

Appendix D
Preliminary WQMP

PRELIMINARY WATER QUALITY MANAGEMENT PLAN (WQMP)

**APPLIED MEDICAL – L203
BRIDGE**
20162-20202 Windrow Drive
Lake Forest, CA

Prepared for:

Applied Medical Resources
29977 Avenida de Las Banderas
Rancho Santa Margarita, CA 92688

Prepared by:

Adams-Streeter Civil Engineers
16755 Von Karman, Suite 150
Irvine, CA 92606
949.474.2330
Felix Gonzalez, PE, QSD
fgonzalez@adams-streeter.com

Prepared on:

November 16, 2020

Revised on:

February 25, 2021



PROJECT OWNER'S CERTIFICATION			
Permit/Application No.:	N/A	Grading Permit No.:	N/A
Tract/Parcel Map and Lot(s)No.:	Tract No. 13932 Lot 19	Building Permit No.:	
Address of Project Site and APN:	20162-20202 Windrow Drive, Lake Forest CA 92688 APN: 612-012-10		

This Final Water Quality Management Plan (WQMP) has been prepared for Applied Medical by ADAMS-STREETER CIVIL ENGINEERS, 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.

OWNER:	Applied Medical Resources
Name:	Jeff Bechtold
Title:	Vice President
Company:	Applied Medical Resources
Address:	30200 Avenida de Las Banderas, Rancho Santa Margarita. CA 92688
Email:	jbechtold@appliedmedical.com
Telephone:	949.713.7848
Signature:	Date:

TABLE OF CONTENTS

SECTION I	DISCRETIONARY PERMITS AND WATER QUALITY CONDITIONS.....	1
SECTION II	PROJECT DESCRIPTION	2
II.1	PROJECT DESCRIPTION.....	2
II.2	POTENTIAL STORM WATER POLLUTANTS.....	4
II.3	HYDROLOGIC CONDITIONS OF CONCERN.....	5
II.4	POST DEVELOPMENT DRAINAGE CHARACTERISTICS	5
II.5	PROPERTY OWNERSHIP/MANAGEMENT	6
SECTION III	SITE DESCRIPTION.....	7
III.1	PHYSICAL SETTING	7
III.2	SITE CHARACTERISTICS	8
III.3	WATERSHED DESCRIPTION	9
SECTION IV	BEST MANAGEMENT PRACTICES (BMPs).....	11
IV.1	PROJECT PERFORMANCE CRITERIA.....	11
IV.2	Site Design and Drainage Plan	14
IV.2.1	Site Design BMPs	14
IV.2.2	DRAINAGE MANAGEMENT AREAS.....	15
IV.3	LID BMP SELECTION AND PROJECT CONFORMANCE ANALYSIS.....	15
IV.3.1	Hydrologic Source Controls (HSCs).....	15
IV.3.2	Infiltration BMPs.....	16
IV.3.3	Evapotranspiration, Rainwater Harvesting BMPs.....	17
IV.3.4	Biotreatment BMPs	20
IV.3.5	Hydromodification Control BMPs.....	21
IV.3.6	Regional/Sub-Regional LID BMPs	21
IV.3.7	Treatment Control BMPs.....	21
IV.3.8	Non-Structural Source Control BMPs	22
IV.3.9	Structural Source Control BMPs	25
IV.4	ALTERNATIVE COMPLIANCE PLAN	26
IV.4.1	Water Quality Credits	26
IV.4.2	Alternative Compliance Plan Information	27
SECTION V	INSPECTION/MAINTENANCE RESPONSIBILITY FOR BMPS	28

SECTION VI SITE PLAN AND DRAINAGE PLAN32
SECTION VII EDUCATIONAL MATERIALS.....34

ATTACHMENTS

Attachment A BMP Site Plan

Attachment B BMP Calculations

Attachment C Orange County Rainfall Zones Map

Attachment D Infiltration Study – NRCS Hydraulic Soils Group

Attachment E Educational Materials

Attachment F Operations and Maintenance Plan

SECTION I DISCRETIONARY PERMITS AND WATER QUALITY CONDITIONS

PROJECT INFORMATION			
Permit/Application No.:	N/A	Tract/Parcel Map No.:	Tract No. 13932 Lot 19
Address of Project Site and APN:	20162-20202 Windrow Drive, Lake Forest CA 92688		
WATER QUALITY CONDITIONS			
Discretionary Permit(s):	SDP 12-20-5391		
Water Quality Conditions:	<p>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.</p> <p>Prior to the issuance of a precise grading permit, the developer shall submit a Final Water Quality Management Plan (WQMP) specifically identifying the Best Management Practices (BMP's) that will be used on site to control predictable pollutant runoff and address hydromodification. The plan shall identify the types of structural and non-structural measures to be used. The Plan shall be consistent with the preliminary WQMP submitted during the environmental review process and comply with City approved structural and non-structural BMP's established during the Final WQMP review process. The plan shall comply with the City of Lake Forest Local Implementation Plan (LIP) as the primary document and with the Orange County Drainage Area Management Plan (DAMP) as secondary documents for WQMP compliance. Particular attention should be addressed to the appendix section "Best Management Practices for New Development.</p>		
WATERSHED-BASED PLAN CONDITIONS			
Applicable conditions from watershed – based plans including WIHMPs and TMDLs:	Not applicable.		

SECTION II PROJECT DESCRIPTION

II.1 PROJECT DESCRIPTION

DESCRIPTION OF PROPOSED PROJECT				
WQMP Development Category:	<p>1. 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>			
Project Area (ft²):	48,787 ft ²			
# of Dwelling Units:	Not applicable.			
SIC Code:	8011			
Narrative Project Description:	<p>The project address is 20162 Windrow Drive in the City of Lake Forest, California. The project site is a rectangular-shaped lot with the building L203 located in the center. Surrounding the building consists of asphalt parking areas on all four sides. Immediately west, across the drive aisle, building L202 begins.</p> <p>The proposed improvements will include the construction of a bridge connection between buildings L202 and L203. Surface improvements will consist of regrading the existing drive aisle between the two buildings, the additional of microturbines (on elevated concrete pads) along the northside of the site, expansion of the existing building by infilling of an existing truck dock and finally the addition of a single story building immediately adjacent to the east façade of the building.</p>			
Project Area:	Pervious Area (ac or ft²)	Pervious Area Percentage	Impervious Area (ac or ft²)	Impervious Area Percentage
Pre-Project Conditions:	7,405 SF	15%	41,382 SF	85%
Post-Project Conditions:	9,147 SF	19%	39,639 SF	81%

<p>Drainage Patterns/Connections:</p>	<p>The existing site drainage pattern is generally flowing from north to south with surface slopes of around 1.0% to 2.5%. The proposed drainage will follow similar suit and mimic the existing conditions.</p>
--	--

II.2 POTENTIAL STORM WATER POLLUTANTS

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

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 ⁽²⁾	N	E
Commercial/Industrial Development	E ⁽¹⁾	E ⁽¹⁾	E ⁽⁵⁾	E ⁽³⁾	E ⁽¹⁾	E	E	E
Automotive Repair Shops	N	N	E	N	N	E	E	E
Restaurants	E ⁽¹⁾⁽²⁾	E ⁽¹⁾	E ⁽²⁾	E	E ⁽¹⁾	E	N	E
Hillside Development >5,000 ft ²	E	E	N	E	E	E	N	E
Parking Lots	E	E ⁽¹⁾	E	E ⁽⁴⁾	E ⁽¹⁾	E	E	E
Streets, Highways & Freeways	E	E ⁽¹⁾	E	E ⁽⁴⁾	E ⁽¹⁾	E	E	E
Retail Gasoline Outlets	N	N	E	N	N	E	E	E
Notes: E = expected to be of concern N = not expected to be of concern (1) Expected pollutant if landscaping exists on-site, otherwise not expected. (2) Expected pollutant if the project includes uncovered parking area, otherwise not expected. (3) Expected pollutant if land use involves food or animal waste products, otherwise not expected. (4) Bacterial indicators are routinely detected in pavement runoff. (5) Expected if outdoor storage or metal roofs, otherwise not expected. Source: County of Orange. (2011, May 19). Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMP). Table 2.1.								

Priority Project Categories and/or Features:

- Community Facility = Low Impact Commercial and Attached Residential
- Hillside Development >5,000 ft²
- Parking Lots

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	E	
Pathogens (Bacteria/Virus)	E	
Pesticides	E	
Oil & Grease	E	
Toxic Organic Compounds	E	
Trash & Debris	E	

II.3 HYDROLOGIC CONDITIONS OF CONCERN

Determine if streams located downstream from the project area are determined to be potentially susceptible to hydromodification impacts. *Refer to Appendix C of the Model WQMP for reference to applicable technical guidance for determining if downstream channels are susceptible to HCOCs.*

Is the proposed project potentially susceptible to hydromodification impacts?

Yes No (show map)

II.4 POST DEVELOPMENT DRAINAGE CHARACTERISTICS

The existing site drainage pattern is generally flowing from north to south with surface slopes of around 1.0% to 2.5%. The proposed drainage will follow similar suit and mimic the existing conditions. Drain inlets will be placed downstream of new concrete v-gutters which will be used to direct stormwater runoff to new designated drainage areas which will be fitted with appropriate treatment BMP systems. The improvements beneath the bridge addition (westside of building) will sheet flow south via a concrete gutter and discharge into a Filterra treatment system before daylighting onto Windrow Drive via an existing parkway drain. The eastside improvements will flow south and collect into a new v-gutter which discharges into below grade infiltration unit located on the eastside of the new added building. Roof drains from the new building will bypass the existing underground storm drain system and connect to a new underground storm drain line. This line will pick up the runoff generated from the building expansion area and from the proposed microturbine area before converging with the surface runoff at the infiltration system. Runoff exceeding the required treatment volume will bypass the CMP via a

hydrodynamic separator unit and reconnect to the existing storm drain system to which it was originally tributary to.

II. 5 PROPERTY OWNERSHIP/MANAGEMENT

PROPERTY OWNERSHIP/MANAGEMENT	
Landscaped Areas:	Applied Medical Resources
Open Space:	Applied Medical Resources
Structural BMPs:	Applied Medical Resources

Applied Medical will be responsible for inspecting and maintaining all BMPs prescribed for the project. Inspection and maintenance responsibilities are outlined in Section V of this report.

SECTION III SITE DESCRIPTION

III.1 PHYSICAL SETTING

Planning Area/ Community Name:	Baker Ranch Planned Community
Address:	20162 & 20202 Windrow Drive, Lake Forest CA
Project Area Description:	The site is nestled in the northwest corner of the intersection of Windrow and Drive and Rancho Parkway. The site is currently a commercial development center with surface flow patterns to the south. Adjacent to the east, a recently constructed residential development exists. The southside is bounded by Rancho Parkways and the westside consists of L202 and L201 Applied Medical Buildings with Lake Forest Drive being the nearest westerly adjacent street.
Land Use:	Commercial
Zoning:	Urban Activity
Acreage:	48, 787 SF
Predominant Soil Type:	HSG C
Impervious Conditions:	Existing: 85% impervious (15% pervious) Proposed: 81% impervious (19% pervious)

III.2 SITE CHARACTERISTICS

Precipitation Zone:	0.9 inches per Figure XVI-1 of the TGD (see Appendix A)
Topography:	The project site is located on relatively flat land with surface slopes varying for 1%-2%.
Drainage Patterns/Connections:	Drainage features include drain inlets, CMP infiltration and Filterra biofiltration systems and underground storm drain pipes.

Soil Type, Geology, and Infiltration Properties:	HSG C
Hydrogeologic (Groundwater) Conditions:	
Geotechnical Conditions (relevant to infiltration):	Recent infiltration testing conducting indicates infiltration is feasible along the eastside of the building L203 but infeasible along the westside. The final WQMP will include revisions to the BMP system consisting of a below grade perforated CMP system for DMA-B.
Off-Site Drainage:	There is no offsite drainage to consider with this project
Utility and Infrastructure Information:	New dry and wet utilities will be incorporated into the proposed project and will tie into existing facilities associated with the existing development.

III.3 WATERSHED DESCRIPTION

Watershed:	San Juan Creek
303(d) Listed Impairments:	<p>Per the 2010 303(d) Integrated Report, the following ESA waterbodies impacted by this project are on the 303(d) List for the impairments indicated and applicable TMDLs:</p> <ul style="list-style-type: none"> • Serrano Creek: Ammonia, Indicator Bacteria, PH • San Diego Creek Reach 2: Indicator Bacteria, Nutrients, Sedimentation/Siltation, Unknown Toxicity • San Diego Creek Reach 1: Fecal Coliform, Nutrients, Pesticides, Sedimentation/Siltation, Selenium, Toxaphene, • Newport Bay Upper: Chlordane, Copper, DDT, Indicator Bacteria, Metals, Nutrients, PCBs, Pesticides, Sediment Toxicity, Sedimentation/Siltation
Applicable TMDLs:	See above.

Pollutants of Concern for the Project:	The project pollutant of concern are nutrients, pesticides, trash and debris
Hydrologic Conditions of Concern (HCOCs):	None. Refer to Section II.3
Environmentally Sensitive and Special Biological Significant Areas:	The project site is not located within or adjacent to a designated Environmentally Sensitive Area (ESA) or designated Area of Special Biological Significance (ASBS).

SECTION IV BEST MANAGEMENT PRACTICES (BMPs)

IV.1 PROJECT PERFORMANCE CRITERIA

Note: A new Order (MS4 NPDES Permit) was adopted on February 11, 2015. Therefore, BMPs will be designed to meet the new language that is approved regarding development and hydromodification.

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: The project as a whole reduces the total impervious area from 85% in the existing condition to 81% in the final condition. This results in the post-project peak flows not exceeding the 2 year storm event pre-development (naturally occurring) peak flows and flow rates from the 10 year storm event the post-project peak flows also not exceeding pre-development (naturally occurring) flows

<p>Hydromodification Control Performance Criteria</p> <p>(Model WQMP Section 7.II-2.4.2.2)</p>	<p>If a hydrologic condition of concern (HCOC) exists, priority projects are subject to the Interim Hydromodification Criteria identified in Section F.1.h.(5) of the South Orange County MS4 Permit. The Interim Hydromodification Criteria is as follows:</p> <p>PDPs must implement the following criteria by comparing the pre-development (naturally occurring) and post-project flow rates and durations using a continuous simulation hydrologic model such as US EPA’s Hydrograph Simulation Program-Fortran (HSPF):</p> <ul style="list-style-type: none">(a) For flow rates from 10 percent of the 2-year storm event to the 5 year storm event, the post-project peak flows shall not exceed pre-development (naturally occurring) peak flows.(b) For flow rates from the 5-year storm event to the 10 year storm event the post-project peak flows may exceed pre-development (naturally occurring) flows by up to 10 percent for a 1-year frequency interval.
--	---

<p>LID Performance Criteria</p> <p>(Model WQMP Section 7.II-2.4.3)</p>	<p>Infiltrate, harvest and use, evapotranspire, or biotreat/biofilter, the 85th 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>
<p>Treatment Control BMP Performance Criteria</p> <p>(Model WQMP Section 7.II-3.2.2)</p>	<p>If a Copermittee determines that implementing BMPs to retain the full design capture volume onsite for a Priority Development Project is not technically feasible, then the Copermittee may allow the Priority Development Project to utilize biofiltration BMPs. Biofiltration BMPs must be designed to have an appropriate hydraulic loading rate to maximize storm water retention and pollutant removal, as well as to prevent erosions, scour, and channeling within the BMP, and must be sized to:</p> <ul style="list-style-type: none"> (a) Treat 1.5 times the design capture volume not reliably retained onsite (Per ORDER R9-2013-001); or (b) Treat the design capture volume not reliably retained onsite with a flow-thru design that has a total volume, including pore spaces and pre-filter detention volume, sized to hold at least 0.75 times the portion of the design capture volume not reliably retained onsite. (Per ORDER R9-2009-002 and R9-2013-0001) <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>

LID Design Storm Capture Efficiency and Multiplier Method for Flow-Based Bioretention BMPs	$Q = C \times I \times A$ Where: <i>Q</i> – design flowrate, cfs <i>C</i> = runoff coefficient = (0.75 x imp + 0.15) <i>I</i> = design intensity (in/hr) <i>A</i> = tributary area (acres) See table in Section IV.2.2
--	---

IV.2 Site Design and Drainage Plan

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

IV.2.1 Site Design BMPs

Minimize Impervious Area

Impervious surfaces have been minimized by incorporating landscaped areas throughout the site surrounding the proposed buildings and hardscape areas.

Maximize Natural Infiltration Capacity

Under the existing conditions, infiltration capacity is low along the westside of the building but feasible along the eastside. Under the proposed condition, infiltration capacity will remain limited to the eastside or DMA-B.

Disconnect Impervious Areas

Landscaping will be provided throughout the site, adjacent to sidewalks, buildings and drive aisles to disconnect impervious areas.

Roof drains of buildings will be connected to drain lines which will be directed to the on-site storm drain system and treated with appropriate BMPs.

Protect Existing Vegetation and Sensitive Areas, and Revegetate Disturbed Areas

Existing vegetation around the buildings will remain as part of the improvements associated with this project.

Xeriscape Landscaping

Not Applicable, the proposed project does not require landscaping.

IV.2.2 DRAINAGE MANAGEMENT AREAS

In accordance with the MS4 permit and the Model WQMP, the project site has been divided into 2 Drainage Management Area (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 volume (DCV) and treatment flow rate (Q_{Design}) for the DMAs is 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 Section IV.3.4 below. Location of DMA and associated LID and treatment BMP are identified on the exhibits in Section VI. Additional calculations and TGD Worksheets are provided in Appendix A.

DMA/ Drainage Area ID ⁽¹⁾	BMP	Drainage Area (ac)	% Imp.	Design Storm Depth ⁽²⁾ (in)	Estimated Tc (min.)	Rainfall Intensity ⁽³⁾ (in/hr)	Q_{Design} ⁽⁵⁾ (cfs)
A	Filtterra Unit	26,572 SF	70%	.9	5	0.2	0.084
B	CMP Infiltration system	22,215 SF	94%	.9	5	0.2	0.087

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 MS4 Storm Water Permit (Order R9-2015-0001) requires the evaluation and use of LID features and techniques to infiltrate, filter, store, evaporate or retain runoff close to the source of runoff. If on-site retention LID BMPs are technically infeasible, LID biofiltration BMPs may treat any volume that is not retained on-site by the pore spaces and pre-filter detention volume, must be sized to hold at least 0.75 times the design storm volume that is not retained onsite by LID retention BMPs. 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 checked="" type="checkbox"/>

The project will utilize HSCs (impervious area reduction) throughout the project site where pervious areas have been replaced with landscaping, permeable decomposed granite walkways and turf areas.

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	Bioretention Without Underdrains	<input type="checkbox"/>
	Rain Gardens	<input type="checkbox"/>
	Porous Landscaping	<input type="checkbox"/>
INF-4	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"/>

INFILTRATION		
ID	Name	Included?
--	French Drains	<input type="checkbox"/>
INF-6	Permeable Asphalt	<input type="checkbox"/>
	Permeable Concrete	<input type="checkbox"/>
	Permeable Concrete Pavers	<input type="checkbox"/>
	Other: Below grade perforated CMP infiltration system	<input type="checkbox"/>

The project site is located in an area comprised of HSG C soil type, according to the TGD.

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

Evapotranspiration 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, <i>see Section IV.3.1</i>	<input type="checkbox"/>
--	Surface-based infiltration BMPs	<input type="checkbox"/>
--	Biotreatment BMPs, <i>see Section VI.3.4</i>	<input type="checkbox"/>
	Other:	<input type="checkbox"/>

The project site is located in an area comprised of HSG C soil type, according to the TGD.

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 type="checkbox"/>
--	Other:	<input type="checkbox"/>

For the purposes of evaluating feasibility in this WQMP, the Effective Irrigated Area to Tributary Area (EIATA) ratio tool was utilized in accordance with Appendix X of the Model WQMP’s Technical Guidance Document (TGD), dated December 20, 2013. The EIATA ratio is calculated as follows:

$$EIATA = \frac{(LA \times K_L)}{(IE \times \text{Tributary Impervious Area})}$$

Where:

EIATA = effective irrigated area to tributary ratio

K_L = Area-weighted landscape coefficient (Table X.4 of the TGD)

LA = landscape area irrigated with harvested water (square feet)

IE = irrigation efficiency (assumed at 90%)

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.8 of the Technical Guidance Document sets forth the minimum demand thresholds / minimum irrigated area for potential partial capture feasibility. Projects with irrigation area below this value are not required to evaluate harvest and use further.

TABLE X.8: MINIMUM IRRIGATED AREA FOR POTENTIAL PARTIAL CAPTURE FEASIBILITY						
General Landscape Type	Conservation Design: <i>K_L</i> = 0.35			Active Turf Areas: <i>K_L</i> = 0.7		
	<i>Closest ET Station</i>	<i>Irvine</i>	<i>Santa Ana</i>	<i>Laguna Beach</i>	<i>Irvine</i>	<i>Santa Ana</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

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 Beach</i>	<i>Irvine</i>	<i>Santa Ana</i>	<i>Laguna Beach</i>
Design Capture Storm Depth, inches	Minimum Required Irrigated Area per Tributary Impervious Acre for Potential Partial Capture, ac/ac					
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

EIATA DEMAND CALCULATIONS					
Total Area (ac)	Tributary Impervious Area (ac)	Tributary Landscaped Area (ac)	Landscape Coefficient (K_L) ⁽¹⁾	EIATA (ac/ac)	Minimum EIATA per Table X.8 (ac/ac)
NA	NA	NA	NA	NA	NA

Notes:
 1. Assumes 100% turf landscaping per Table X.4 of the WQMP Technical Guidance Document, dated December 20, 2013

Harvest and reuse is not applicable to this project as there is little landscaping. Therefore, harvest and reuse is not feasible for this project at this time.

Indoor toilet demand is also not applicable as there are no toilets associated with this scope of work.

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, storm water planters, and proprietary biotreatment systems.

BIOTREATMENT		
ID	Name	Included?
BIO-1	Bioretention with underdrains	<input type="checkbox"/>
	Storm Water biofiltration 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"/>

Since both infiltration and harvest and reuse are considered infeasible, runoff from the project site will be treated through the use of biofiltration BMPs: proprietary biotreatment systems (Modular Wetlands) and Filterra will be installed downstream of all proposed improvements. In accordance with the Model WQMP and TGD, the biofiltration BMPs will be sized to treat runoff from the Design Capture Storm (85th percentile, 24-hour). Locations and tributary drainage areas are shown on the WQMP Exhibit included in Section VI. Detailed calculations, associated TGD Worksheets and BMP details are included in Attachment A. Operation and maintenance details are included in Section V and Attachment D (O&M Plan).

Filterra and 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.

IV.3.5 Hydromodification Control BMPs

A new Order (MS4 NPDES Permit) was adopted on February 11, 2015. Therefore, BMPs will be designed to meet the new language that is approved regarding development and hydromodification.

IV.3.6 Regional/Sub-Regional LID BMPs

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

IV.3.7 Treatment Control BMPs

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

TREATMENT CONTROL BMPs		
ID	Name	Included?
TRT-1	Sand Filters	<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 (biotreatment) will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this section.

IV.3.8 Non-Structural Source Control BMPs

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

NON-STRUCTURAL SOURCE CONTROL BMPs				
ID	Name	Included?	Not Applicable?	If Not Applicable, Provide Brief Reason
N1	Education for Property Owners, Tenants and Occupants	<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 activities that generate hazardous wastes or require hazardous materials are proposed at this site.
N6	Local Industrial Permit Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Project does not propose any industrial use.
N7	Spill Contingency Plan	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No activities that generate hazardous wastes or materials proposed.
N8	Underground Storage Tank Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No USTs proposed.
N9	Hazardous Materials Disclosure Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No activities that generate hazardous wastes or materials proposed.
N10	Uniform Fire Code Implementation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No activities that generate hazardous wastes or materials proposed.
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 proposed.
N14	Common Area Catch Basin Inspection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
N15	Street Sweeping Private Streets and Parking Lots	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No associated parking area
N16	Retail Gasoline Outlets	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No RGOs proposed.

N1, Education for Property Owners, Tenants and Occupants

The Owner will provide congregation and church maintenance staff with storm water pollution prevention educational materials upon first occupancy and on an annual basis thereafter. These materials can be found in Appendix C and on the County of Orange website: www.ocwatersheds.com.

N2, Activity Restrictions

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

N3, Common Area Landscape Management

The Owner shall be responsible for ongoing maintenance and management of all landscaped areas on their property, consistent with the Dana Point Municipal Code 9.55 Water Efficient Landscaping Standards and Requirements. Program includes how to reduce the potential pollutant sources of fertilizer and pesticide uses, utilization of water-efficient landscaping practices, ongoing trimming and other landscape maintenance activities and proper disposal of landscape wastes by the owner and/or contractors.

N4, BMP Maintenance

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

N11, Common Area Litter Control

The Owner will be responsible for performing trash pick-up and sweeping of littered common areas on a weekly basis, and proper disposal of waste collected. Responsibilities will also include investigating, noting and documenting improper disposal materials by residents.

N12, Employee Training

All employees 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. Employees shall follow proper BMP operation and maintenance guidelines as described in Appendix F of this report.

N14, Common Area Catch Basin Inspection

All private on-site catch basin inlets, area drains, ribbon gutters, curb and gutters, basins and other drainage systems shall be inspected and cleaned out by the Owner at least once a year, prior to the rainy season, no later than October 1st of each year in accordance with the fact sheets attached to this WQMP.

Dry Weather Flow Control

Any activities that may occur in areas that are not draining to BMPs that are a potential source of dry weather flows must be effectively controlled. Irrigation, air conditioning condensate, etc. must be controlled in a manner such that it does not contribute to flows off site. This is an element to address the Highest Priority Water Quality Condition associated with unnatural dry weather flow regime established in the South Orange County Water Quality Improvement Plan (WQIP), in draft form at the time of this writing.

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 material storage areas proposed.
S3 SD-32	Design and construct trash and waste storage areas to reduce pollution introduction	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Trash Enclosure not included in scope of work
S4 SD-12	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No landscaping is proposed
S5	Protect slopes and channels and provide energy dissipation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not applicable
S6 SD-31	Properly Design: Dock areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No dock areas proposed.
S7 SD-31	Properly Design: Maintenance bays	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No maintenance bays proposed.
S8 SD-33	Properly Design: Vehicle wash areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No vehicle wash areas proposed.
S9 SD-36	Properly Design: Outdoor processing areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No outdoor processing areas proposed.
S10	Properly Design: Equipment wash areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No equipment wash areas proposed.
S11 SD-30	Properly Design: Fueling areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No fueling areas proposed.
S12 SD-10	Properly Design: Hillside landscaping	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not applicable
S13	Properly Design: Wash water control for food preparation areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No food preparation areas proposed.
S14	Properly Design: Community car wash racks	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No car wash racks 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.

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"/>

WATER QUALITY CREDITS	
Credit	Applicable ?
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"/>
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. 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.

SECTION V INSPECTION/MAINTENANCE RESPONSIBILITY FOR BMPS

It has been determined that the Owner, Applied Medical Resources, shall assume all BMP inspection and maintenance responsibilities for the project site.

Contact Name:	Jeff Bechtold
Title:	Vice President
Company:	Applied Medical Resources
Address:	22872 Avenida Empresa, Rancho Santa Margarita. CA 92688
Phone:	949.713.7848
Fax:	
Email:	jbechtold@appliedmedical.com

Should the maintenance responsibility be transferred at any time during the operational life of the site, a formal notice of transfer shall be submitted to the City of Lake Forest at the time responsibility of the property subject to this WQMP being transferred. The transfer of responsibility shall be incorporated into this WQMP as an amendment.

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

Lake Forest may conduct verifications to assure that implementation and appropriate maintenance of structural and non-structural BMPs prescribed within this WQMP is taking place at the project site. The Owner, Applied Medical, 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 by Applied Medical.

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

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
BIOTREATMENT BMPs				
BIO-7	(1) Below grade CMP infiltration system	Annual maintenance consists of a minimum of two scheduled visits (every 6 months), one after the rainy season to clean up after the wet season, and one before the wet season to inspect and clean the unit. Each maintenance visit consists of the following: Inspection, cleaning, and/or replacement per manufacturer’s recommendations.	2 x per year	Owner
BIO-8	(1) Filterra Biofiltration System	Annual maintenance consists of a minimum of two scheduled visits (every 6 months), one after the rainy season to clean up after the wet season, and one before the wet season to inspect and clean the unit. Each maintenance visit consists of the following: Inspection, cleaning, and/or replacement per manufacturer’s recommendations.	2 x per year	Owner

NON-STRUCTURAL SOURCE CONTROL BMPs				
N1	Education for Property Owners, Tenants and Occupants	Provide educational materials to congregation and church maintenance staff upon first occupancy and annually thereafter.	Annually	Owner
N2	Activity Restrictions	The Owner will prescribe activity restrictions to protect surface water quality for the property. Restrictions include, but are not limited to, prohibiting vehicle maintenance or vehicle washing.	Continuous	Owner
N3	Common Area Landscape Management	Maintenance shall be consistent with City Municipal Standards and 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. Trimmings, clippings, and other waste shall be properly disposed of off-site in accordance with local regulations. Materials temporarily stockpiled during maintenance activities shall be placed away from water courses and drain inlets.	Weekly	Owner
N4	BMP Maintenance	Maintenance of BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP. Records of inspections and BMP maintenance shall be maintained by the Owner and documented with the WQMP, and shall be available for review upon request. The O&M Plan is included in Appendix F.	Ongoing	Owner
N11	Common Area Litter Control	Litter patrol, violations investigation, reporting and other litter control activities shall be performed in conjunction with maintenance activities. Litter collection and removal shall be performed on a weekly basis.	Weekly	Owner

N12	Employee Training	The Owner shall educate all new employees on storm water pollution prevention, particularly good housekeeping practices, prior to the start of the rainy season (October 1). Refresher courses shall be conducted on an as needed basis. Materials that may be used are attached to this WQMP.	Annually	Owner
N14	Common Area Catch Basin Inspection	Catch basin inlets, area drains, curb-and-gutter systems and other drainage systems shall be inspected after each storm event and, if necessary, cleaned prior to the storm season by October 1 st each year.	Annually	Owner
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 st each year. Those determined to be illegible will be re-stenciled as soon as possible.	Annually	Owner

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
- WQMP Exhibit – See Attachment A

BMP Details

- Filterra System – See Attachment B

ATTACHMENT A

BMP SITE PLAN

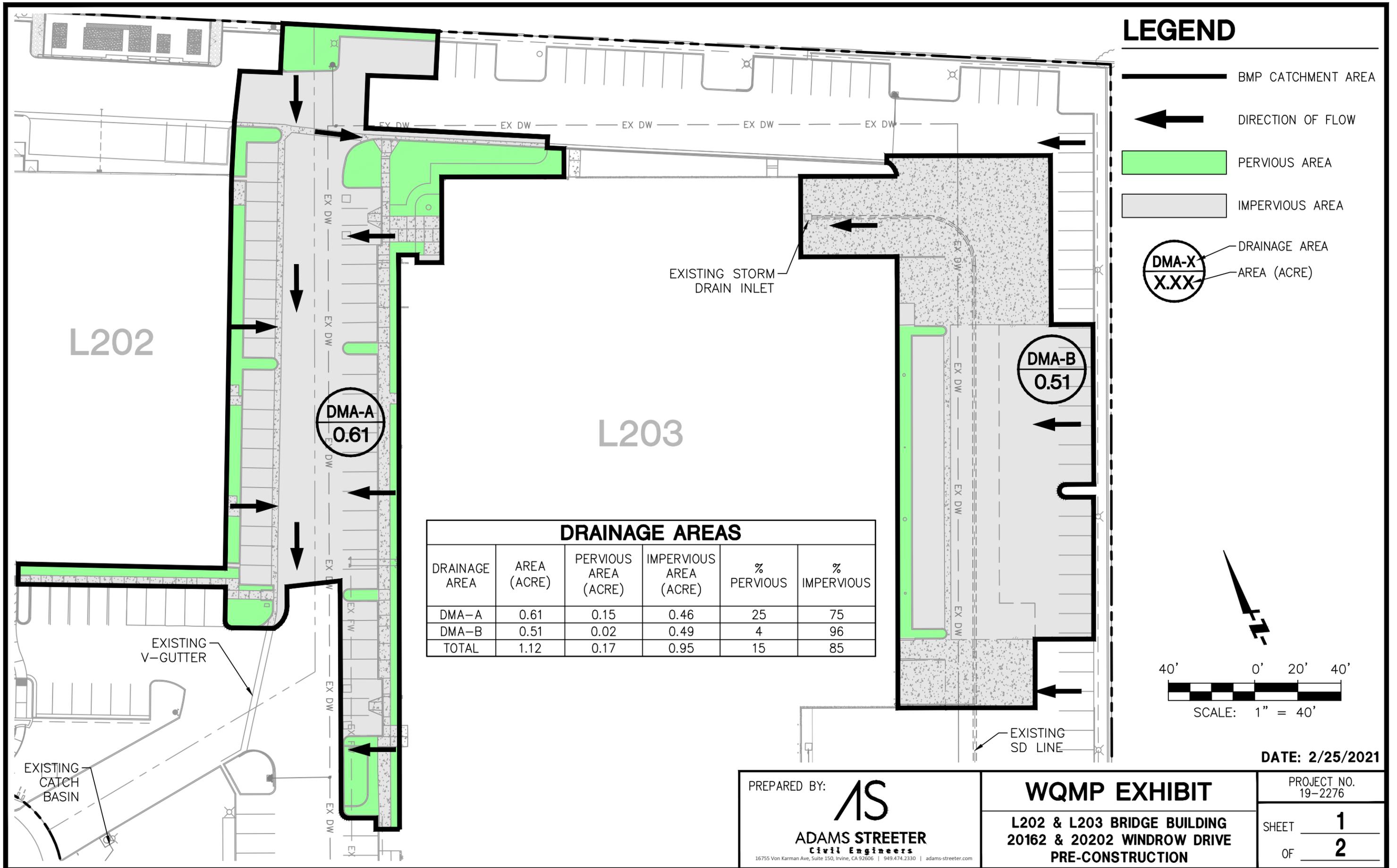
VICINITY MAP



**PROJECT
LOCATION**

VICINITY MAP

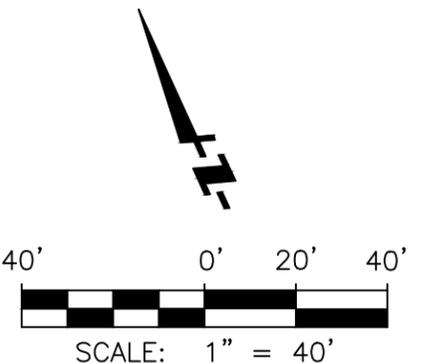
NOT TO SCALE



LEGEND

-  BMP CATCHMENT AREA
-  DIRECTION OF FLOW
-  PERVIOUS AREA
-  IMPERVIOUS AREA
-  DRAINAGE AREA
AREA (ACRE)

DRAINAGE AREAS					
DRAINAGE AREA	AREA (ACRE)	PERVIOUS AREA (ACRE)	IMPERVIOUS AREA (ACRE)	% PERVIOUS	% IMPERVIOUS
DMA-A	0.61	0.15	0.46	25	75
DMA-B	0.51	0.02	0.49	4	96
TOTAL	1.12	0.17	0.95	15	85



DATE: 2/25/2021

PREPARED BY:



ADAMS STREETER
Civil Engineers
16755 Von Karman Ave, Suite 150, Irvine, CA 92606 | 949.474.2330 | adams-streeter.com

WQMP EXHIBIT

L202 & L203 BRIDGE BUILDING
20162 & 20202 WINDROW DRIVE
PRE-CONSTRUCTION

PROJECT NO.
19-2276

SHEET **1**
OF **2**

ATTACHMENT B
BMP CALCULATIONS

DMA - A

E.3.7.3 Worksheet for Using the Flow-Based Capture Efficiency via Nomograph Method for Sizing Treatment Control BMPs

Worksheet 11: Capture Efficiency and Multiplier Method for Flow-Based Biotreatment BMPs

Part 1: Determine the design storm intensity and flow rate				
1	Enter the time of concentration, T_c (min) (See Section E.2.3)	$T_c =$	5	min
2	If T_c is less than 20 minutes, then use $I_1 = 0.2$ in/hr. Otherwise, using Figure E-7 or the figure included in the worksheet, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1	$I_1 =$	0.2	in/hr
3a	Enter DMA area tributary to BMP (s), A (acres)	$A =$	0.61	acres
3b	Enter DMA Imperviousness, imp (unitless)	$imp =$	0.70	
3c	Calculate runoff coefficient, $c = (0.75 \times imp) + 0.15$	$c =$	0.68	
3d	Calculate design flowrate, $Q = (c \times I_{design} \times A)$	$Q =$	0.08	cfs
Supporting Calculations				
Describe system: The proposed LID BMP consists of a Contech Filterra 6x4-658242-10 unit with a treatment capacity of 0.08 CFS				
Provide time of concentration assumptions:				

DMA - B

E.3.7.3 Worksheet for Using the Flow-Based Capture Efficiency via Nomograph Method for Sizing Treatment Control BMPs

Worksheet 11: Capture Efficiency and Multiplier Method for Flow-Based Biotreatment BMPs

Part 1: Determine the design storm intensity and flow rate				
1	Enter the time of concentration, T_c (min) (See Section E.2.3)	$T_c =$	5	min
2	If T_c is less than 20 minutes, then use $I_1 = 0.2$ in/hr. Otherwise, using Figure E-7 or the figure included in the worksheet, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1	$I_1 =$	0.2	in/hr
3a	Enter DMA area tributary to BMP (s), A (acres)	$A =$	0.51	acres
3b	Enter DMA Imperviousness, imp (unitless)	$imp =$	0.94	
3c	Calculate runoff coefficient, $c = (0.75 \times imp) + 0.15$	$c =$	0.85	
3d	Calculate design flowrate, $Q = (c \times I_{design} \times A)$	$Q =$	0.08	cfs
Supporting Calculations				
Describe system:				
Provide time of concentration assumptions:				

SECTION VII EDUCATIONAL MATERIALS

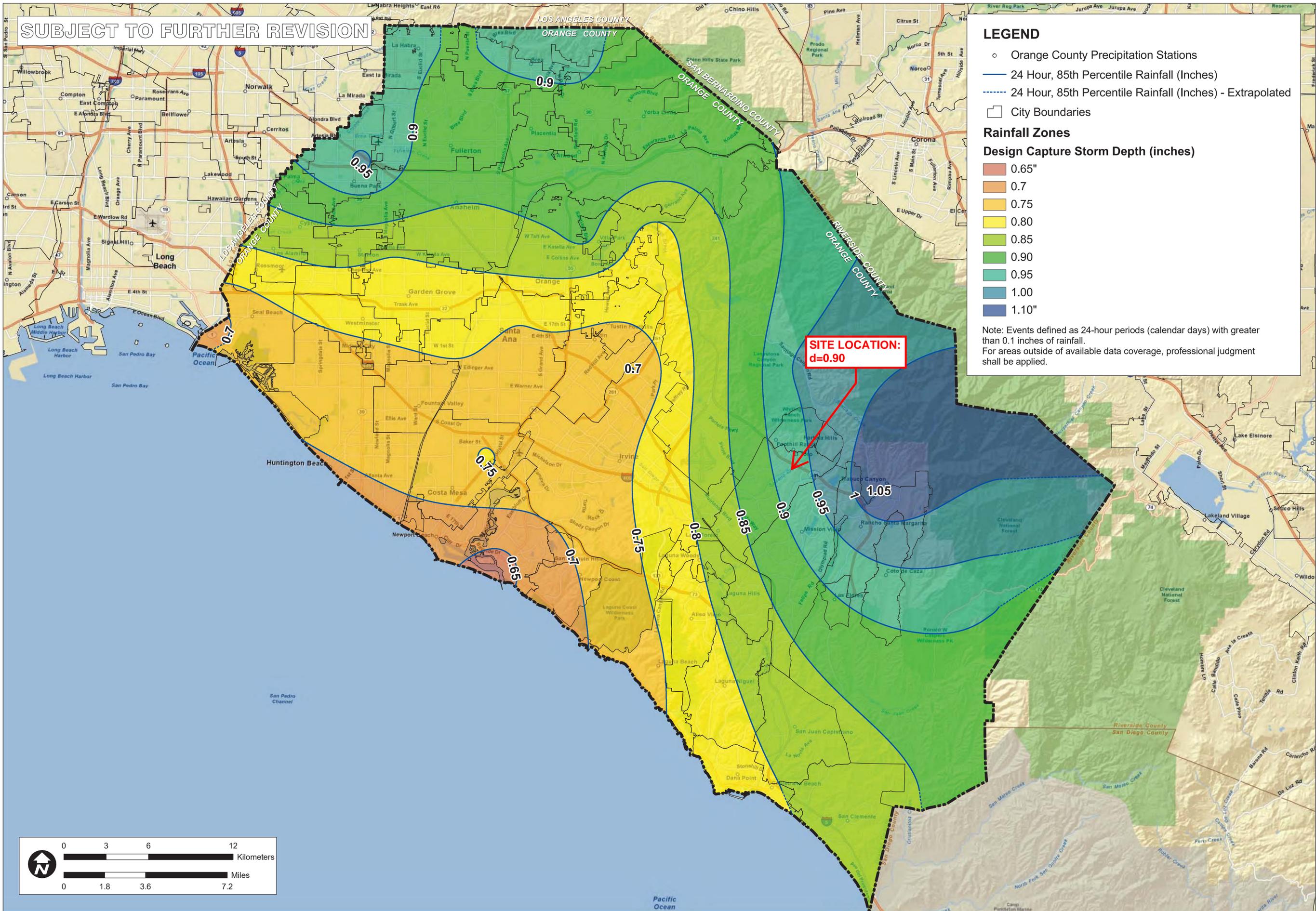
The educational materials included in this WQMP are provided to inform people involved in future uses, activities, or ownership of the site about the potential pitfalls associated with careless storm water management. “The Ocean Begins at Your Front Door” provides users with information about storm water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

EDUCATION MATERIALS			
Residential Materials (http://www.ocwatersheds.com)	Check If Applicable	Business Materials (http://www.ocwatersheds.com)	Check If Applicable
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 checked="" type="checkbox"/>
Household Tips	<input checked="" type="checkbox"/>	Other Materials (http://www.ocwatersheds.com) (http://www.cabmphandbooks.com)	Check If Attached
Proper Disposal of Household Hazardous Waste	<input checked="" type="checkbox"/>		
Recycle at Your Local Used Oil Collection Center (North County)	<input type="checkbox"/>	DF-1 Drainage System Operation & Maintenance	<input 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 type="checkbox"/>
Tips for the Home Improvement Projects	<input type="checkbox"/>	R-6 Disposal of Green Waste	<input type="checkbox"/>

Tips for Horse Care	<input type="checkbox"/>	R-7 Household Hazardous Waste	<input type="checkbox"/>
Tips for Landscaping and Gardening	<input type="checkbox"/>	R-8 Water Conservation	<input type="checkbox"/>
Tips for Pet Care	<input type="checkbox"/>	SD-10 Site Design & Landscape Planning	<input 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 type="checkbox"/>	SD-12 Efficient Irrigation	<input type="checkbox"/>
Tips for Projects Using Paint	<input type="checkbox"/>	SD-13 Storm Drain Signage	<input type="checkbox"/>
Tips for Protecting Your Watershed	<input type="checkbox"/>	SD-31 Maintenance Bays & Docs	<input type="checkbox"/>
Other: Children's Brochure	<input type="checkbox"/>	SD-32 Trash Storage Areas	<input checked="" type="checkbox"/>

ATTACHMENT C
ORANGE COUNTY RAINFALL ZONES MAP

SUBJECT TO FURTHER REVISION



LEGEND

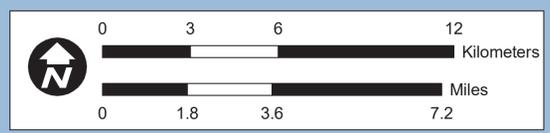
- Orange County Precipitation Stations
- 24 Hour, 85th Percentile Rainfall (Inches)
- - - 24 Hour, 85th Percentile Rainfall (Inches) - Extrapolated
- City Boundaries

Rainfall Zones

Design Capture Storm Depth (inches)

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

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



RAINFALL ZONES

ORANGE COUNTY TECHNICAL GUIDANCE DOCUMENT

ORANGE COUNTY

JOB NO. 9526-E

DATE 04/22/10

CHECKED BMP

DRAWING TH

DESIGNED TH

SCALE 1" = 1.8 miles

JOB

ORANGE CO.

CA

TITLE



FIGURE
XVI-1

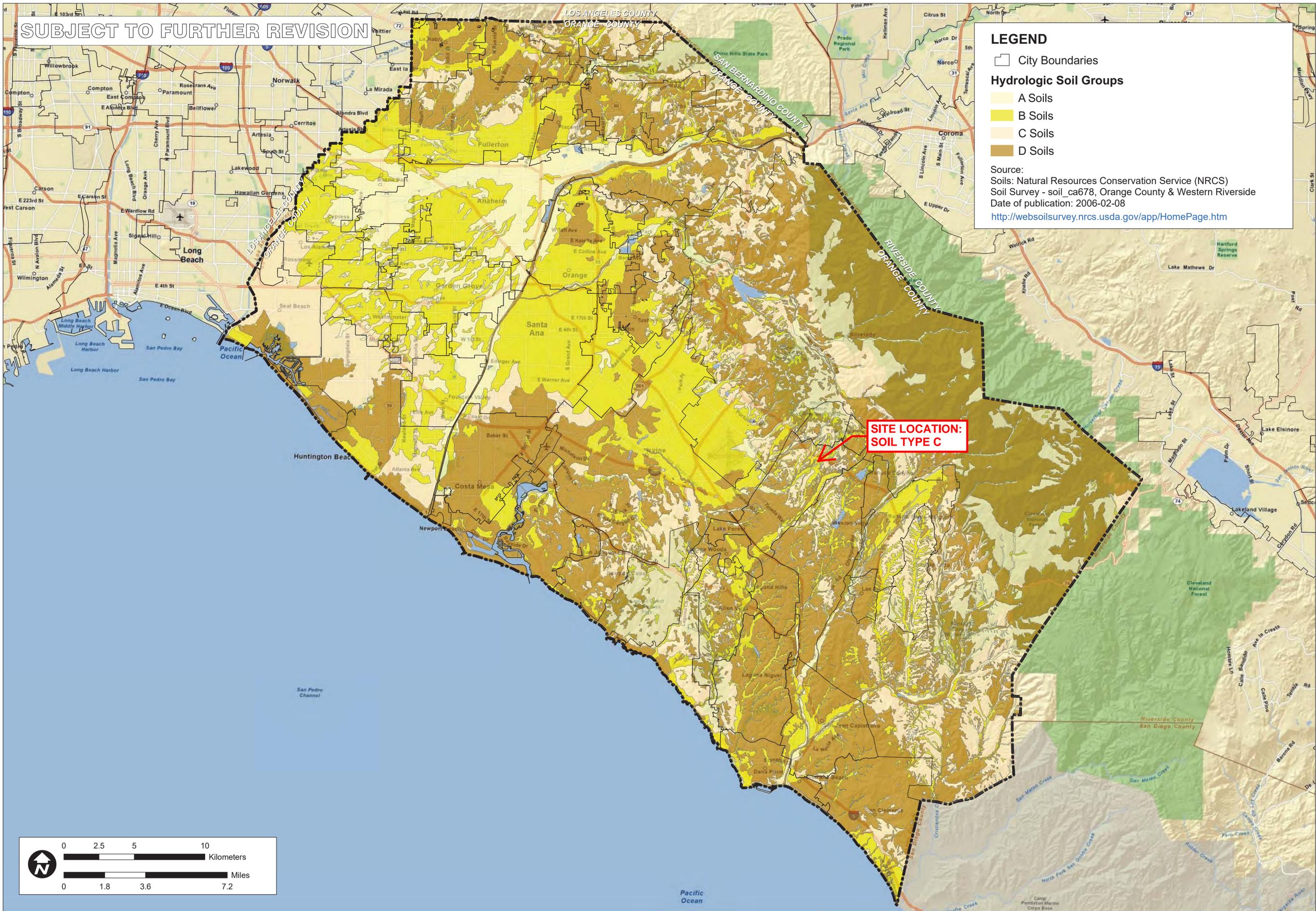
P:\9526E\6-GIS\Mxd\Reports\InfiltrationFeasibility_20110215\9526E_FigureXVI-1_RainfallZones_20110215.mxd

ATTACHMENT D

INFILTRATION STUDY:

NRCS HYDRAULIC SOILS GROUPS

SUBJECT TO FURTHER REVISION



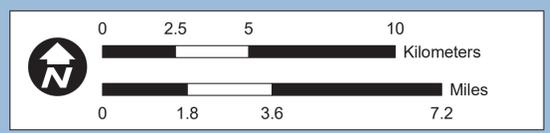
LEGEND

- City Boundaries

Hydrologic Soil Groups

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

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



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

FIGURE XVI-2a

P:\9526E\6-GIS\Mxd\Reports\InfiltrationFeasibility_20110215\9526E_FigureXVI-2a_HydroSoils_20110215.mxd

ATTACHMENT E
EDUCATIONAL MATERIALS

For More Information

Orange County Stormwater Program

The Ocean Begins at Your Front Door

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.oilandfills.com for information on household hazardous waste collection centers, recycling centers and solid waste collection

O.C. Agriculture Commissioner

(714) 447-7100 or visit www.ocagcomm.com

Stormwater Best Management Practice Handbook

Visit www.cabmphandbooks.com

UC Master Gardener Hotline

(714) 708-1646 or visit www.uccemg.com

The Orange County Stormwater Program has created and moderates an electronic mailing list to facilitate communications, take questions and exchange ideas among its users about issues and topics related to stormwater and urban runoff and the implementation of program elements.

To join the list, please send an email to ocstormwaterinfo-join@list.ocwatersheds.com

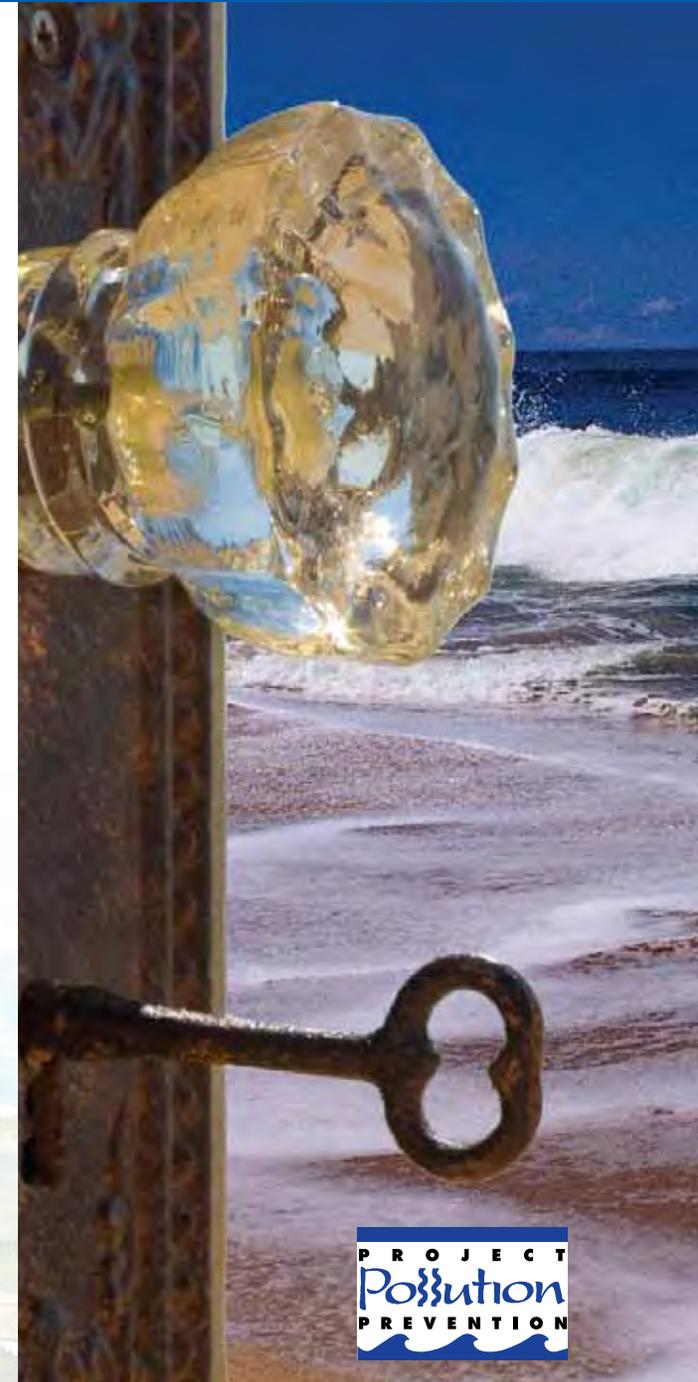
Aliso Viejo	(949)	425-2535
Anaheim Public Works Operations	(714)	765-6860
Brea Engineering	(714)	990-7666
Buena Park Public Works	(714)	562-3655
Costa Mesa Public Services	(714)	754-5323
Cypress Public Works	(714)	229-6740
Dana Point Public Works	(949)	248-3584
Fountain Valley Public Works	(714)	593-4441
Fullerton Engineering Dept.	(714)	738-6853
Garden Grove Public Works	(714)	741-5956
Huntington Beach Public Works	(714)	536-5431
Irvine Public Works	(949)	724-6315
La Habra Public Services	(562)	905-9792
La Palma Public Works	(714)	690-3310
Laguna Beach Water Quality	(949)	497-0378
Laguna Hills Public Services	(949)	707-2650
Laguna Niguel Public Works	(949)	362-4337
Laguna Woods Public Works	(949)	639-0500
Lake Forest Public Works	(949)	461-3480
Los Alamitos Community Dev.	(562)	431-3538
Mission Viejo Public Works	(949)	470-3056
Newport Beach, Code & Water		
Quality Enforcement	(949)	644-3215
Orange Public Works	(714)	532-6480
Placentia Public Works	(714)	993-8245
Rancho Santa Margarita	(949)	635-1800
San Clemente Environmental Programs	(949)	361-6143
San Juan Capistrano Engineering	(949)	234-4413
Santa Ana Public Works	(714)	647-3380
Seal Beach Engineering	(562)	431-2527 x317
Stanton Public Works	(714)	379-9222 x204
Tustin Public Works/Engineering	(714)	573-3150
Villa Park Engineering	(714)	998-1500
Westminster Public Works/Engineering	(714)	898-3311 x446
Yorba Linda Engineering	(714)	961-7138
Orange County Stormwater Program	(877)	897-7455
Orange County 24-Hour		
Water Pollution Problem Reporting Hotline		
1-877-89-SPILL (1-877-897-7455)		

On-line Water Pollution Problem Reporting Form

www.ocwatersheds.com



Printed on Recycled Paper





Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities such as pest control can lead to water pollution if you're not careful. Pesticide treatments must be planned and applied properly to ensure that pesticides do not enter the street, gutter or storm drain. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never dump pesticides into the ocean, so don't let it enter the storm drains. Pesticides can cause significant damage to our environment if used improperly. If you are thinking of using a pesticide to control a pest, there are some important things to consider.

For more information,
please call
University of California Cooperative
Extension Master Gardeners at
(714) 708-1646
or visit these Web sites:
www.uccemg.org
www.ipm.ucdavis.edu

For instructions on collecting a specimen
sample visit the Orange County
Agriculture Commissioner's website at:
http://www.ocagcomm.com/ser_lab.asp

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.

Information From:
Cheryl Wilen, Area IPM Advisor; Darren Haver,
Watershed Management Advisor; Mary
Louise Flint, IPM Education and Publication
Director; Pamela M. Geisel, Environmental
Horticulture Advisor; Carolyn L. Unruh,
University of California Cooperative
Extension staff writer. Photos courtesy of
the UC Statewide IPM Program and
Darren Haver.

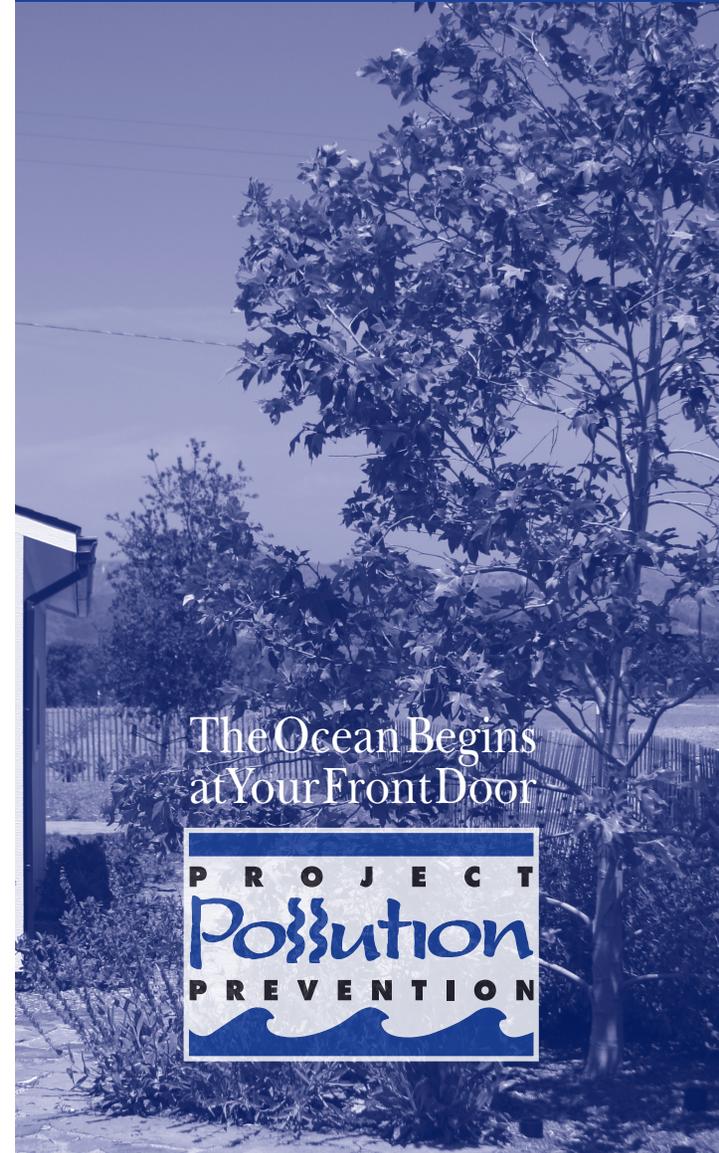
Funding for this brochure has been provided in full
or in part through an agreement with the State Water
Resources Control Board (SWRCB) pursuant to the
Costa-Machado Water Act of 2000 (Prop. 13).



Printed on Recycled Paper

Help Prevent Ocean Pollution:

Responsible Pest Control



The Ocean Begins
at Your Front Door



Tips for Pest Control

Key Steps to Follow:

Step 1: Correctly identify the pest (insect, weed, rodent, or disease) and verify that it is actually causing the problem.



This is important because beneficial insects are often mistaken for pests and sprayed with pesticides needlessly.

Consult with a Certified Nursery Professional at a local nursery or garden center or send a sample of the pest to the Orange County Agricultural Commissioner's Office.

Determine if the pest is still present – even though you see damage, the pest may have left.

Step 2: Determine how many pests are present and causing damage.



Small pest populations may be controlled more safely using non-pesticide techniques. These include removing food sources, washing off leaves with a strong stream of water, blocking entry into the home using caulking and replacing problem plants with ones less susceptible to pests.

Integrated Pest Management (IPM) usually combines several least toxic pest control methods for long-term prevention and management of pest problems without harming you, your family, or the environment.



Step 3: If a pesticide must be used, choose the least toxic chemical.

Obtain information on the least toxic pesticides that are effective at controlling the target pest from the UC Statewide Integrated Pest Management (IPM) Program's Web site at www.ipm.ucdavis.edu.

Seek out the assistance of a Certified Nursery Professional at a local nursery or garden center when selecting a pesticide. Purchase the smallest amount of pesticide available.

Apply the pesticide to the pest during its most vulnerable life stage. This information can be found on the pesticide label.

Step 4: Wear appropriate protective clothing.

Follow pesticide labels regarding specific types of protective equipment you should wear. Protective clothing should always be washed separately from other clothing.

Step 5: Continuously monitor external conditions when applying pesticides such as weather, irrigation, and the presence of children and animals.

Never apply pesticides when rain is predicted within the next 48 hours. Also, do not water after applying pesticides unless the directions say it is necessary.

Apply pesticides when the air is still; breezy conditions may cause the spray or dust to drift away from your targeted area.

In case of an emergency call 911 and/or the regional poison control number at (714) 634-5988 or (800) 544-4404 (CA only).

For general questions you may also visit www.calpoison.org.

Step 6: In the event of accidental spills, sweep up or use an absorbent agent to remove any excess pesticides. Avoid the use of water.

Be prepared. Have a broom, dust pan, or dry absorbent material, such as cat litter, newspapers or paper towels, ready to assist in cleaning up spills.

Contain and clean up the spill right away. Place contaminated materials in a doubled plastic bag. All materials used to clean up the spill should be properly disposed of according to your local Household Hazardous Waste Disposal site.

Step 7: Properly store and dispose of unused pesticides.

Purchase Ready-To-Use (RTU) products to avoid storing large concentrated quantities of pesticides.



Store unused chemicals in a locked cabinet.

Unused pesticide chemicals may be disposed of at a Household Hazardous Waste Collection Center.

Empty pesticide containers should be triple rinsed prior to disposing of them in the trash.

Household Hazardous Waste
Collection Center
(714) 834-6752
www.oilandfills.com





Preventing water pollution at your commercial/industrial site

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many landscape and building maintenance activities can lead to water pollution if you're not careful. Paint, chemicals, plant clippings and other materials can be blown or washed into 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 pour soap or fertilizers into the ocean, so why would you let them enter the storm drains? Follow these easy tips to help prevent water pollution.

Some types of industrial facilities are required to obtain coverage under the State General Industrial Permit. For more information visit: www.swrcb.ca.gov/stormwater/industrial.html

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** at **1-877-89-SPILL** (1-877-897-7455).

For emergencies, dial 911.



RECYCLE
USED OIL



Printed on Recycled Paper

Help Prevent Ocean Pollution:

Proper Maintenance Practices for Your Business



The Ocean Begins at Your Front Door



Proper Maintenance Practices for your Business

Landscape Maintenance

- Compost grass clippings, leaves, sticks and other vegetation, or dispose of it at a permitted landfill or in green waste containers. Do not dispose of these materials in the street, gutter or storm drain.
- Irrigate slowly and inspect the system for leaks, overspraying and runoff. Adjust automatic timers to avoid overwatering.
- Follow label directions for the use and disposal of fertilizers and pesticides.
- Do not apply pesticides or fertilizers if rain is expected within 48 hours or if wind speeds are above 5 mph.
- Do not spray pesticides within 100 feet of waterways.
- Fertilizers should be worked into the soil rather than dumped onto the surface.
- If fertilizer is spilled on the pavement or sidewalk, sweep it up immediately and place it back in the container.

Building Maintenance

- Never allow washwater, sweepings or sediment to enter the storm drain.
- Sweep up dry spills and use cat litter, towels or similar materials to absorb wet spills. Dispose of it in the trash.
- If you wash your building, sidewalk or parking lot, you **must** contain the water. Use a shop vac to collect the water and contact your city or sanitation agency for proper disposal information. Do not let water enter the street, gutter or storm drain.
- Use drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of materials in the trash.
- Use a ground cloth or oversized tub for mixing paint and cleaning tools.
- Use a damp mop or broom to clean floors.
- Cover dumpsters to keep insects, animals, rainwater and sand from entering. Keep the area around the dumpster clear of trash and debris. Do not overfill the dumpster.

- Call your trash hauler to replace leaking dumpsters.
- Do not dump any toxic substance or liquid waste on the pavement, the ground, or near a storm drain. Even materials that seem harmless such as latex paint or biodegradable cleaners can damage the environment.
- Recycle paints, solvents and other materials. For more information about recycling and collection centers, visit www.oclandfills.com.
- Store materials indoors or under cover and away from storm drains.
- Use a construction and demolition recycling company to recycle lumber, paper, cardboard, metals, masonry, carpet, plastic, pipes, drywall, rocks, dirt, and green waste. For a listing of construction and demolition recycling locations in your area, visit www.ciwmb.ca.gov/recycle.
- Properly label materials. Familiarize employees with Material Safety Data Sheets.

NEVER DISPOSE
OF ANYTHING
IN THE STORM
DRAIN.



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

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

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

UCCE Master Gardener Hotline:
(714) 708-1646

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

For emergencies, dial 911.

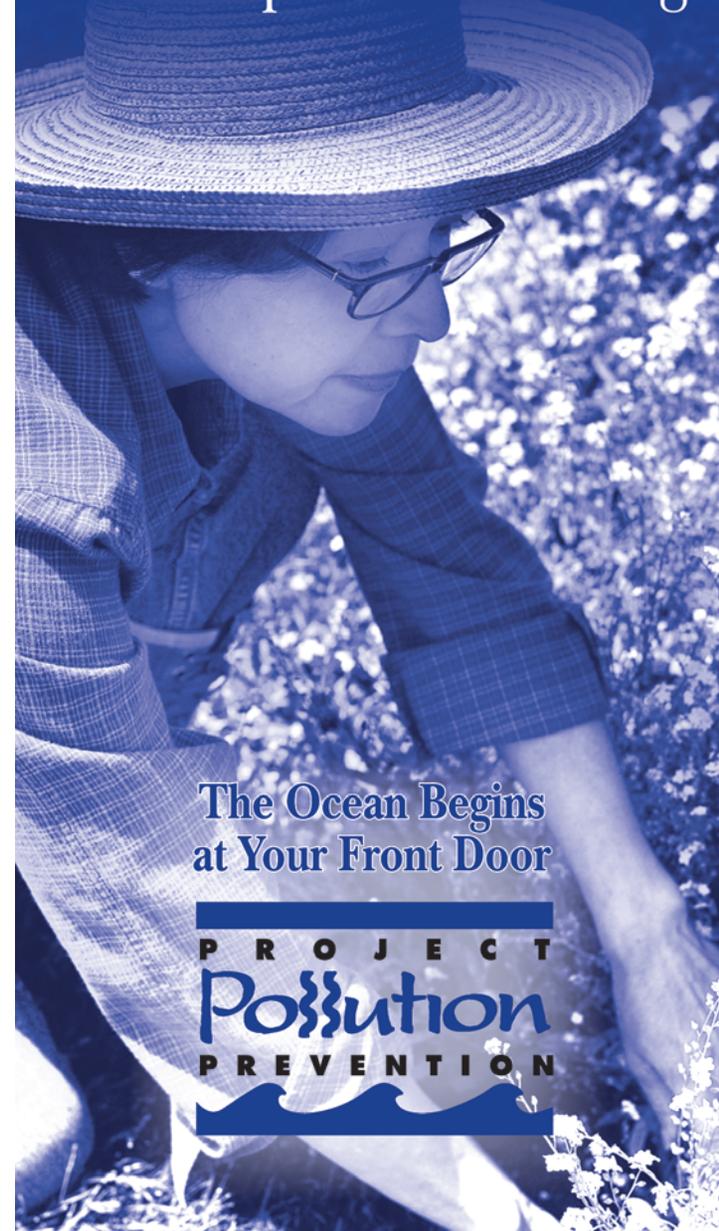
The tips contained in this brochure provide useful information to help prevent water pollution while landscaping or gardening. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.



Printed on Recycled Paper

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.
- 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.oilandfills.com



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**
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.



Printed on Recycled Paper

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.oilandfills.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.

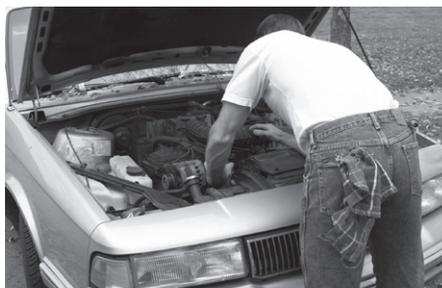
Yard Maintenance

- 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.
- 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.



Filterterra Owner's Manual



filterterra[®]
Bioretention Systems

C NTECH[®]
ENGINEERED SOLUTIONS



Table of Contents

Introduction	4
Activation Overview	4
Filtererra Plant Selection Overview	6
Warranty Overview	6
Routine Maintenance Guidelines.....	6
Maintenance Visit Procedure.....	9
Appendix 1 – Activation Checklist	12
Appendix 2 – Planting Requirements for Filtererra Systems.....	13

Enclosed

Local Area Filtererra Plant List



Introduction

Thank you for your purchase of the Filterra® Bioretention System. Filterra is a specially engineered stormwater treatment system incorporating high performance biofiltration media to remove pollutants from stormwater runoff. The system’s biota (vegetation and soil microorganisms) then further breakdown and absorb captured pollutants. All components of the system work together to provide a sustainable long-term solution for treating stormwater runoff.

The Filterra system has been delivered to you with protection in place to resist intrusion of construction related sediment which can contaminate the biofiltration media and result in inadequate system performance. These protection devices are intended as a best practice and cannot fully prevent contamination. It is the purchaser’s responsibility to provide adequate measures to prevent construction related runoff from entering the Filterra system.

Included with your purchase is Activation of the Filterra system by the manufacturer as well as a 1-year warranty from delivery of the system and 1-year of routine maintenance (mulch replacement, debris removal, and pruning of vegetation) up to twice during the first year after activation.

Design and Installation

Each project presents different scopes for the use of Filterra systems. Information and help may be provided to the design engineer during the planning process. Correct Filterra box sizing (by rainfall region) is essential to predict pollutant removal rates for a given area. The engineer shall submit calculations for approval by the local jurisdiction. The contractor is responsible for the correct installation of Filterra units as shown in approved plans. A comprehensive installation manual is available at www.ContechES.com.

Activation Overview

Activation of the Filterra system is a procedure completed by the manufacturer to place the system into working condition. This involves the following items:

- Removal of construction runoff protection devices
- Planting of the system’s vegetation
- Placement of pretreatment mulch layer using mulch certified for use in Filterra systems.

Activation MUST be provided by the manufacturer to ensure proper site conditions are met for Activation, proper installation of the vegetation, and use of pretreatment mulch certified for use in Filterra systems.



Minimum Requirements

The minimum requirements for Filterra Activation are as follows:

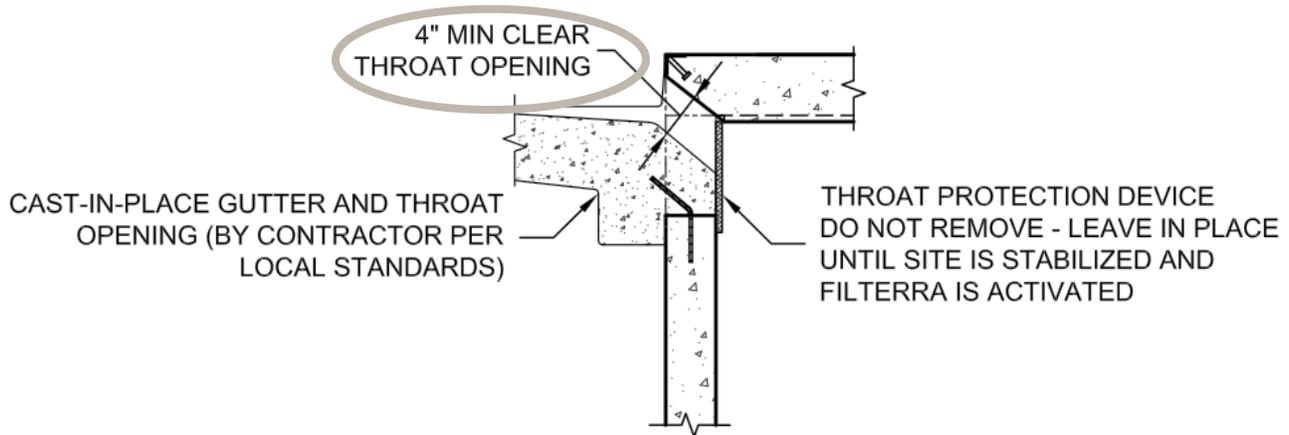
1. The site landscaping must be fully stabilized, i.e. full landscaping installed and some grass cover (not just straw and seed) is required to reduce sediment transport. Construction debris and materials should be removed from surrounding area.



2. Final paving must be completed. Final paving ensures that paving materials will not enter and contaminate the Filterra system during the paving process, and that the plant will receive runoff from the drainage area, assisting with plant survival for the Filterra system.



3. Filterra throat opening should be at least 4" in order to ensure adequate capacity for inflow and debris.



An Activation Checklist is included on page 12 to ensure proper conditions are met for Contech to perform the Activation services. A charge of \$500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation.

Filterra Plant Selection Overview

A Plant List has been enclosed with this packet highlighting recommended plants for Filterra systems in your area. Keep in mind that plants are subject to availability due to seasonality and required minimum size for the Filterra system. Plants installed in the Filterra system are container plants (max 15 gallon) from nursery stock and will be immature in height and spread at Activation.

It is the responsibility of the owner to provide adequate irrigation when necessary to the plant of the Filterra system.

The “Planting Requirements for Filterra Systems” document is included as an appendix and discusses proper selection and care of the plants within Filterra systems.

Warranty Overview

Refer to the Contech Engineered Solutions LLC Stormwater Treatment System LIMITED WARRANTY for further information. The following conditions may void the Filterra system’s warranty and waive the manufacturer provided Activation and Maintenance services:

- Unauthorized activation or performance of any of the items listed in the activation overview
- Any tampering, modifications or damage to the Filterra system or runoff protection devices
- Removal of any Filterra system components
- Failure to prevent construction related runoff from entering the Filterra system
- Failure to properly store and protect any Filterra components (including media and underdrain stone) that may be shipped separately from the vault

Routine Maintenance Guidelines

With proper routine maintenance, the biofiltration media within the Filterra system should last as long as traditional bioretention media. Routine maintenance is included by the manufacturer on all Filterra systems for the first year after activation. This includes a maximum of 2 visits to remove debris, replace pretreatment mulch, and prune the vegetation. More information is provided in the Operations and Maintenance Guidelines. Some Filterra systems also contain pretreatment or outlet bays. Depending on site pollutant loading, these bays may require periodic removal of debris, however this is not included in the first year of maintenance, and would likely not be required within the first year of operation.

These services, as well as routine maintenance outside of the included first year, can be provided by certified maintenance providers listed on the Contech website. Training can also be provided to other stormwater maintenance or landscape providers.



Why Maintain?

All stormwater treatment systems require maintenance for effective operation. This necessity is often incorporated in your property's permitting process as a legally binding BMP maintenance agreement. Other reasons to maintain are:

- Avoiding legal challenges from your jurisdiction's maintenance enforcement program.
- Prolonging the expected lifespan of your Filterra media.
- Avoiding more costly media replacement.
- Helping reduce pollutant loads leaving your property.

Simple maintenance of the Filterra is required to continue effective pollutant removal from stormwater runoff before discharge into downstream waters. This procedure will also extend the longevity of the living biofilter system. The unit will recycle and accumulate pollutants within the biomass, but is also subjected to other materials entering the inlet. This may include trash, silt and leaves etc. which will be contained above the mulch layer. Too much silt may inhibit the Filterra's flow rate, which is the reason for site stabilization before activation. Regular replacement of the mulch stops accumulation of such sediment.

When to Maintain?

Contech includes a 1-year maintenance plan with each system purchase. Annual included maintenance consists of a maximum of two (2) scheduled visits. Additional maintenance may be necessary depending on sediment and trash loading (by Owner or at additional cost). The start of the maintenance plan begins when the system is activated.

Maintenance visits are scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands while the fall visit helps the system by removing excessive leaf litter.

It has been found that in regions which receive between 30-50 inches of annual rainfall, (2) two visits are generally required; regions with less rainfall often only require (1) one visit per annum. Varying land uses can affect maintenance frequency; e.g. some fast food restaurants require more frequent trash removal. Contributing drainage areas which are subject to new development wherein the recommended erosion and sediment control measures have not been implemented may require additional maintenance visits.

Some sites may be subjected to extreme sediment or trash loads, requiring more frequent maintenance visits. This is the reason for detailed notes of maintenance actions per unit, helping the Supplier and Owner predict future maintenance frequencies, reflecting individual site conditions.

Owners must promptly notify the (maintenance) Supplier of any damage to the plant(s), which constitute(s) an integral part of the bioretention technology. Owners should also advise other landscape or maintenance contractors to leave all maintenance to the Supplier (i.e. no pruning or fertilizing) during the first year.



Exclusion of Services

Clean up due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not covered under the Supplier maintenance contract. Should a major contamination event occur the Owner must block off the outlet pipe of the Filterra (where the cleaned runoff drains to, such as drop inlet) and block off the throat of the Filterra. The Supplier should be informed immediately.

Maintenance Visit Summary

Each maintenance visit consists of the following simple tasks (detailed instructions below).

1. Inspection of Filterra and surrounding area
2. Removal of tree grate and erosion control stones
3. Removal of debris, trash and mulch
4. Mulch replacement
5. Plant health evaluation and pruning or replacement as necessary
6. Clean area around Filterra
7. Complete paperwork

Maintenance Tools, Safety Equipment and Supplies

Ideal tools include: camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing and barricades when working in close proximity to traffic and also safety hats and shoes. A T-Bar or crowbar should be used for moving the tree grates (up to 170 lbs ea.). Most visits require minor trash removal and a full replacement of mulch. See below for actual number of bagged mulch that is required in each media bay size. Mulch should be a double shredded, hardwood variety. Some visits may require additional Filterra engineered soil media available from the Supplier.

Box Length	Box Width	Filter Surface Area (ft ²)	Volume at 3" (ft ³)	# of 2 ft ³ Mulch Bags
4	4	16	4	2
6	4	24	6	3
8	4	32	8	4
6	6	36	9	5
8	6	48	12	6
10	6	60	15	8
12	6	72	18	9
13	7	91	23	12

Maintenance Visit Procedure

Keep sufficient documentation of maintenance actions to predict location specific maintenance frequencies and needs. An example Maintenance Report is included in this manual.



1. Inspection of Filterra and surrounding area

- Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

Record on Maintenance Report the following:

Standing Water	yes		no
Damage to Box Structure	yes		no
Damage to Grate	yes		no
Is Bypass Clear	yes		no

If yes answered to any of these observations, record with close-up photograph (numbered).



2. Removal of tree grate and erosion control stones

- Remove cast iron grates for access into Filterra box.
- Dig out silt (if any) and mulch and remove trash & foreign items.

3. Removal of debris, trash and mulch

Record on Maintenance Report the following:

Silt/Clay	yes		no
Cups/ Bags	yes		no
Leaves	yes		no
Buckets Removed	_____		



- After removal of mulch and debris, measure distance from the top of the Filterra engineered media soil to the top of the top slab. Compare the measured distance to the distance shown on the approved Contract Drawings for the system. Add Filterra media (not top soil or other) to bring media up as needed to distance indicated on drawings.

Record on Maintenance Report the following:

Distance to Top of Top Slab (inches)	_____
Inches of Media Added	_____



4. Mulch replacement

- Add double shredded mulch evenly across the entire unit to a depth of 3".
- Refer to Filterra Mulch Specifications for information on acceptable sources.
- Ensure correct repositioning of erosion control stones by the Filterra inlet to allow for entry of trash during a storm event.
- Replace Filterra grates correctly using appropriate lifting or moving tools, taking care not to damage the plant.

5. Plant health evaluation and pruning or replacement as necessary

- Examine the plant's health and replace if necessary.
- Prune as necessary to encourage growth in the correct directions



Record on Maintenance Report the following:

Height above Grate	_____	(ft)
Width at Widest Point	_____	(ft)
Health	healthy unhealthy	
Damage to Plant	yes no	
Plant Replaced	yes no	



6. Clean area around Filterra

- Clean area around unit and remove all refuse to be disposed of appropriately.



7. Complete paperwork

- Deliver Maintenance Report and photographs to appropriate location (normally Contech during maintenance contract period).
- Some jurisdictions may require submission of maintenance reports in accordance with approvals. It is the responsibility of the Owner to comply with local regulations.

Maintenance Checklist

Drainage System Failure	Problem	Conditions to Check	Condition that Should Exist	Actions
Inlet	Excessive sediment or trash accumulation.	Accumulated sediments or trash impair free flow of water into Filterra.	Inlet should be free of obstructions allowing free distributed flow of water into Filterra.	Sediments and/or trash should be removed.
Mulch Cover	Trash and floatable debris accumulation.	Excessive trash and/or debris accumulation.	Minimal trash or other debris on mulch cover.	Trash and debris should be removed and mulch cover raked level. Ensure bark nugget mulch is not used.
Mulch Cover	"Ponding" of water on mulch cover.	"Ponding" in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils.	Stormwater should drain freely and evenly through mulch cover.	Recommend contact manufacturer and replace mulch as a minimum.
Vegetation	Plants not growing or in poor condition.	Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.	Contact manufacturer for advice.
Vegetation	Plant growth excessive.	Plants should be appropriate to the species and location of Filterra.		Trim/prune plants in accordance with typical landscaping and safety needs.
Structure	Structure has visible cracks.	Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks.		Vault should be repaired.

Maintenance is ideally to be performed twice annually.

Filterra Inspection & Maintenance Log

Filterra System Size/Model: _____ Location: _____

Date	Mulch & Debris Removed	Depth of Mulch Added	Mulch Brand	Height of Vegetation Above Grate	Vegetation Species	Issues with System	Comments
1/1/17	5 – 5 gal Buckets	3"	Lowe's Premium Brown Mulch	4'	Galaxy Magnolia	- Standing water in downstream structure	- Removed blockage in downstream structure

Appendix 1 – Filterra® Activation Checklist



Project Name: _____ Company: _____

Site Contact Name: _____ Site Contact Phone/Email: _____

Site Owner/End User Name: _____ Site Owner/End User Phone/Email: _____

Preferred Activation Date: _____ (provide 2 weeks minimum from date this form is submitted)

Site Designation	System Size	Final Pavement / Top Coat Complete	Landscaping Complete / Grass Emerging	Construction materials / Piles / Debris Removed	Throat Opening Measures 4" Min. Height	Plant Species Requested
		<input type="checkbox"/> Yes <input type="checkbox"/> No				
		<input type="checkbox"/> Yes <input type="checkbox"/> No				
		<input type="checkbox"/> Yes <input type="checkbox"/> No				
		<input type="checkbox"/> Yes <input type="checkbox"/> No				
		<input type="checkbox"/> Yes <input type="checkbox"/> No				
		<input type="checkbox"/> Yes <input type="checkbox"/> No				
		<input type="checkbox"/> Yes <input type="checkbox"/> No				
		<input type="checkbox"/> Yes <input type="checkbox"/> No				
		<input type="checkbox"/> Yes <input type="checkbox"/> No				

Attach additional sheets as necessary.

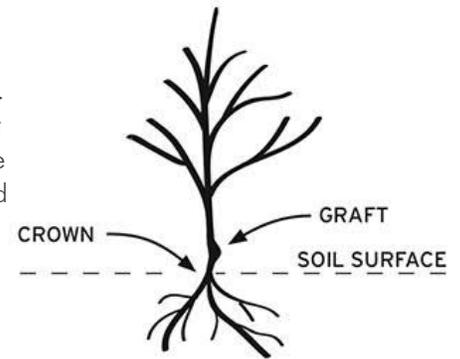
NOTE: A charge of \$500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation. ONLY Contech authorized representatives can perform Activation of Filterra systems; unauthorized Activations will void the system warranty and waive manufacturer supplied Activation and 1st Year Maintenance.

Signature _____ Date _____

Appendix 2 – Planting Requirements for Filterra® Systems

Plant Material Selection

- Select plant(s) as specified in the engineering plans and specifications.
- Select plant(s) with full root development but not to the point where root bound.
- Use local nursery container plants only. Ball and burlapped plants are not permitted.
- For precast Filterra systems with a tree grate, plant(s) must not have scaffold limbs at least 14 inches from the crown due to spacing between the top of the mulch and the tree grate. Lower branches can be pruned away provided there are sufficient scaffold branches for tree or shrub development.
- For precast Filterra systems with a tree grate, at the time of installation, it is required that plant(s) must be at least 6" above the tree grate opening at installation for all Filterra configurations. This DOES NOT apply to Full Grate Cover designs.
- Plant(s) shall not have a mature height greater than 25 feet.
- For standard 21" media depth, a 7 – 15 gallon container size shall be used. Media less than 21" (Filterra boxes only) will require smaller container plants.
- For precast Filterra systems, plant(s) should have a single trunk at installation, and pruning may be necessary at activation and maintenance for some of the faster growing species, or species known to produce basal sprouts.



Plant Installation

- During transport protect the plant leaves from wind and excessive jostling.
- Prior to removing the plant(s) from the container, ensure the soil moisture is sufficient to maintain the integrity of the root ball. If needed, pre-wet the container plant.
- Cut away any roots which are growing out of the container drain holes. Plants with excessive root growth from the drain holes should be rejected.
- Plant(s) should be carefully removed from the pot by gently pounding on the sides of the container with the fist to loosen root ball. Then carefully slide out. Do not lift plant(s) by trunk as this can break roots and cause soil to fall off. Extract the root ball in a horizontal position and support it to prevent it from breaking apart. Alternatively the pot can be cut away to minimize root ball disturbance.
- Remove any excess soil from above the root flare after removing plant(s) from container.
- Excavate a hole with a diameter 4" greater than the root ball, gently place the plant(s).
- If plant(s) have any circling roots from being pot bound, gently tease them loose without breaking them.
- If root ball has a root mat on the bottom, it should be shaved off with a knife just above the mat line.
- Plant the tree/shrub/grass with the top of the root ball 1" above surrounding media to allow for settling.
- All plants should have the main stem centered in the tree grate (where applicable) upon completion of installation.
- With all trees/shrubs, remove dead, diseased, crossed/rubbing, sharply crotched branches or branches growing excessively long or in wrong direction compared to majority of branches.
- To prevent transplant shock (especially if planting takes place in the hot season), it may be necessary to prune some of the foliage to compensate for reduced root uptake capacity. This is accomplished by pruning away some of the smaller secondary branches or a main scaffold branch if there are too many. Too much foliage relative to the root ball can dehydrate and damage the plant.
- Plant staking may be required.

Mulch Installation

- Only mulch that has been meeting Contech Engineered Solutions' mulch specifications can be used in the Filterra system.
- Mulch must be applied to a depth of 3" evenly over the surface of the media.

Irrigation Requirements

- Each Filterra system must receive adequate irrigation to ensure survival of the living system during periods of drier weather.
- Irrigation sources include rainfall runoff from downspouts and/or gutter flow, applied water through the tree grate or in some cases from an irrigation system with emitters installed during construction.
- At Activation: Apply about one (cool climates) to two (warm climates) gallons of water per inch of trunk diameter over the root ball.
- During Establishment: In common with all plants, each Filterra plant will require more frequent watering during the establishment period. One inch of applied water per week for the first three months is recommended for cooler climates (2 to 3 inches for warmer climates). If the system is receiving rainfall runoff from the drainage area, then irrigation may not be needed. Inspection of the soil moisture content can be evaluated by gently brushing aside the mulch layer and feeling the soil. Be sure to replace the mulch when the assessment is complete. Irrigate as needed**.
- Established Plants: Established plants have fully developed root systems and can access the entire water column in the media. Therefore irrigation is less frequent but requires more applied water when performed. For a mature system assume 3.5 inches of available water within the media matrix. Irrigation demand can be estimated as 1" of irrigation demand per week. Therefore if dry periods exceed 3 weeks, irrigation may be required. It is also important to recognize that plants which are exposed to windy areas and reflected heat from paved surfaces may need more frequent irrigation. Long term care should develop a history which is more site specific.

** Five gallons per square yard approximates 1 inch of water Therefore for a 6' by 6' Filterra approximately 20-60 gallons of water is needed. To ensure even distribution of water it needs to be evenly sprinkled over the entire surface of the filter bed, with special attention to make sure the root ball is completely wetted. NOTE: if needed, measure the time it takes to fill a five gallon bucket to estimate the applied water flow rate then calculate the time needed to irrigate the Filterra. For example, if the flow rate of the sprinkler is 5 gallons/minute then it would take 12 minutes to irrigate a 6' by 6' filter.





9025 Centre Pointe Drive, Suite 400
West Chester, OH 45069
info@conteches.com | 800-338-1122
www.ContechES.com

© 2020 Contech Engineered Solutions LLC, a QUIKRETE Company

ALL RIGHTS RESERVED. PRINTED IN THE USA.

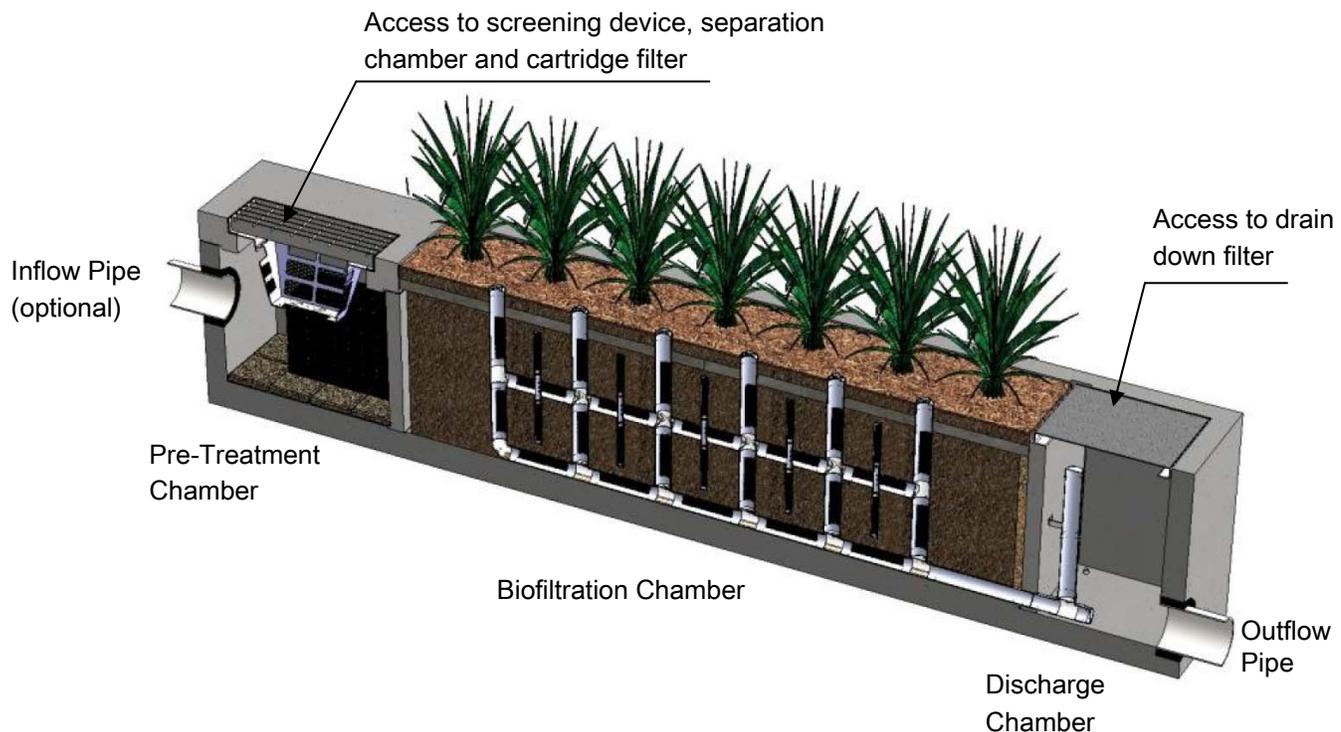
NOTHING IN THIS CATALOG SHOULD BE CONSTRUED AS A WARRANTY. APPLICATIONS SUGGESTED HEREIN ARE DESCRIBED ONLY TO HELP READERS MAKE THEIR OWN EVALUATIONS AND DECISIONS, AND ARE NEITHER GUARANTEES NOR WARRANTIES OF SUITABILITY FOR ANY APPLICATION. CONTECH MAKES NO WARRANTY WHATSOEVER, EXPRESS OR IMPLIED, RELATED TO THE APPLICATIONS, MATERIALS, COATINGS, OR PRODUCTS DISCUSSED HEREIN. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR ANY PARTICULAR PURPOSE ARE DISCLAIMED BY CONTECH. SEE CONTECH'S CONDITIONS OF SALE (AVAILABLE AT WWW.CONTECHES.COM/COS) FOR MORE INFORMATION.

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

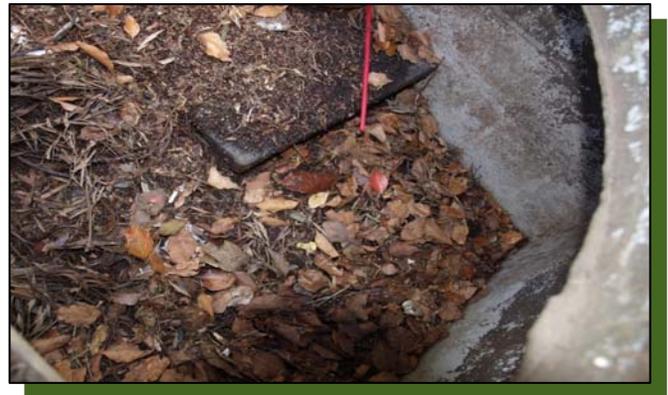
Screening Device

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.



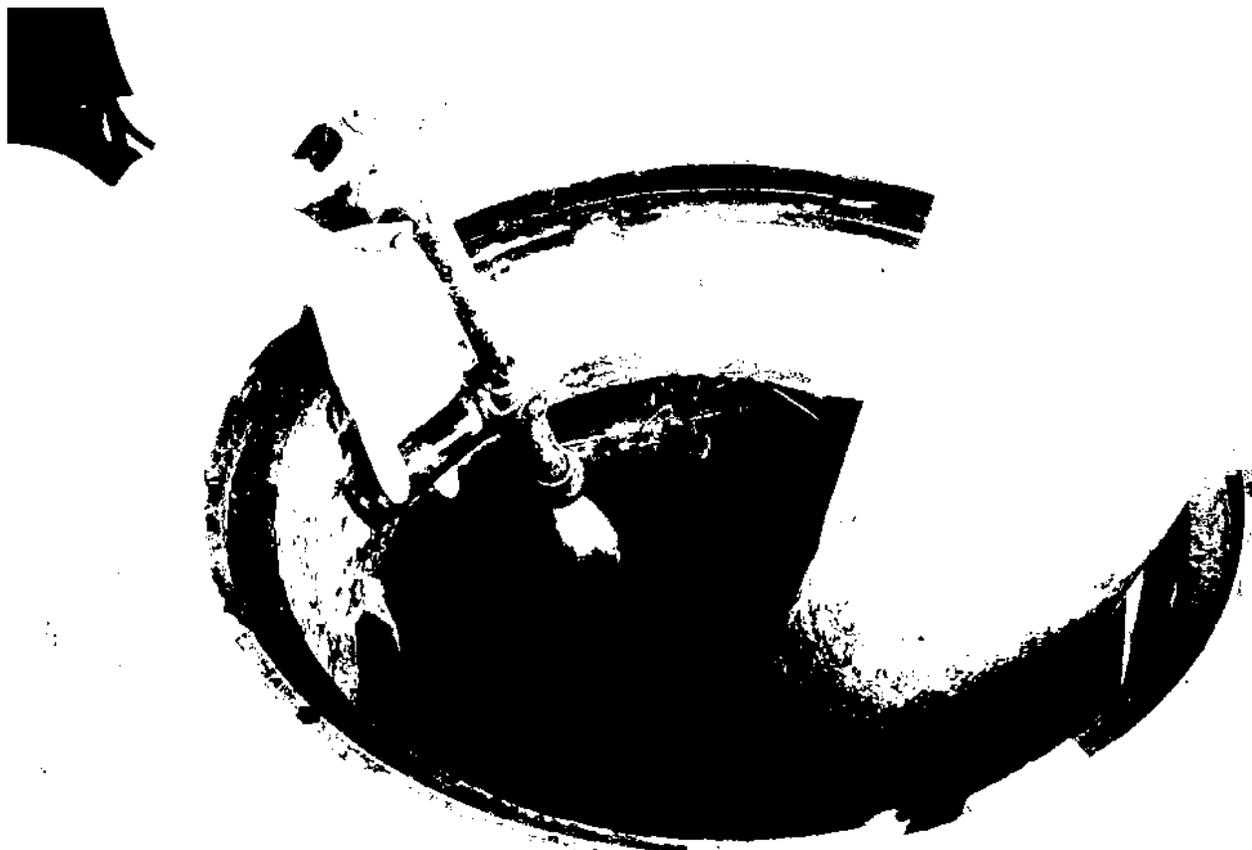
Trim Vegetation

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

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?			
Working Condition:			
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.			
Other Inspection Items:			
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



Modular Wetland System, Inc.

P. 760.433-7640

F. 760-433-3176

E. Info@modularwetlands.com

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: Long:	MWS Catch Basins						
		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:
