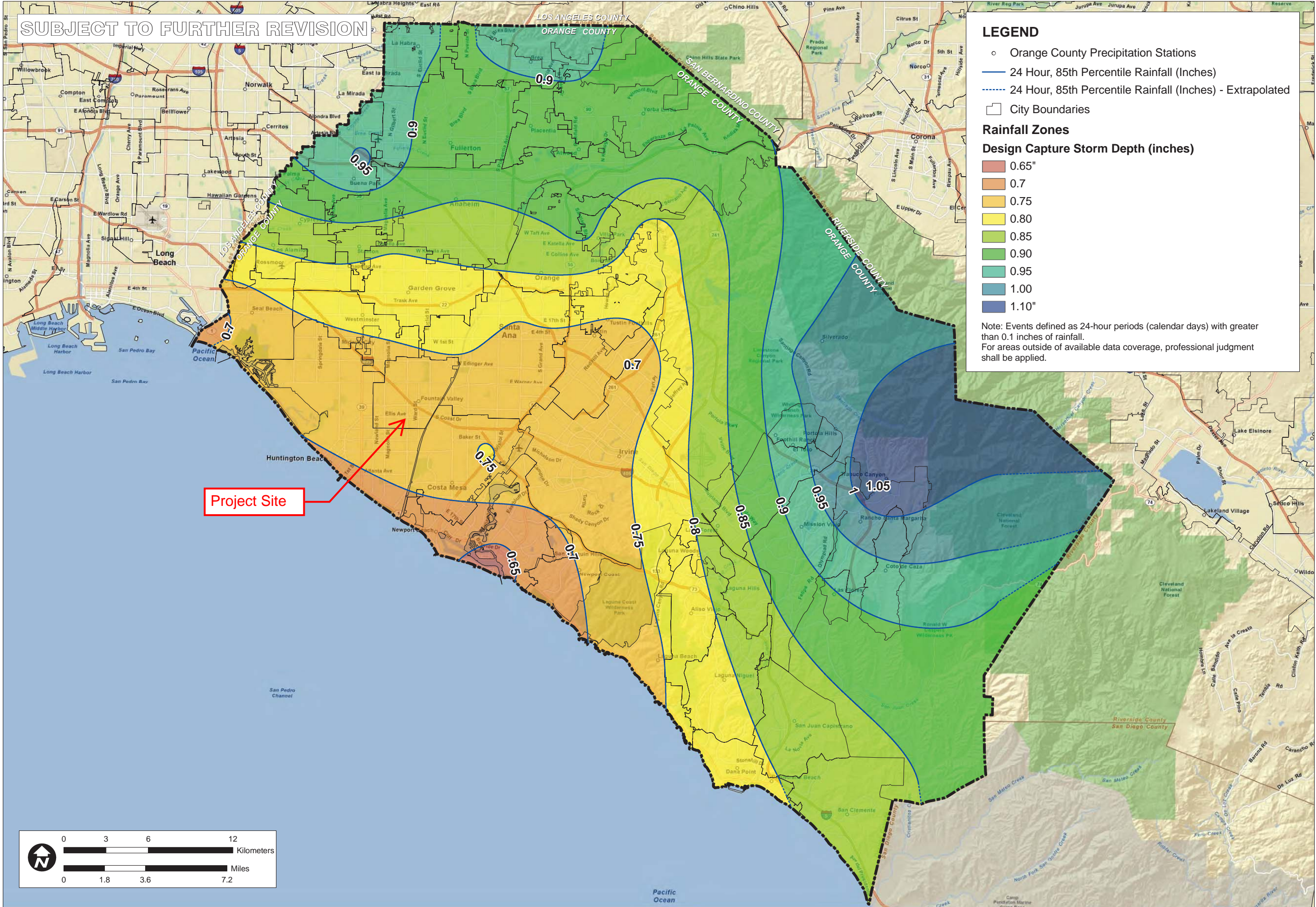
Project: Moiola Park Residential

Date: 01/17/2020

			Total Site	DMA A	DMA C1	DMA C2	DMA C3	
<b>Step 1: Determine the design capture storm depth used for calculating volume</b>								
1	Enter the time of concentration, $T_c$ (min) (See Appendix IV.2)	$T_c =$	5.0	5.0	5.0	5.0	5.0	min
2	Using Figure III.4, determine the design intensity at which the estimated time of concentration ( $T_c$ ) achieves 80% capture efficiency, $I_1$	$I_1 =$	0.260	0.260	0.260	0.260	0.260	in/hr
3	Enter the effect depth of provided HSCs upstream, $d_{HSC}$ (inches) (Worksheet A)	$d_{HSC} =$	0	0	0	0	0	inches
4	Enter capture efficiency corresponding to $d_{HSC}$ , $Y_2$ (Worksheet A)	$Y_2 =$	0%	0%	0%	0%	0%	%
5	Using Figure III.4, determine the design intensity at which the time of concentration ( $T_c$ ) achieves the upstream capture efficiency ( $Y_2$ ), $I_2$	$I_2 =$	0	0	0	0	0	in/hr
6	Determine the design intensity that must be provided by BMP, $I_{design} = I_1 - I_2$	$I_{design} =$	0.260	0.260	0.260	0.260	0.260	in/hr
<b>Step 2: Calculate the design flowrate</b>								
1	Enter Project area tributary to BMP(s), $A$ (acres)	$A =$	12.999	5.763	2.906	1.024	2.583	acres
2	Enter Project Imperviousness, $imp$ (unitless)	$imp =$	56.1%	49.2%	62.7%	62.3%	61.8%	%
3	Calculate runoff coefficient, $C = (0.75 \times imp) + 0.15$	$C =$	0.571	0.519	0.620	0.618	0.614	
4	Calculate design flowrate, $Q_{design} = (C \times I_{design} \times A)$	$Q_{design} =$	1.930	0.778	0.468	0.165	0.412	cfs
<b>Supporting Calculations</b>								
Describe System:								
<u>Proprietary BioTreatment (BIO-7):</u>								
Unit Size / Model =				MWS-L-8-16	MWS-L-4-19	MWS-L-4-15	MWS-L-8-16	
				MWS-L-8-12				
Unit Size / Model Treatment Capacity =				0.462	0.237	0.175	0.462	cfs
				0.346				cfs
Number of Units Needed =				2	2	1	1	
Total Bio-treatment Provided =				0.808	0.474	0.175	0.462	cfs
Provide time of concentration assumptions:								
5.0 min								
A $T_c$ of 5 minutes was chosen to be conservative								



P:\9526E\6-GIS\MapDocs\Reports\InfiltrationFeasability\_20110215\9526E\_FigureXVI-1\_RainfallZones\_20110215.mxd

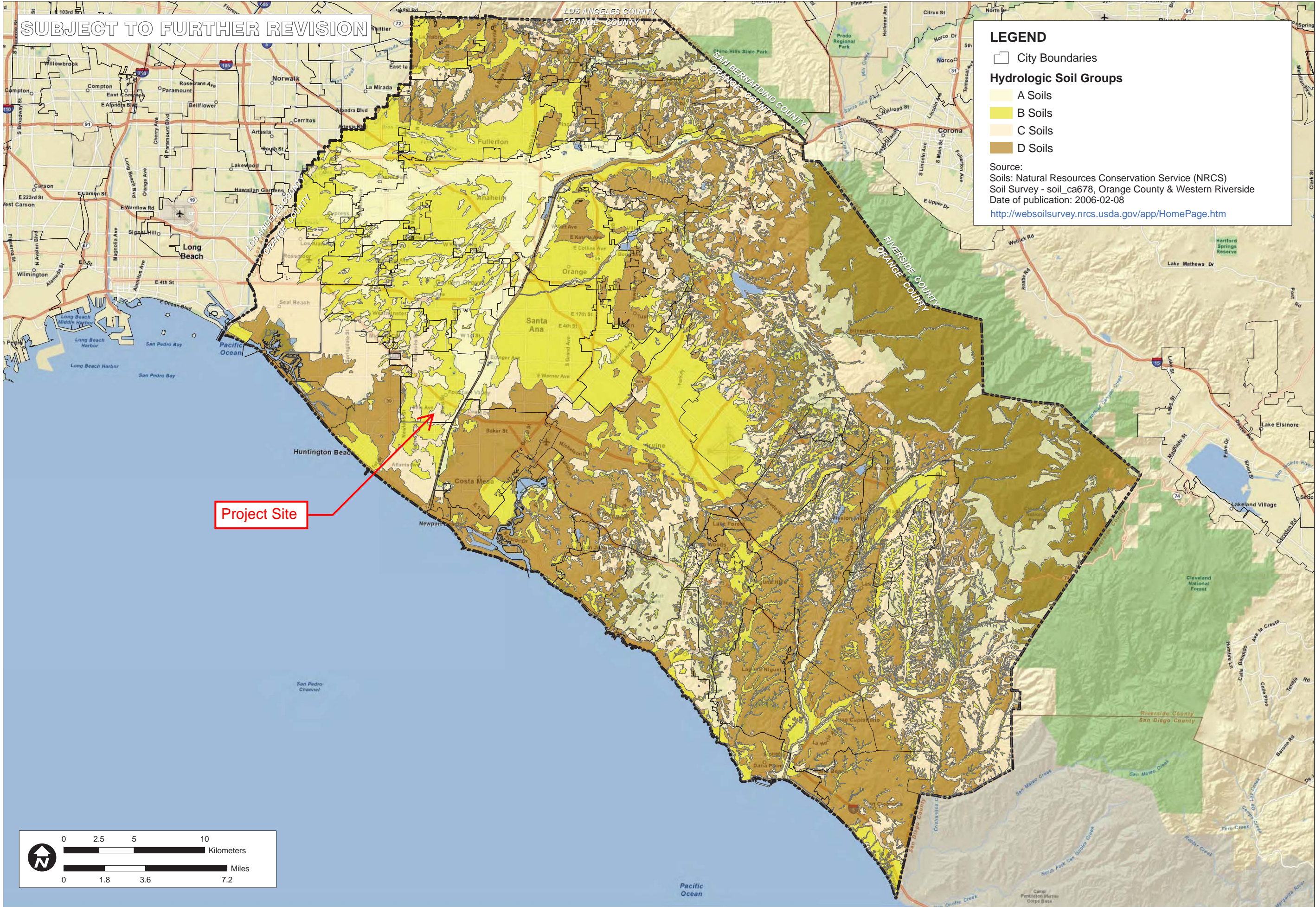


ORANGE COUNTY TECHNICAL GUIDANCE DOCUMENT		RAINFALL ZONES	
JOB		CA	
SCALE	1" = 1.8 miles	DESIGNED	TH
DRAWING	TH	CHECKED	BMP
DATE	04/22/10	JOB NO.	9526-E
FIGURE		XVI-1	

**PACE**  
Advanced Water Engineering



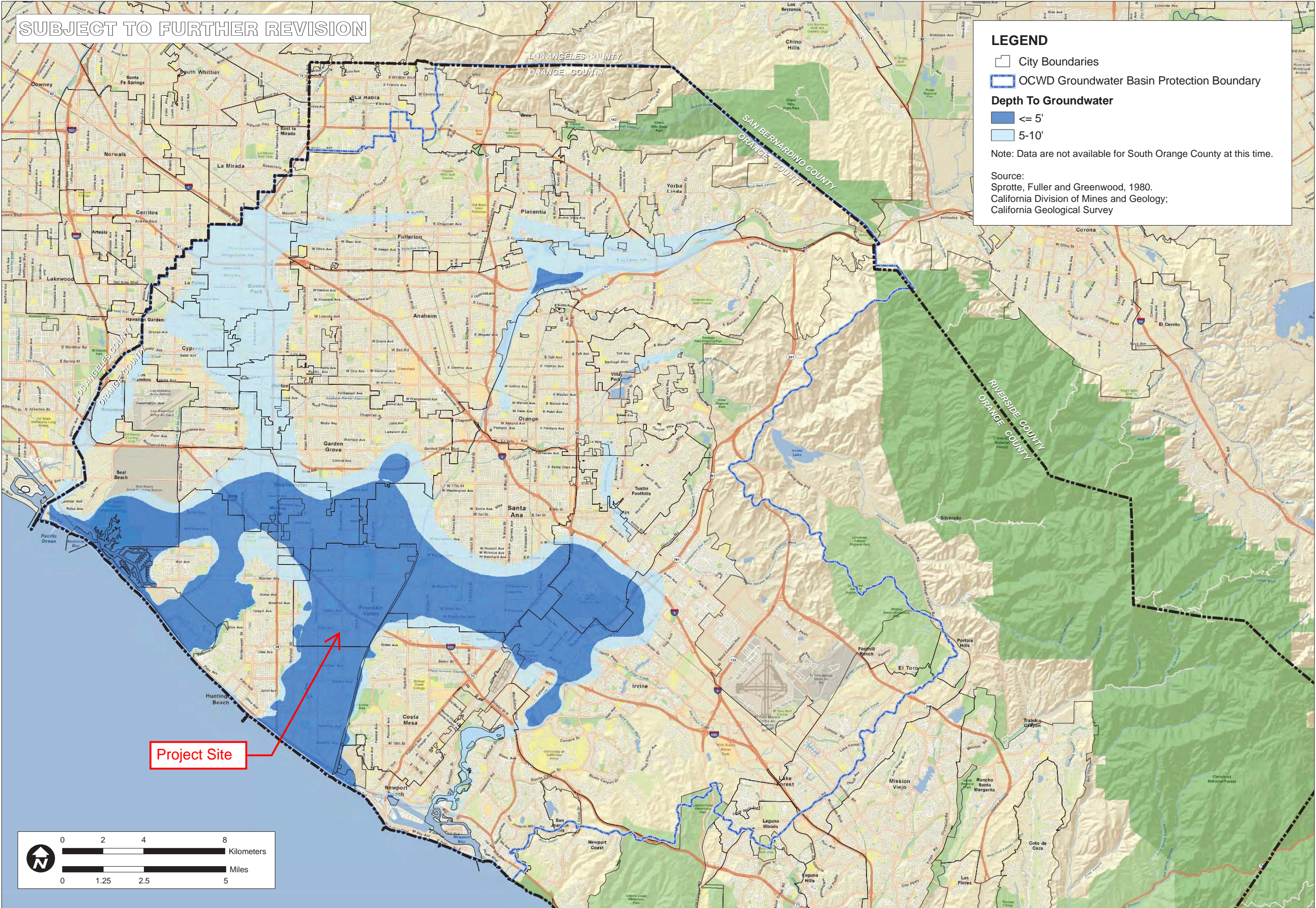
P:\9526E\6-GIS\MapDocs\Reports\Infiltration\Feasibility\_20110215\9526E\_FigureXVI-2a\_HydroSoils\_20110215.mxd



TITLE		ORANGE COUNTY INFLTRATION STUDY		JOB	
NRCS HYDROLOGIC SOILS GROUPS		ORANGE CO.		CA	
SCALE 1" = 1.8 miles		DESIGNED TH	DRAWING TH	CHECKED BMP	DATE 02/09/11
FIGURE XVI-2a		JOB NO. 9526-E			

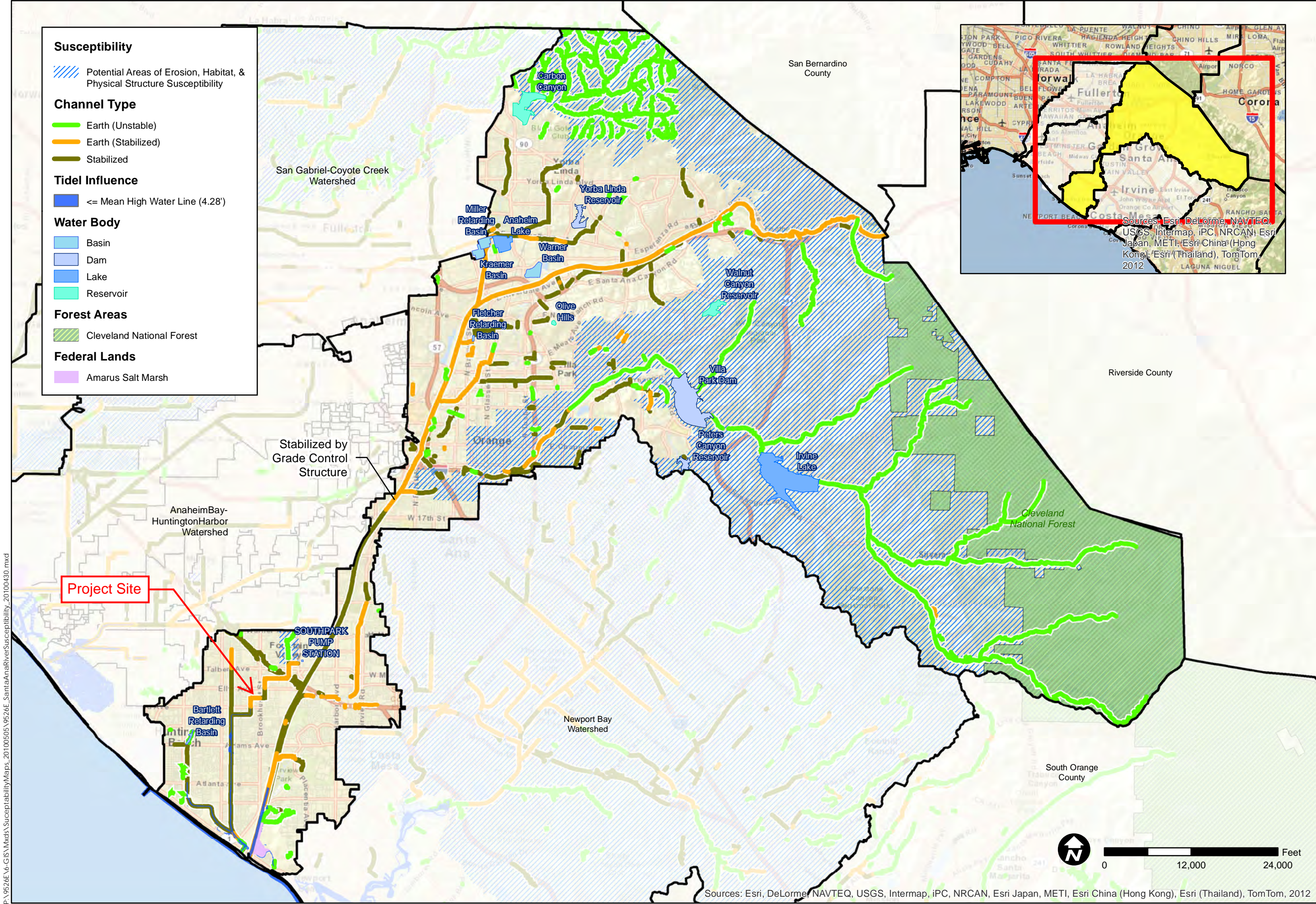


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NORTH ORANGE COUNTY MAPPED SHALLOW GROUNDWATER		TITLE	
ORANGE COUNTY INFILTRATION STUDY		CA	
ORANGE CO.		JOB	
SCALE 1" = 1.25 miles	DESIGNED TH	DRAWING TH	
	CHECKED BMP	DATE 02/09/11	
	JOB NO. 9526-E		
		FIGURE <b>XVI-2e</b>	





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SUSCEPTIBILITY ANALYSIS  
SANTA ANA RIVER

ORANGE COUNTY  
WATERSHED  
MASTER PLANNING

SCALE	1" = 12000'
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/30/10
JOB NO.	9526 E





## APPENDIX B

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### NOTICE OF TRANSFER OF RESPONSIBILITY

# NOTICE OF TRANSFER OF RESPONSIBILITY

## WATER QUALITY MANAGEMENT PLAN

Moiola Park Residential  
Track No. 19606

Submission of this Notice Of Transfer of Responsibility constitutes notice to the City of Fountain Valley 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 not 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 Owner 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

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### EDUCATIONAL MATERIALS





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.



### The Effect on the Ocean

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

## For More Information

- 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](mailto:ocstormwaterinfo-join@list.ocwatersheds.com)



- 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.

### Sources of Non-Point Source Pollution

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](http://www.ocwatersheds.com)



Printed on Recycled Paper



- 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 storm drains is (from sinks or toilets), water in storm drains is not treated before entering our waterways.

### Where Does It Go?

- 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.
- 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.

### Did You Know?

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

## The Ocean Begins at Your Front Door



# 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](http://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](http://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](http://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





# 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)*  
*Other Toxic 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

<input type="checkbox"/>	_____	<input type="checkbox"/>
<input type="checkbox"/>	_____	<input type="checkbox"/>
<input type="checkbox"/>	_____	<input type="checkbox"/>
<input type="checkbox"/>	_____	<input type="checkbox"/>
<input type="checkbox"/>	_____	<input type="checkbox"/>
<input type="checkbox"/>	_____	<input type="checkbox"/>
<input type="checkbox"/>	_____	<input type="checkbox"/>
<input type="checkbox"/>	_____	<input type="checkbox"/>
<input type="checkbox"/>	_____	<input type="checkbox"/>
<input type="checkbox"/>	_____	<input type="checkbox"/>

#### 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.)
<input type="checkbox"/> _____ <input type="checkbox"/>		<ul style="list-style-type: none"> <li>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)</li> </ul>
<input type="checkbox"/> _____ <input type="checkbox"/>		<ul style="list-style-type: none"> <li>1b. Consider retrofitting energy dissipaters (e.g. riprap) below culvert outfalls to minimize potential for erosion. (SED)</li> </ul>
<input type="checkbox"/> _____ <input type="checkbox"/>		<ul style="list-style-type: none"> <li>1c. Repair any v-ditches that have cracked or displaced in a manner that accelerates erosion. (SED)</li> </ul>
<input type="checkbox"/> _____ <input type="checkbox"/>		<ul style="list-style-type: none"> <li>1d. If suspicious conditions appear to exist, test selected samples of the removed wastes for compliance with hazardous waste regulations prior to disposal. (TOX)</li> </ul>
<input type="checkbox"/> _____ <input type="checkbox"/>		<ul style="list-style-type: none"> <li>1e. Consider more frequent regular cleaning of selected drainage structures to help address ongoing specific impairments. (SED, BACT, NUT, TRASH)</li> </ul>
<input type="checkbox"/> _____ <input type="checkbox"/>		<ul style="list-style-type: none"> <li>1f. Consider structural retrofits to the MS4 to help address ongoing specific impairments (SED, BACT, NUT, TRASH, O&amp;G)</li> </ul>
<input type="checkbox"/> _____ <input type="checkbox"/>		<ul style="list-style-type: none"> <li>1g. Consider cleaning out pipes at gradient breaks or other in-pipe debris accumulation points as identified/needed. (ANY, BACT, NUT, TRASH)</li> </ul>
<input type="checkbox"/> _____ <input type="checkbox"/>		<b>Storm Drain Flushing</b> <ul style="list-style-type: none"> <li>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).</li> </ul>
<input type="checkbox"/> _____ <input type="checkbox"/>		<ul style="list-style-type: none"> <li>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)</li> </ul>
<input type="checkbox"/> _____ <input type="checkbox"/>		<b>Waste Management</b> <ul style="list-style-type: none"> <li>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.</li> </ul>
<input type="checkbox"/> _____ <input type="checkbox"/>		<ul style="list-style-type: none"> <li>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)</li> </ul>
<input type="checkbox"/> _____ <input type="checkbox"/>		<ul style="list-style-type: none"> <li>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).</li> </ul>

2. Controlling Illicit Connections and Discharges	
<p><b>Unsatisfactory</b></p> <p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p>	<p><b>OK</b></p> <p><b>General Guidelines</b></p> <p>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.</p> <p>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.)</p> <p>T 2C. Report all observed illicit connections and discharges to the 24-hour water pollution problem reporting hotline (714) 567-6363.</p> <p>T 2D. Encourage public reporting of improper waste disposal by distributing public education materials and advertising the 24-hour water pollution problem reporting hotline.</p> <p><b>Storm Drain Stenciling ("No Dumping—Drains to Ocean")</b></p> <p>T 2E. Implement and maintain a storm drain stenciling program.</p> <ul style="list-style-type: none"> <li>2a. Consider adding the hotline number to the storm drain stencils (BACT, TOX, TRASH).</li> </ul>
3. Controlling Illegal Dumping	
<p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p> <p><input type="checkbox"/> _____</p> <p>_____</p>	<p><b>Field Investigation</b></p> <p>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.</p> <p>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)).</p> <p>T 3C. Report all observed illegal dumping to the 24-hour water pollution problem reporting hotline (714) 567-6363.</p> <p>T 3D. Encourage public reporting of improper waste disposal by distributing public education materials and advertising the 24-hour water pollution problem reporting hotline.</p> <p>T 3E. If perpetrator can be identified, take appropriate enforcement action.</p> <ul style="list-style-type: none"> <li>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)</li> </ul>



<p><b>Unsatisfactory</b> <b>OK</b></p> <p><input type="checkbox"/> _____ <input type="checkbox"/></p> <p>_____</p> <p><input type="checkbox"/> _____ <input type="checkbox"/></p> <p>_____</p> <p><input type="checkbox"/> _____ <input type="checkbox"/></p> <p>_____</p> <p>_____</p> <p>_____</p>	<p><b>Training/Education/Outreach</b></p> <p>T 3F. Verify that appropriate employees and subcontractors are trained to recognize and report illegal dumping.</p> <p>T 3G. Encourage public reporting of illegal dumping by advertising the 24-hour water pollution problem reporting hotline (714) 567-6363.</p> <ul style="list-style-type: none"> <li>• 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)</li> </ul>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

### 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.

*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.**



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Help Prevent Ocean Pollution:

## Proper Disposal of Household Hazardous Waste



**The Ocean Begins at  
Your Front Door**

**P R O J E C T**  
**Pollution**  
**P R E V E N T I O N**

**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](http://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.





Help Prevent Ocean Pollution:

*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.

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.

**REMEMBER THE  
WATER IN YOUR  
STORM DRAIN  
IS NOT TREATED  
BEFORE  
IT ENTERS OUR  
WATERWAYS**

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.



## Household Tips



**The Ocean Begins at Your Front Door**



# 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 wastewater.
- **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](http://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](http://www.oclandfills.com).





**C**lean 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](http://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.**

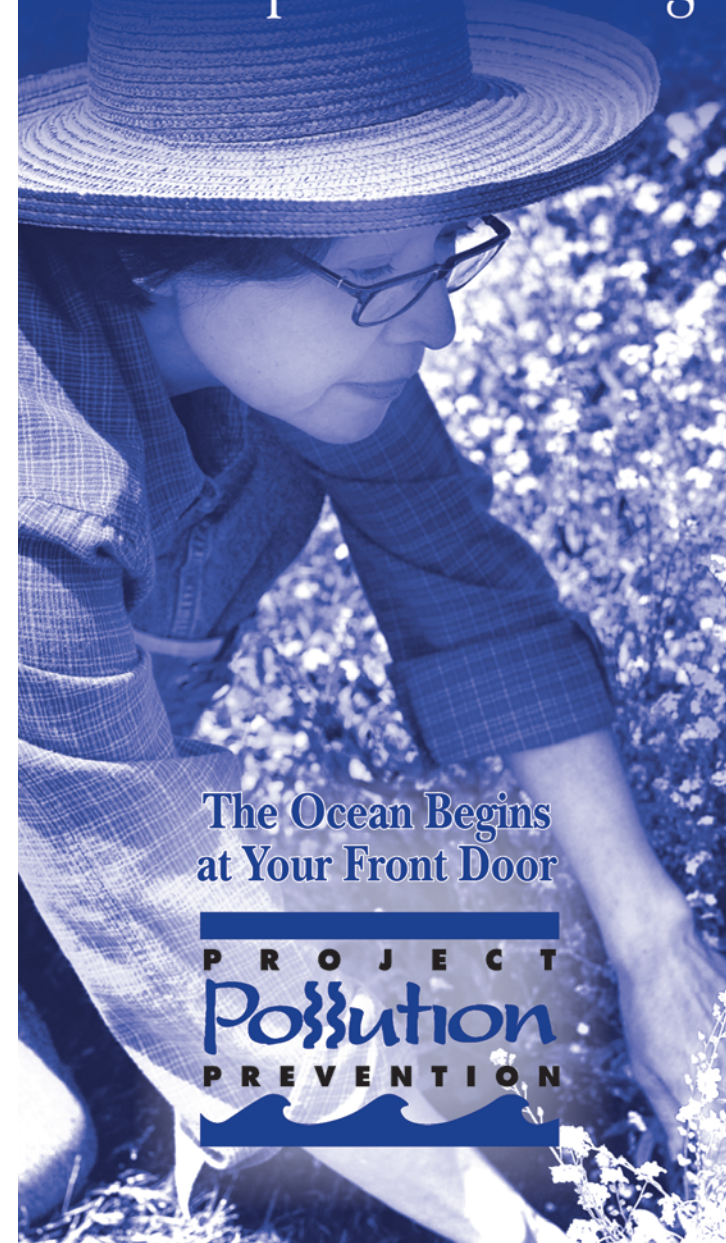
The tips contained in this brochure provide useful information to help prevent water pollution while landscaping or gardening. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.



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Help Prevent Ocean Pollution:

## Tips for Landscape & Gardening



The Ocean Begins  
at Your Front Door



# 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.

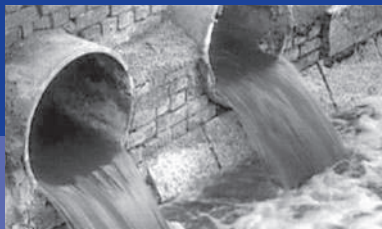
- When available, use non-toxic alternatives to traditional pesticides, and use pesticides specifically designed to control the pest you are targeting. For more information, visit [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu).
- If fertilizer is spilled, sweep up the spill before irrigating. If the 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](http://www.oclandfills.com)





**C**lean 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.**

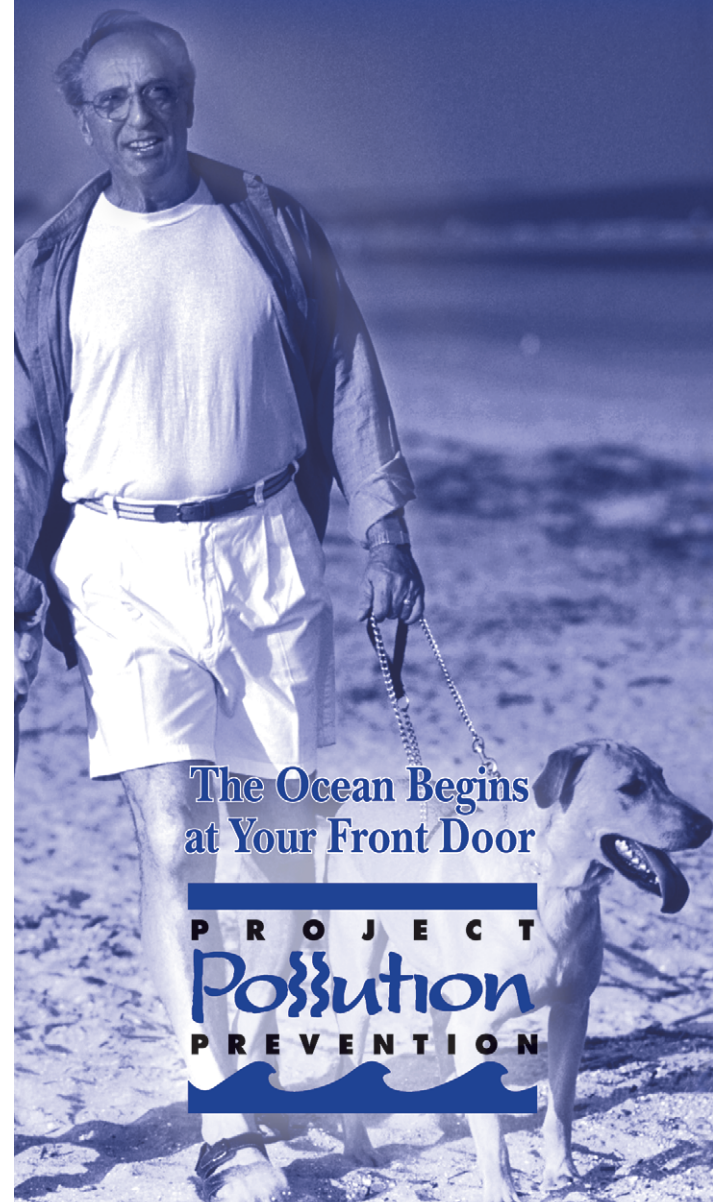
The tips contained in this brochure provide useful information to help prevent water pollution while caring for your pet. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.



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Help Prevent Ocean Pollution:

## Tips for Pet Care



**The Ocean Begins  
at Your Front Door**



# 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.





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

To report a spill,  
call the  
**Orange County 24-Hour  
Water Pollution Problem  
Reporting Hotline**  
at **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. 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 Residential Pool, Landscape and Hardscape Drains



The Ocean Begins  
at Your Front Door

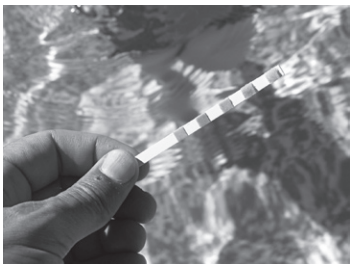


# Tips for Residential Pool, Landscape and Hardscape Drains

## Pool Maintenance

All pool water discharged to the curb, gutter or permitted pool drain from your property must meet the following water quality criteria:

- 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.
- There is no discharge of filter media or acid cleaning wastes.



Some cities have ordinances that do not allow pool water to be discharged to the storm drain. Check with your city.

## Landscape and Hardscape Drains

The following recommendations will help reduce or prevent pollutants from your landscape and hardscape drains from entering the street, gutter or storm drain. Unlike water that enters the sewer (from sinks and toilets), water that enters a landscape or hardscape drain is not treated before entering our creeks, rivers, bays and ocean.

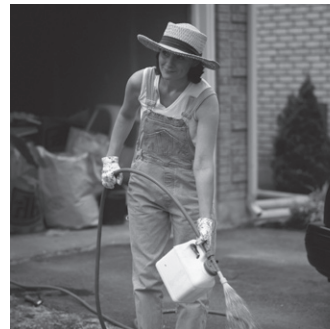
## Household Activities

- Do not rinse spills of materials or chemicals to any drain.
- Use dry cleanup methods such as applying cat litter or another absorbent material, then sweep it up and dispose of it in the trash. If the material is hazardous, dispose of it at a Household Hazardous Waste Collection Center (HHWCC). For locations, call (714) 834-6752 or visit [www.oclandfills.com](http://www.oclandfills.com).
- Do not hose down your driveways, sidewalks or patios to your landscape or hardscape drain. Sweep up debris and dispose of it in the trash.
- Always pick up after your pet. Flush waste down the toilet or dispose of it in the trash.

- Do not store items such as cleaners, batteries, automotive fluids, paint products, TVs, or computer monitors uncovered outdoors. Take them to a HHWCC for disposal.

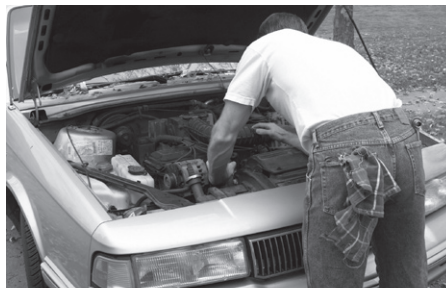
## Yard Maintenance

- Do not overwater. Water by hand or set automated irrigation systems to reflect seasonal water needs.
- Follow directions on pesticides and fertilizers (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Cultivate your garden often to control weeds and reduce the need to use chemicals.



## Vehicle Maintenance

- Never pour oil or antifreeze down your landscape or hardscape drain. Recycle these substances at a service station, a waste collection center or used oil recycling center. For locations, contact the Used Oil Program at 1-800-CLEANUP or visit [www.CLEANUP.org](http://www.CLEANUP.org).
- Whenever possible, take your vehicle to a commercial car wash.
- If you do wash your vehicle at home, do not allow the washwater to go down your landscape or hardscape drain. Instead, dispose of it in the sanitary sewer (a sink or toilet) or onto an absorbent surface such as your lawn.
- Use a spray nozzle that will shut off the water when not in use.





## 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.

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.

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	

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](http://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 from nearby creeks or storm drains.

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](http://www.ocwatersheds.com)





## R-6 DISPOSAL OF GREEN WASTES

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.

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	

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](http://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.

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.

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

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](http://www.ocwatersheds.com)







***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](http://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](http://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](http://www.oclandfills.com).



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



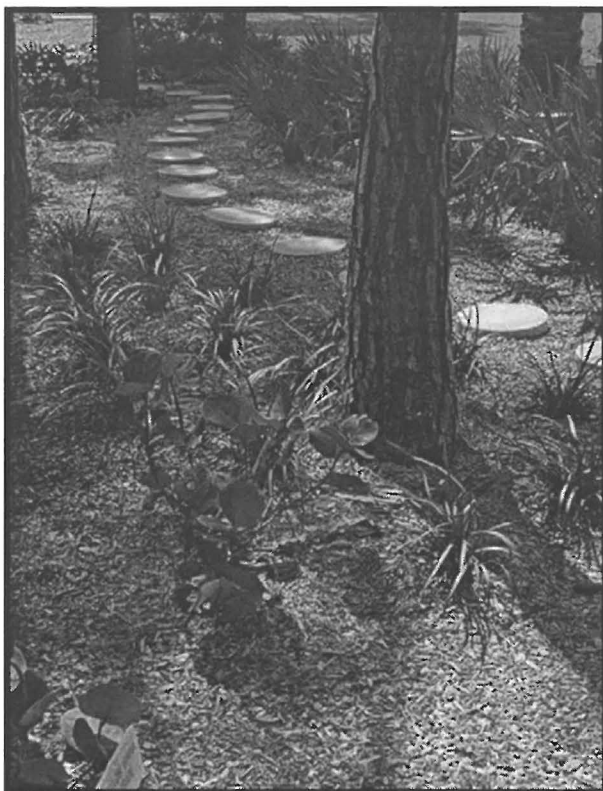
## NORTH COUNTY

# Used Oil Collection Centers

<b>Anaheim</b> <b>All Seasons Tire and Auto Center, Inc.</b> 817 S Brookhurst St., Anaheim, CA 92804 (714)772-6090( ) CIWMB#: 30-C-03177	<b>Kragen Auto Parts #1582</b> 3420 W Lincoln Ave., Anaheim, CA 92801 (714)828-7977( ) CIWMB#: 30-C-04103	<b>Cypress</b> <b>AutoZone #5521</b> 5471 Lincoln Ave., Cypress, CA 90630 (714)995-4644( ) CIWMB#: 30-C-00836	<b>Kragen Auto Parts #4133</b> 904 W Orangethorpe Ave., Fullerton, CA 92832 (714)526-3570( ) CIWMB#: 30-C-06256	<b>Firestone Store #2736</b> 1071 S Beach Blvd., La Habra, CA 90631 (562)691-1731( ) CIWMB#: 30-C-01169	<b>USA 10 Minute Oil Change</b> 8100 Lampson Ave., Stanton, CA 92841 (714)373-4432( ) CIWMB#: 30-C-05909
<b>AutoZone #3317</b> 423 N Anaheim Blvd., Anaheim, CA 92805 (714)776-0787( ) CIWMB#: 30-C-05263	<b>Pep Boys #613</b> 10912 Katella Ave., Anaheim, CA 92804 (714)828-0863( ) CIWMB#: 30-C-01756	<b>Big O Tires</b> 6052 Cerritos Ave., Cypress, CA 90630 (714)826-6334( ) CIWMB#: 30-C-04245	<b>Pep Boys #642</b> 1530 S Harbor Blvd., Fullerton, CA 92832 (714)870-0700( ) CIWMB#: 30-C-01755	<b>Kragen Auto Parts #1569</b> 1621 W Whittier Blvd., La Habra, CA 90631 (562)905-2538( ) CIWMB#: 30-C-04076	<b>Westminster</b> <b>AutoZone #5543</b> 6611 Westminster Blvd., Westminster, CA 92683 (714)898-2898( ) CIWMB#: 30-C-04964
<b>AutoZone #5226</b> 2145 W Lincoln Ave., Anaheim, CA 92801 (714)533-6599( ) CIWMB#: 30-C-04604	<b>Pep Boys #663</b> 3030 W Lincoln Anaheim, CA 92801 (714)826-4810( ) CIWMB#: 30-C-03417	<b>Econo Lube N' Tune #213</b> 5497 Cerritos Ave., Cypress, CA 90630 (714)761-0456( ) CIWMB#: 30-C-06240	<b>Sunnyside 76 Car Care Center</b> 2701 N Brea Blvd., Fullerton, CA 92835 (714)256-0773( ) CIWMB#: 30-C-01381	<b>Pep Boys #997</b> 125 W Imperial Hwy., La Habra, CA 90631 (714)447-0601( ) CIWMB#: 30-C-04026	<b>AutoZone #5544</b> 8481 Westminster Blvd., Westminster, CA 92683 (714)891-3511( ) CIWMB#: 30-C-04966
<b>Bedard Automotive</b> 3601 E Miraloma Ave., Anaheim, CA 92806 (714)528-1380( ) CIWMB#: 30-C-02205	<b>Pep Boys #809</b> 8205 E Santa Ana Cyn Rd., Anaheim, CA 92808 (714)974-0105( ) CIWMB#: 30-C-03443	<b>Jiffy Lube #851</b> 4942 Lincoln Ave., Cypress, CA 90630 (626)965-9689( ) CIWMB#: 30-C-06182	<b>Garden Grove</b> <b>76 Pro Lube Plus</b> 9001 Trask Ave., Garden Grove, CA 92844 (714)393-0590( ) CIWMB#: 30-C-05276	<b>SpeedDee Oil Change &amp; Tune-Up</b> 1580 W Imperial Hwy., La Habra, CA 90631 (562)697-3513( )	<b>City of Westminster Corporate Yard</b> 14381 Olive St., Westminster, CA 92683 (714)895-2876(292 ) CIWMB#: 30-C-02008
<b>Classic Chevrolet</b> 1001 Weir Canyon Rd., Anaheim, CA 92807 (714)283-5400( ) CIWMB#: 30-C-05223	<b>Pick Your Part</b> 1235 S Beach Blvd., Anaheim, CA 92804 (714)527-1645( ) CIWMB#: 30-C-03744	<b>M &amp; N Coastline Auto &amp; Tire Service</b> 4005 Ball Rd., Cypress, CA 90630 (714)826-1001( ) CIWMB#: 30-C-04387	<b>AutoZone #5527</b> 13190 Harbor Blvd., Garden Grove, CA 92843 (714)636-5665( ) CIWMB#: 30-C-04760	<b>Los Alamitos</b> <b>Jiffy Lube #1740</b> 3311 Katella Ave., Los Alamitos, CA 90720 (562)596-1827( ) CIWMB#: 30-C-03529	<b>Honda World</b> 13600 Beach Blvd., Westminster, CA 92683 (714)890-8900( ) CIWMB#: 30-C-03639
<b>Econo Lube N' Tune #4</b> 3201 W Lincoln Ave., Anaheim, CA 92801 (714)821-0128( ) CIWMB#: 30-C-01485	<b>PK Auto Performance</b> 3106 W. Lincoln Ave., Anaheim, CA 92801 (714)826-2141( ) CIWMB#: 30-C-05628	<b>Masterlube #103</b> 5904 Lincoln Cypress, CA 90630 (714)826-2323( ) CIWMB#: 30-C-01071	<b>David Murray Shell</b> 12571 Vly View St., Garden Grove, CA 92845 (714)898-0170( ) CIWMB#: 30-C-00547	<b>Midway City</b> <b>Bolsa Transmission</b> 8331 Bolsa Ave., Midway City, CA 92655 (714)799-6158( ) CIWMB#: 30-C-05768	<b>Jiffy Lube #1579</b> 6011 Westminster Blvd., Westminster, CA 92683 (714)899-2727( ) CIWMB#: 30-C-02745
<b>EZ Lube Inc - Savi Ranch #43</b> 985 N Weir Canyon Rd., Anaheim, CA 92807 (714)556-1312( ) CIWMB#: 30-C-06011	<b>Quick Change Lube and Oil</b> 2731 W Lincoln Ave., Anaheim, CA 92801 (714)821-4464( ) CIWMB#: 30-C-04363	<b>Masterlube #104</b> 5971 Ball Rd., Cypress, CA 90630 (714)220-1555( ) CIWMB#: 30-C-04682	<b>Express Lube &amp; Wash</b> 8100 Lampson Ave., Garden Grove, CA 92841 (909)316-8261( ) CIWMB#: 30-C-06544	<b>Placentia</b> <b>Advanced Auto &amp; Diesel</b> 144 S Bradford Placentia, CA 92870 (714)996-8222( ) CIWMB#: 30-C-06242	<b>John's Brake &amp; Auto Repair</b> 13050 Hoover St., Westminster, CA 92683 (714)379-2088( ) CIWMB#: 30-C-05617
<b>Firestone Store #71C7</b> 1200 S Magnolia Ave., Anaheim, CA 92804 (949)598-5520( ) CIWMB#: 30-C-05743	<b>Saturn of Anaheim</b> 1380 S Auto Center Dr., Anaheim, CA 92806 (714)648-2444( ) CIWMB#: 30-C-06332	<b>Metric Motors of Cypress</b> 6042 Cerritos Ave., Cypress, CA 90630 (714)821-4702( ) CIWMB#: 30-C-05157	<b>Firestone Store #7180</b> 10081 Chapman Ave., Garden Grove, CA 92840 (714)530-4630( ) CIWMB#: 30-C-01224	<b>Castner's Auto Service</b> 214 S. Bradford Ave., Placentia, CA 92870 (714)528-1311( ) CIWMB#: 30-C-06452	<b>Kragen Auto Parts #0762</b> 6562 Westminster Blvd., Westminster, CA 92683 (714)898-0810( ) CIWMB#: 30-C-02590
<b>Great Western Lube Express</b> 125 N Brookhurst St., Anaheim, CA 92801 (714)254-1300( ) CIWMB#: 30-C-05542	<b>Sun Tech Auto Service</b> 105 S State College Blvd., Anaheim, CA 92806 (714)956-1389( ) CIWMB#: 30-C-06455	<b>Fullerton</b> <b>AutoZone #2898</b> 146 N. Raymond Ave., Fullerton, CA 92831 (714)870-9772( ) CIWMB#: 30-C-04488	<b>Firestone Store #71W3</b> 13961 Brookhurst St., Garden Grove, CA 92843 (714)590-2741( ) CIWMB#: 30-C-03690	<b>Econo Lube N' Tune</b> 100 W Chapman Ave., Placentia, CA 92870 (714)524-0424( ) CIWMB#: 30-C-06454	<b>Midway City Sanitary District</b> 14451 Cedarwood St., Westminster, CA 92683 (714)893-3553( ) CIWMB#: 30-C-01626
<b>HR Pro Auto Service Center</b> 3180 W Lincoln Ave., Anaheim, CA 92801 (714)761-4343( ) CIWMB#: 30-C-05927	<b>Vonic Truck Services</b> 515 S Rose St., Anaheim, CA 92805 (714)533-3333( ) CIWMB#: 30-C-01142	<b>AutoZone #5522</b> 1801 Orangethorpe W. Fullerton, CA 92833 (714)870-8286( ) CIWMB#: 30-C-06062	<b>Jiffy Lube #1991</b> 13970 Harbor Blvd., Garden Grove, CA 92843 (714)554-0610( ) CIWMB#: 30-C-05400	<b>Fairway Ford</b> 1350 E Yorba Linda Blvd., Placentia, CA 92870 (714)524-1200( ) CIWMB#: 30-C-01863	<b>Pep Boys #653</b> 15221 Beach Blvd., Westminster, CA 92683 (714)893-8544( ) CIWMB#: 30-C-03415
<b>Ira Newman Automotive Services</b> 1507 N State College Blvd., Anaheim, CA 92806 (714)635-2392( ) CIWMB#: 30-C-01482	<b>Anaheim Hills</b> <b>Anaheim Hills Car Wash &amp; Lube</b> 5810 E La Palma Ave., Anaheim Hills, CA 92807 (714)777-6605( ) CIWMB#: 30-C-01387	<b>AutoZone #5523</b> 102 N Euclid Fullerton, CA 92832 (714)870-8286( ) CIWMB#: 30-C-04755	<b>Kragen Auto Parts #1251</b> 13933 N Harbor Blvd., Garden Grove, CA 92843 (714)554-3780( ) CIWMB#: 30-C-02663	<b>Seal Beach</b> <b>M &amp; N Coastline Auto &amp; Tire Service</b> 12239 Seal Beach Blvd., Seal Beach, CA 90740 (714)826-1001( ) CIWMB#: 30-C-04433	<b>Yorba Linda</b> <b>AutoZone #5545</b> 18528 Yorba Linda Blvd., Yorba Linda, CA 92886 (714)970-8933( ) CIWMB#: 30-C-04971
<b>Jiffy Lube #1028</b> 2400 W Ball Rd., Anaheim, CA 92804 (714)761-5211( ) CIWMB#: 30-C-00870	<b>Brea</b> <b>Firestone Store #27A9</b> 891 E Imperial Hwy., Brea, CA 92821 (714)529-8404( ) CIWMB#: 30-C-01221	<b>EZ Lube #17</b> 4002 N Harbor Blvd., Fullerton, CA 92835 (714)871-9980( ) CIWMB#: 30-C-03741	<b>Kragen Auto Parts #1555</b> 9851 Chapman Ave., Garden Grove, CA 92841 (714)741-8030( ) CIWMB#: 30-C-04079	<b>Seal Beach Chevron</b> 12541 Seal Beach Blvd., Seal Beach, CA 90740 (949)495-0774(14 ) CIWMB#: 30-C-06425	<b>Econo Lube N' Tune</b> 22270 La Palma Ave., Yorba Linda, CA 92887 (714)692-8394( ) CIWMB#: 30-C-06513
<b>Jiffy Lube #1903</b> 2505 E Lincoln Ave., Anaheim, CA 92806 (714)490-1274( ) CIWMB#: 30-C-05511	<b>Oil Can Henry's</b> 230 N Brea Blvd., Brea, CA 92821 (714)990-1900( ) CIWMB#: 30-C-04273	<b>Firestone Store #27EH</b> 1933 N Placentia Ave., Fullerton, CA 92831 (714)993-7100( ) CIWMB#: 30-C-02122	<b>Nissan of Garden Grove</b> 9670 Trask Ave., Garden Grove, CA 92884 (714)537-0900( ) CIWMB#: 30-C-06553	<b>Stanton</b> <b>AutoZone #2806</b> 11320 Beach Blvd., Stanton, CA 90680 (714)895-7665( ) CIWMB#: 30-C-04563	<b>EZ Lube Inc. #41</b> 17511 Yorba Linda Blvd., Yorba Linda, CA 92886 (714)556-1312( ) CIWMB#: 30-C-05739
<b>Jiffy Lube #2340</b> 2181 W Lincoln Ave., Anaheim, CA 92801 (714)533-1000( ) CIWMB#: 30-C-04647	<b>Buena Park</b> <b>Firestone Store #71F7</b> 6011 Orangethorpe Buena Park, CA 90620 (714)670-7912( ) CIWMB#: 30-C-01218	<b>Fox Service Center</b> 1018 W Orangethorpe Fullerton, CA 92833 (714)879-1430( ) CIWMB#: 30-C-02318	<b>Toyota of Garden Grove</b> 9444 Trask Ave., Garden Grove, CA 92844 (714)895-5595( ) CIWMB#: 30-C-06555	<b>Joe's Auto Clinic</b> 11763 Beach Blvd., Stanton, CA 90680 (714)891-7715( ) CIWMB#: 30-C-03253	<b>Firestone Store #27T3</b> 18500 Yorba Linda Blvd., Yorba Linda, CA 92886 (714)779-1966( ) CIWMB#: 30-C-01222
<b>Kragen Auto Parts #1303</b> 1088 N State College Blvd., Anaheim, CA 92806 (714)956-7351( ) CIWMB#: 30-C-03438	<b>Firestone Store #71T8</b> 8600 Beach Blvd., Buena Park, CA 90620 (714)827-5300( ) CIWMB#: 30-C-02121	<b>Fullerton College Automotive Technology</b> 321 E Chapman Ave., Fullerton, CA 92832 (714)992-7275( ) CIWMB#: 30-C-03165	<b>Burch Ford</b> 201 N Harbor Blvd., La Habra, CA 90631 (562)691-3225( ) CIWMB#: 30-C-05179	<b>Kragen Auto Parts #1742</b> 11951 Beach Blvd., Stanton, CA 90680 (714)799-7574( ) CIWMB#: 30-C-05231	<b>Jiffy Lube #1532</b> 16751 Yorba Linda Blvd., Yorba Linda, CA 92886 (714)528-2800( ) CIWMB#: 30-C-03777
<b>Kragen Auto Parts #1399</b> 2245 W Ball Rd., Anaheim, CA 92804 (714)490-1274( ) CIWMB#: 30-C-04094	<b>Kragen Auto Parts #1204</b> 5303 Beach Blvd., Buena Park, CA 90621 (714)994-1320( ) CIWMB#: 30-C-02623	<b>Kragen Auto Parts #0731</b> 2978 Yorba Linda Fullerton, CA 92831 (714)996-4780( ) CIWMB#: 30-C-02628		<b>Scher Tire #20</b> 7000 Katella Ave., Stanton, CA 90680 (714)892-9924( ) CIWMB#: 30-C-05907	<b>Mike Schultz Import Service</b> 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).*

# 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.



# SD-10 Site Design & Landscape Planning

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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



# Site Design & Landscape Planning SD-10

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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.

## **SD-10 Site Design & Landscape Planning**

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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.



### Design Objectives

- ☒ Maximize Infiltration
- ☒ Provide Retention
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- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
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- 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.



- 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.

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## Design Objectives

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## 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"



– 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.

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**C**lean 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](http://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.



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## Help Prevent Ocean Pollution: Tips For Protecting Your Watershed



The Ocean Begins  
at Your Front Door



# 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](http://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](http://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](http://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.





## APPENDIX D

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### BMP MAINTENANCE SUPPLEMENT / O&M PLAN

# OPERATIONS AND MAINTENANCE (O&M) PLAN

Water Quality Management Plan

For

Moiola Park Residential

Finch Avenue, Fountain Valley, CA 92708  
Tract No. 19606

APN: 157-033-15

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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 property owners annually. Materials to be distributed are found in Appendix C of this WQMP. Owners will maintain a copy of these materials and distribute them to all employees annually. <u>Frequency:</u> Annually	Brookfield Residential/HOA
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. <u>Frequency:</u> Ongoing	Brookfield Residential/HOA



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) as well as local requirements. 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 drain inlets. <u>Frequency:</u> Monthly	Brookfield Residential/HOA
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. <u>Frequency:</u> Ongoing	Brookfield Residential/HOA
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. <u>Frequency:</u> Weekly	Brookfield Residential/HOA
Yes	N12. Employee Training	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. <u>Frequency:</u> Annually	Brookfield Residential/HOA
No	N13. Housekeeping of Loading Docks	Not Applicable	
Yes	N14. Common Area Catch Basin Inspection	Catch basin inlets and other drainage facilities shall be inspected after each storm event and once per year. Inlets and other facilities shall be cleaned prior to the rainy season, by October 1 each year. <u>Frequency:</u> Annually	Brookfield Residential/HOA

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	N15. Street Sweeping Private Streets and Parking Lots	Drive aisles & any exposed parking areas must be swept at least once per month, including prior to the start of the rainy season (October 1). <u>Frequency:</u> Monthly	Brookfield Residential/HOA
No	N16. Retail Gasoline Outlets	Not Applicable	
STRUCTURAL SOURCE CONTROL BMPs			
Yes	S1. Provide storm drain system stenciling and signage	Storm drain stencils shall be inspected for legibility, at minimum, once prior to the storm season, no later than October 1 each year. Those determined to be illegible will be re-stenciled as soon as possible. <u>Frequency:</u> Annually	Brookfield Residential/HOA
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	

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	S4. Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	In conjunction with routine maintenance activities, verify that landscape design continues to function properly by adjusting properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather, and day or night time 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. <u>Frequency:</u>	
No	S5. Protect slopes and channels and provide energy dissipation	Not Applicable	
No	S6. Dock areas	Not Applicable	
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	



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	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
<b>LOW IMPACT DEVELOPMENT BMPs</b>		
HU-2: Underground Detention (RainHarvest Systems or similar)	Inspect system via the maintenance port for drawdown after major rain events and at least semi-annually, once prior to the rainy season and once after the rainy season. Should drawdown times get significantly reduced due to sediment buildup, flush system by injecting high pressure water via the maintenance port and remove sediment laden water via sump pump. <u>Frequency:</u> 2x per year inspection, annual cleanout (minimum)	Brookfield Residential/HOA

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
BIO-7: Modular Wetland System	<p>The Modular Wetland units shall be maintained in accordance with manufacturer's specifications. The system shall be inspected at a minimum of once every six months, prior to the start of the rainy season (October 1) each year, and after major storm events. Typical maintenance includes:</p> <ul style="list-style-type: none"> <li>• Removing trash &amp; debris from the catch basin screening filter (by hand).</li> <li>• Removal of sediment and solids in the settlement chamber (vacuum truck).</li> <li>• Replacement of the BioMediaGREENTM filter cartridge and drain-down filter (if equipped)</li> <li>• Trim plants within the wetland chamber as needed in conjunction with routine landscape maintenance activities. No fertilizer shall be used.</li> </ul> <p>Wetland chamber should be inspected during rain events to verify flow through the system. If little to no flow is observed from the lower valve or orifice plate, the wetland media may require replacement.</p> <p><u>Frequency:</u> 2x per year</p>	Brookfield Residential/HOA

### **Required Permits**

An encroachment permit from Orange County Public Works (OCPW) will be required for the abandonment of the existing storm drain connection, and for construction of the new connections to the channel.

### **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: \_\_\_\_\_

[illegible]



## RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: \_\_\_\_\_

Name of Person Performing Activity (Printed): \_\_\_\_\_

Signature: \_\_\_\_\_

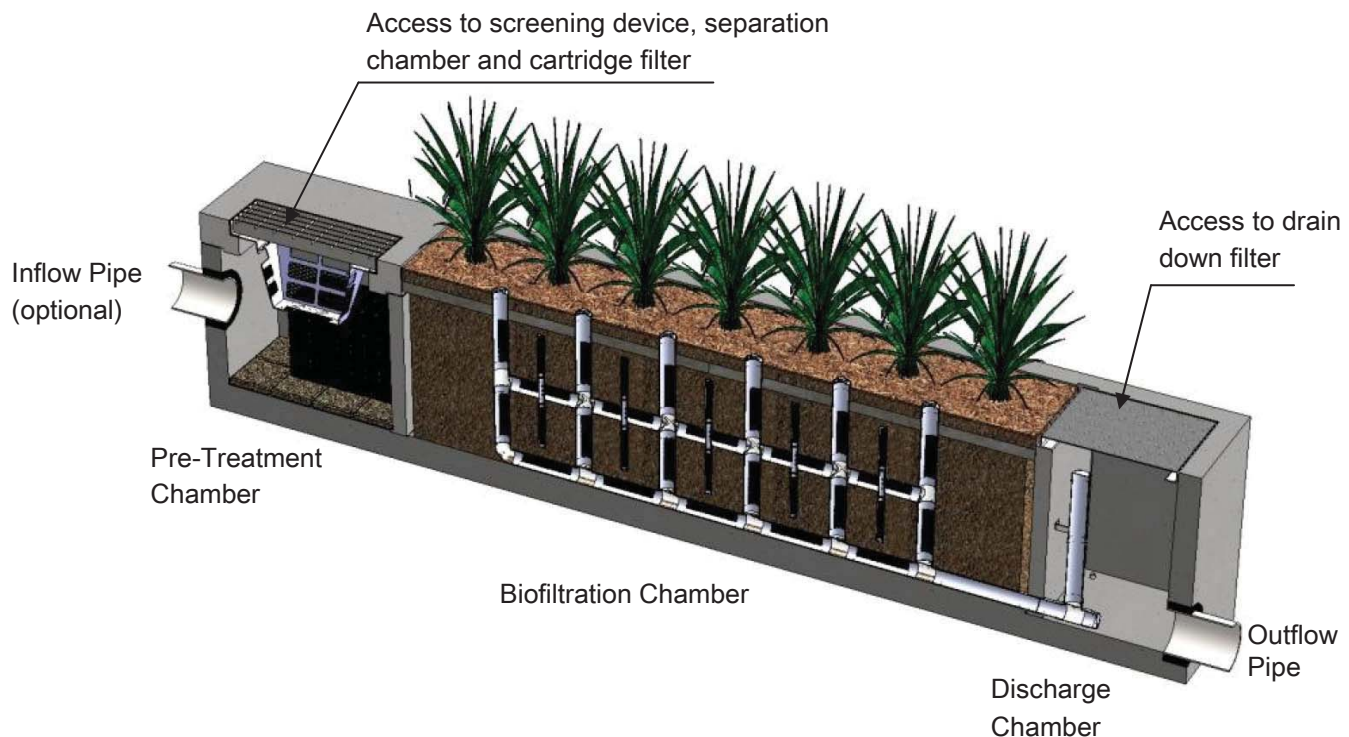
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# Maintenance Guidelines for Modular Wetland System - Linear

## Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
  - *(5 minute average service time).*
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
  - *(10 minute average service time).*
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
  - *(10-15 minute per cartridge average service time).*
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
  - *(5 minute average service time).*
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - *(Service time varies).*

## System Diagram



## **Maintenance Procedures**

### **Screening Device**

1. Remove grate or manhole cover to gain access to the screening device in the Pre-Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screening device.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

### **Separation Chamber**

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

### **Cartridge Filters**

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

### **Drain Down Filter**

1. Remove hatch or manhole cover over discharge chamber and enter chamber.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.



## Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.
2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.
3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.
4. Entry into chambers may require confined space training based on state and local regulations.
5. No fertilizer shall be used in the Biofiltration Chamber.
6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.



## Maintenance Procedure Illustration

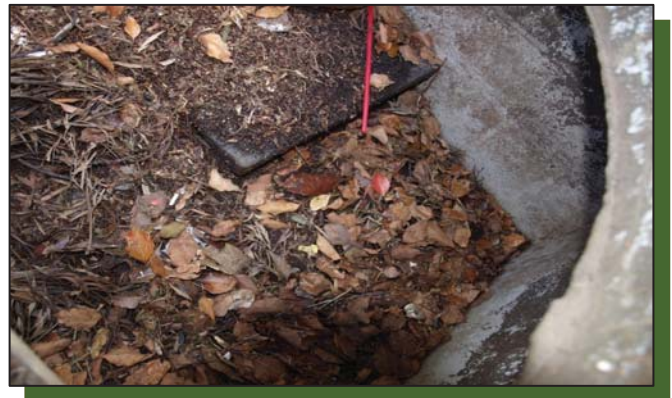
### Screening Device

The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.



### Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.



### Cartridge Filters

The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.



### Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.





## Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.





## Inspection Form



Modular Wetland System, Inc.

P. 760.433-7640

F. 760-433-3176

E. [Info@modularwetlands.com](mailto:Info@modularwetlands.com)

[www.modularwetlands.com](http://www.modularwetlands.com)





# Inspection Report Modular Wetlands System



Project Name \_\_\_\_\_

Project Address \_\_\_\_\_ (city) (Zip Code)

Owner / Management Company \_\_\_\_\_

Contact \_\_\_\_\_

Phone ( ) -

Inspector Name \_\_\_\_\_

Date \_\_\_\_ / \_\_\_\_ / \_\_\_\_ Time \_\_\_\_ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition \_\_\_\_\_

Additional Notes \_\_\_\_\_

For Office Use Only

(Reviewed By)

(Date)  
Office personnel to complete section to the left.

## Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): \_\_\_\_\_ Size (22', 14' or etc.): \_\_\_\_\_

Structural Integrity:	Yes	No	Comments
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
<b>Working Condition:</b>			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes, specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
<b>Other Inspection Items:</b>			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	Yes	No
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: \_\_\_\_\_



## Maintenance Report



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[www.modularwetlands.com](http://www.modularwetlands.com)



## Cleaning and Maintenance Report Modular Wetlands System



Project Name \_\_\_\_\_

Project Address \_\_\_\_\_  
(city) (Zip Code)

Owner / Management Company \_\_\_\_\_

Contact \_\_\_\_\_

Phone ( ) -

Inspector Name \_\_\_\_\_

Date \_\_\_\_ / \_\_\_\_ / \_\_\_\_ Time \_\_\_\_ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint

☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition \_\_\_\_\_

Additional Notes \_\_\_\_\_

For Office Use Only

(Reviewed By)

(Date)  
Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat:	MWS Catch Basins						
	Long:							
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:

# Instructions for maintenance of GRAF EcoBloc Inspect flex, Ecobloc Inspect 230 & EcoBloc Inspect 420

## GRAF EcoBloc Inspect



The points described in these instructions must be observed under all circumstances. All warranty rights are invalidated in the event of non-observance. Separate installation instructions are enclosed in the transportation packaging for all additional articles purchased from GRAF.

The Graf EcoBloc Inspect must be checked for any damage prior to installation under all circumstances.

Missing instructions can be downloaded on [www.graf.info](http://www.graf.info) or can be requested from GRAF.

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## 1. General information

### 1.1 General

Infiltration/attenuation systems are usually subject to official approval processes. This should be investigated in the planning phase and approval sought if required. The statutory specifications and the requirements in the relevant literature, such as German and European standards and work sheets / data sheets of the DWA, always apply.

Only authorised and qualified personnel should install and inspect the infiltration/attenuation system. The following safety and installation instructions should also be noted.

The infiltration/attenuation system is usually sized in accordance with national standards. You can request free sizing from Graf. The permeability of the surrounding soil is of great significance and may result in problems with and damage to the Graf infiltration & attenuation system if calculated incorrectly.

### 1.2 Safety

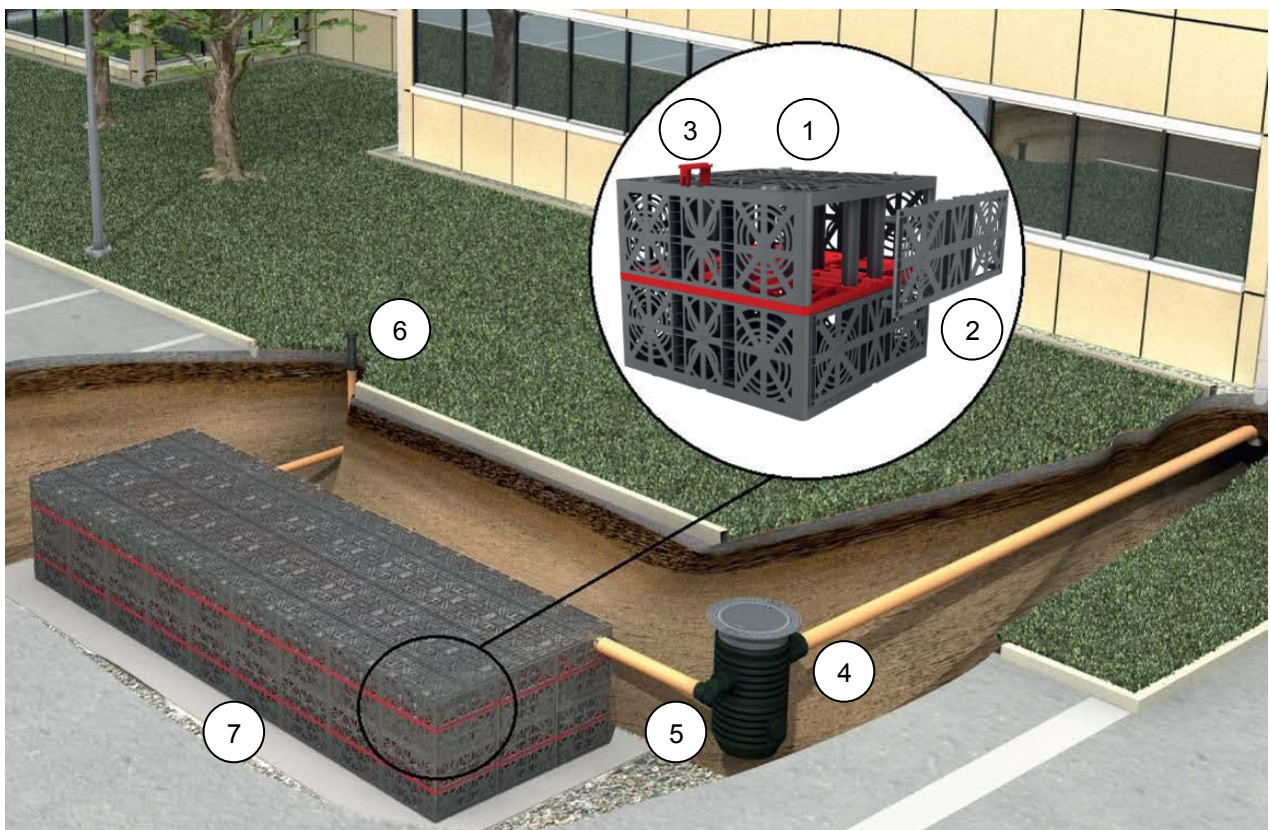
All work should be undertaken in compliance with the relevant accident prevention regulations according to BGV C22. There is an increased risk of slipping on Graf Ecobloc Inspect flex, 230 or 420 in frosty and wet conditions.

GRAF provides an extensive range of accessories, which are all coordinated and can be combined to form complete systems. Using other manufacturers accessories or components may result in the system's reduced performance or failure and liability for damage or costs will not be accepted.

## 2. General product information

The GRAF infiltration/attenuation range includes the following products:

Product Type		Description	Part #
Infiltration System			
	1	GRAF EcoBloc Inspect	402000
	2	GRAF EcoBloc Inspect end plates	402002
	3	GRAF EcoBloc connecting elements, e.g. 10-piece set	402015
		GRAF EcoBloc Inspect flex primary module	402005
		GRAF EcoBloc Inspect baseplate	402006
Shafts			
	4	GRAF VS inlet module DN 400	330339
		GRAF VS connecting piece DN 400	330341
	5	GRAF VS distributor module DN 400	330340
		GRAF VS inlet module DN 600	330360
Accessories			
	6	4" venting end	369017
		8" Inspection end	340527
	7	GRAF-tex geo textile, roll width 5 metre	231002



### 3. General legal information

#### 3.1 European and German guidelines for infiltration/attenuation system operators

The person operating an infiltration/attenuation system, usually the owner, is bound by obligations which are laid down in European and German guidelines. Any discharge, by infiltration/attenuation system through layers of soil, of dangerous substances into the water cycle, especially the groundwater, is prohibited by the European Directives 76/464/EEC and 80/68/EEC. Operators of infiltration/attenuation systems are also bound to the German Federal Water Act (WHG) and in terms of the soil layers, the Federal Soil Protection Act and Federal Soil Protection Ordinance.

Together with local guidelines, the operator is subject to the following obligations:

- Dangerous substances must not enter the water cycle
- If there is a risk of dangerous substances entering the water cycle, appropriate countermeasures (treatment with filter or swale) should be taken
- Should ensure that the infiltration/attenuation system is operated correctly at all times.

An information brochure detailing the methods required (oil separators, filters, silt traps, swale etc.) for pre-treatment is usually available from the local authority or water board responsible. This will also contain information about infiltration/attenuation not requiring a licence and the licence issued under water law for infiltration/attenuation which may have to be obtained.

### 4. Technical data

	Double unit	Single unit
<b>Volumen (gross/net)</b>	<b>(111/107 US-gal.)</b>	<b>(54.2/51.5 US-gal.)</b>
<b>Dimensions (LxWxH)</b>	<b>(31.44" x 31.44" x 25.98")</b>	<b>(31.44" x 31.44" x 12.6")</b>
<b>Connections</b>	<b>(8) 8"/6"/4" + (8) 4"</b>	<b>(4) 8"/6"/" + (4) 4"</b>
<b>Weight</b>	<b>17 kg (37.5 lbs)</b>	<b>8 kg (17.6 lbs)</b>
<b>Material</b>	<b>100 % polypropylene (PP), recycled material</b>	
<b>Load capacity</b>		
Short term	max. 100 kN/m <sup>2</sup> (14.5 psi)	
Long term	max. 59 kN/m <sup>2</sup> (8.55 psi)	

## 5. Treating Surface & rainwater

### 5.1 Treating surface & rainwater

To ensure perfect operation of the infiltration/attenuation system, filters of sufficient sizes should usually be fitted. These filters are required to be installed upstream of the infiltration/attenuation system.

In special cases, multi-stage filter systems with coarse and fine filters are used to treat the rainwater. The exposure and size of the collection surfaces can be used to determine whether a multi-stage system is needed and the size of filter required. We would be happy to help you select an appropriate filter/filter shaft. GRAF provides an extensive range of such products.

Work sheet DWA A-138 and data sheet DWA M-153 also contain sizing examples and information about filter stages upstream of infiltration/attenuation systems.

### 5.2 Filter units

The DWA data sheet M-153 provides various recommendations for working with rainwater. An overview is provided in Table 1.

**Table 1**

Groundwater intake	Retention soil filters	Sedimentation systems	Filters
Swales	Sand filters	Silt traps	Coarse filters
Surface infiltration	Ponds	Purification basins for rainwater	Fine filters
			Substrate filters

In areas with high concentrations of pollutants, several filter systems can also be combined to form one overall filter. This firstly filters out coarse particles and then retains dissolved substances.

The layers of soil which the rainwater penetrates during the infiltration process before it reaches the groundwater also have a filtering effect. A distance of one metre between the bed of the infiltration system and average groundwater level should therefore be maintained during the planning phase and/or when setting up the system in accordance with DWA A-138.



## 6. Maintaining the infiltration/attenuation system

### 6.1 Collection surfaces

Maintenance begins at the start of the rain cycle. A very dirty collection surface may produce an increased amount of dirt for the system which then requires a lot of effort to filter out later on. To extend the service life of the filters, we would therefore recommend maintaining the collection surfaces to remove large pieces of dirt (leaves, grit etc.).

### 6.2 Filter unit

All kinds of filter units, see chapter 5, require maintenance to ensure the infiltration/attenuation system operates perfectly. Perfect operation is essential for avoiding damage to the infiltration/attenuation system and maintaining performance.

The pollutant levels depend on seasonal factors. During these periods, we would therefore recommend checking the filter units for overflows or full sludge and dirt buckets. Increased dirt levels will arise in the event of

- snow melt
- build-up of grit
- high pollen levels
- heavy rainfall during storms
- autumn leaf drop

The details provided by the manufacturer on maintaining and servicing the filter units used should also be followed.

### 6.3 Inspection & performance of system

Regularly checking the infiltration/attenuation system will ensure high performance and guarantee the rapid distribution of surface & rainwater in the event of heavy rainfall of a high intensity.



Jet washing the system



Inspection with camera

## **7. Maintaining the infiltration/attenuation system**

As described above, dirt may reduce the performance of the infiltration/attenuation system. Drops in performance can be checked using e.g. tests with a defined volume.

The volume and duration for a test can be estimated and compared using the sizing documents according to DWA A-138.

If the infiltration performance deviates by  $\geq 25\%$ , we would recommend using inspection equipment to check the system. Coarse particles or dirty geo textile impairing the infiltration performance can be removed with appropriate high-pressure purging probes. The general condition, for example, correct installation or changes to the system over time, can also be checked with Inspection equipment.

Local drain Inspection companies can inspect and rinse the systems.

## **8. Other applications**

This documentation only relates to use of the GRAF EcoBloc infiltration/attenuation systems for retaining, storing or infiltrating surface & rainwater. Any other use of the infiltration/attenuation system must be agreed with Otto GRAF GmbH from a technical, material and/or structural viewpoint.

Should special requirements apply, we would also recommend contacting architects or planners with knowledge of hydrology and geology.

## APPENDIX E

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### CONDITIONS OF APPROVAL

*(PENDING ISSUANCE)*

## APPENDIX F

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### CUSTOM SOIL RESOURCE REPORT





United States  
Department of  
Agriculture

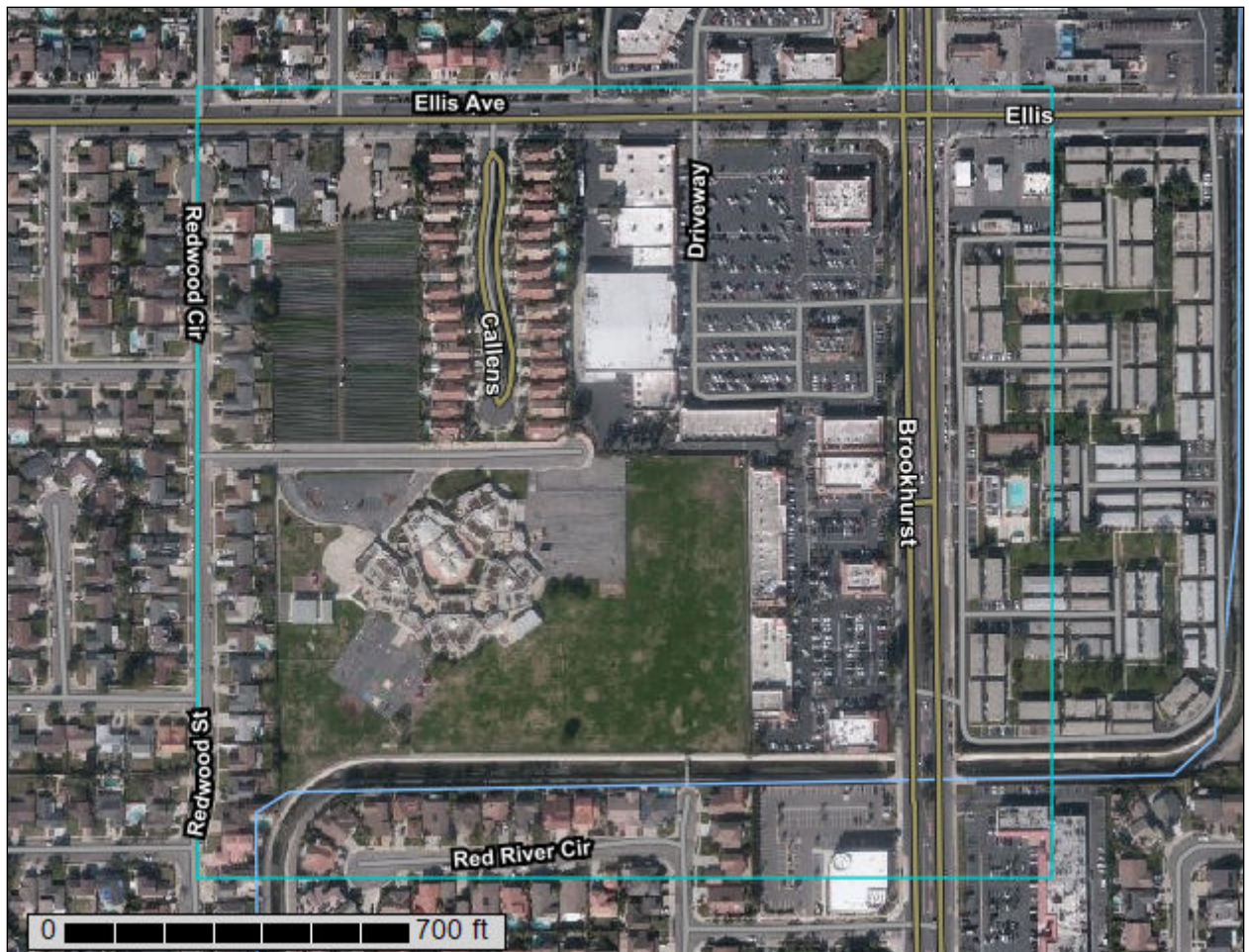
**NRCS**

Natural  
Resources  
Conservation  
Service

A product of the National  
Cooperative Soil Survey,  
a joint effort of the United  
States Department of  
Agriculture and other  
Federal agencies, State  
agencies including the  
Agricultural Experiment  
Stations, and local  
participants

# Custom Soil Resource Report for Orange County and Part of Riverside County, California

**Moiola Park Residences - Fountain  
Valley**



January 6, 2020

# Preface

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Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist ([http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2\\_053951](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951)).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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# How Soil Surveys Are Made

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Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

## Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

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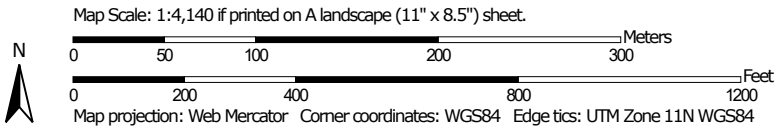
The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.



# Custom Soil Resource Report Soil Map




Soil Map may not be valid at this scale.



# Custom Soil Resource Report

## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)


### Soils


 Soil Map Unit Polygons


 Soil Map Unit Lines


 Soil Map Unit Points

### Special Point Features

 Blowout

 Borrow Pit


 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop


 Saline Spot

 Sandy Spot

 Severely Eroded Spot


 Sinkhole


 Slide or Slip


 Sodic Spot


 Spoil Area

 Stony Spot


 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

### Water Features

 Streams and Canals


### Transportation

 Rails


 Interstate Highways

 US Routes

 Major Roads

 Local Roads

### Background

 Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL:  
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County and Part of Riverside County, California  
Survey Area Data: Version 13, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 13, 2018—Jan 25, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

## MAP LEGEND

## MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
123	Bolsa silt loam, drained	54.5	85.1%
158	Hueneme fine sandy loam, drained	9.5	14.9%
<b>Totals for Area of Interest</b>		<b>64.0</b>	<b>100.0%</b>

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,



onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

## Orange County and Part of Riverside County, California

### 123—Bolsa silt loam, drained

#### Map Unit Setting

*National map unit symbol:* hclz  
*Elevation:* 0 to 680 feet  
*Mean annual precipitation:* 11 to 15 inches  
*Mean annual air temperature:* 62 to 65 degrees F  
*Frost-free period:* 360 to 365 days  
*Farmland classification:* Prime farmland if irrigated

#### Map Unit Composition

*Bolsa and similar soils:* 70 percent  
*Minor components:* 30 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Bolsa

##### Setting

*Landform:* Alluvial fans  
*Landform position (three-dimensional):* Talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Mixed alluvium derived from igneous, metamorphic and sedimentary rock

##### Typical profile

*Ap1 - 0 to 6 inches:* silt loam  
*Ap2 - 6 to 12 inches:* silt loam  
*C1 - 12 to 18 inches:* silt loam  
*C2 - 18 to 29 inches:* silt loam  
*C3 - 29 to 39 inches:* silty clay loam  
*C4 - 39 to 49 inches:* silty clay loam  
*C5 - 49 to 55 inches:* silty clay loam  
*Cg - 55 to 69 inches:* silty clay loam

##### Properties and qualities

*Slope:* 0 to 2 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Somewhat poorly drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* Rare  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 5 percent  
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water storage in profile:* High (about 11.1 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 3w

Custom Soil Resource Report

*Hydrologic Soil Group: C*  
*Hydric soil rating: No*

**Minor Components**

**Hueneme, fine sandy loam**

*Percent of map unit: 10 percent*  
*Landform: Alluvial fans*  
*Landform position (three-dimensional): Talf*  
*Down-slope shape: Linear*  
*Across-slope shape: Linear*  
*Hydric soil rating: No*

**Chino, silty clay loam**

*Percent of map unit: 10 percent*  
*Landform: Alluvial fans*  
*Landform position (three-dimensional): Talf*  
*Down-slope shape: Linear*  
*Across-slope shape: Linear*  
*Hydric soil rating: No*

**Metz, loamy sand**

*Percent of map unit: 4 percent*  
*Landform: Alluvial fans*  
*Landform position (three-dimensional): Talf*  
*Down-slope shape: Linear*  
*Across-slope shape: Linear*  
*Hydric soil rating: No*

**San emigdio, fine sandy loam**

*Percent of map unit: 2 percent*  
*Landform: Flood plains*  
*Landform position (three-dimensional): Talf*  
*Down-slope shape: Linear*  
*Across-slope shape: Linear*  
*Hydric soil rating: No*

**Bolsa, sandy loam overwash**

*Percent of map unit: 2 percent*  
*Landform: Alluvial fans*  
*Landform position (three-dimensional): Talf*  
*Down-slope shape: Linear*  
*Across-slope shape: Linear*  
*Hydric soil rating: No*

**Omni, drained**

*Percent of map unit: 2 percent*  
*Landform: Flood plains*  
*Landform position (three-dimensional): Talf*  
*Down-slope shape: Linear*  
*Across-slope shape: Linear*  
*Hydric soil rating: No*

## 158—Hueneme fine sandy loam, drained

### Map Unit Setting

*National map unit symbol:* hcn3

*Mean annual precipitation:* 15 inches

*Frost-free period:* 300 to 350 days

*Farmland classification:* Prime farmland if irrigated

### Map Unit Composition

*Hueneme and similar soils:* 85 percent

*Minor components:* 15 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Hueneme

#### Setting

*Landform:* Alluvial fans

*Landform position (two-dimensional):* Toeslope

*Landform position (three-dimensional):* Rise

*Down-slope shape:* Linear

*Across-slope shape:* Convex

*Parent material:* Stratified alluvium derived from sedimentary rock

#### Typical profile

*H1 - 0 to 27 inches:* fine sandy loam

*H2 - 27 to 60 inches:* stratified sand to silt loam

#### Properties and qualities

*Slope:* 0 to 2 percent

*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Poorly drained

*Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 1 percent

*Salinity, maximum in profile:* Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)

*Available water storage in profile:* Moderate (about 9.0 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 1

*Land capability classification (nonirrigated):* 3c

*Hydrologic Soil Group:* A

*Hydric soil rating:* Yes



**Minor Components**

**Bolsa, silt loam, drained**

*Percent of map unit:* 5 percent

*Hydric soil rating:* No

**Hueneme, fine sandy loam**

*Percent of map unit:* 5 percent

*Hydric soil rating:* No

**San emigdio, fine sandy loam**

*Percent of map unit:* 5 percent

*Hydric soil rating:* No

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