Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING

LOW IMPACT DEVELOPMENT (LID)

FOR:
WHITTIER BOULEVARD BUSINESS PARK
12352 WHITTIER BOULEVARD
WHITTIER, CALIFORNIA 90602
APNs: 8170-026-011 AND 015

OWNER:
WESTERN REALCO, LLC
500 NEWPORT CENTER DRIVE, SUITE 630
NEWPORT BEACH, CA 92660
PHONE: (949) 720-3788
CONTACT: VANCE MAPE

OCTOBER 26, 2021
MARCH 28, 2022

JOB NO. 3868

PREPARED BY:
THIENES ENGINEERING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PHONE: (714) 521-4811
FAX: (714) 521-4173
CONTACT: LUIS PRADO (luisp@thieneseng.com)

Preparer (Engineer) Certification

Engineer's Name:	Reinhard Stenzel		
Engineer's Title:	Director of Engineering		
Company:	Thienes Engineering Inc.		
Address:	14349 Firestone Boulevard, La Mirada, CA 90638		
Email:	reinhard@thieneseng.com		
Telephone No:	714-521-4811		
I hereby certify that this Low Impact Development Plan is in compliance with, and meets the requirements set forth in, Order No. R4−2012−0175, of the Los Angeles Regional Water Quality Control Board.			
Engineer's Signature		Date	
Place Stamp Here			

TABLE OF CONTENTS

1.0 Project Description 1
1.1 Existing Site Description 2
1.2 Proposed Site Description 2
1.3 Geological Investigation/Infiltration Feasibility 3
2.0 Project Specific Requirements 4
2.1 Peak Storm Water Runoff Discharge Rates 4
2.2 Source Controls 4
2.2.A Storm Drain Message and Signage (S-1) 4
2.2.B Outdoor Material Storage Area (S-2) 4
2.2.C Outdoor Trash Storage/Waste Handling Areas (S-3) 4
2.2.D Outdoor Loading/Unloading Dock Area (S-4) 5
2.2.F Outdoor Vehicle/Equipment Repair/Maintenance Area (S-5) 5
2.2.G Outdoor Vehicle/Equipment Accessory Wash Area (S-6) 5
2.2.H Fuel & Maintenance Area (S-7) 5
2.2.I Landscape Irrigation Practices (S-8) 5
2.2.J Building Materials (S-9) 5
2.2.K Animal Care and Handling Facilities (S-10) 5
2.2.L Outdoor Horticulture Areas (S-11) 5
2.3 Low Impact Development (LID) 6
2.3.A Infiltration 6
2.3.B Harvest and Use 6
2.3.C Biofiltration 6
2.4 Hydromodification 6
2.5 Conserve Natural Areas 6
2.6 Minimize Storm Water Pollutants of Concern 7
2.7 Protect Slopes and Channels 8
2.8 Provide Proof of Ongoing BMP Maintenance 8
2.9 Design Standards for Structural or Treatment Controls BMPs 9
2.10 Provisions Applicable to Individual Priority Project Categories 10
2.10.A Parking Lots 10
2.10.A.1 Properly Design Parking Area 10
2.10.A.2 Properly Design to Limit Oil Contamination and Perform Maintenance 10
2.11 Waiver 10
2.12 Mitigation Funding 11
2.13 Limitation on Use of Infiltration BMPs 11
2.14 Alternative Certification for Storm Water Treatment Mitigation 12
2.15 Resources and Reference 12

APPENDICES

Appendix A Stormwater Quality Design Calculations (SWQDv)

Appendix B LID Site Plan

Appendix C BMP Operation and Maintenance

Appendix D Maintenance and Covenant Agreement

Appendix E Educational Materials

Appendix F Infiltration Feasibility

Project Owner's Certification

I certify under penalty of law that this document and all attachments were prepared under my jurisdiction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathered the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Owner's Name:	Vance Mape		
Owner's Title:	Developer		
Company:	Western Realco, LLC		
Address:	500 Newport Center Drive, Suite 630, Newport Beach, CA 92660		
Email:	jmape@westernrealco.com		
Telephone No:	(949) 720-3788		
Signature:		Date:	

1.0 Project Description

The project site is located at 12352 Whittier Boulevard within the City of Whittier (Figure 1 - Vicinity Map), at APNs: 8170-026-011 and 015 of Los Angeles County. The project site encompasses approximately 13.50 acres, where 12.90 acres will receive LID treatment and the remainder 0.60 acres is primarily landscaping/pervious area draining offsite without being routed to the LID BMP. There is one proposed warehouse type building of approximately 288,300 square feet. At-grade loading docks will be provided along the south side of the building. There will be vehicle parking and paved drive aisles surrounding the building. The remaining areas will consist of landscaping.

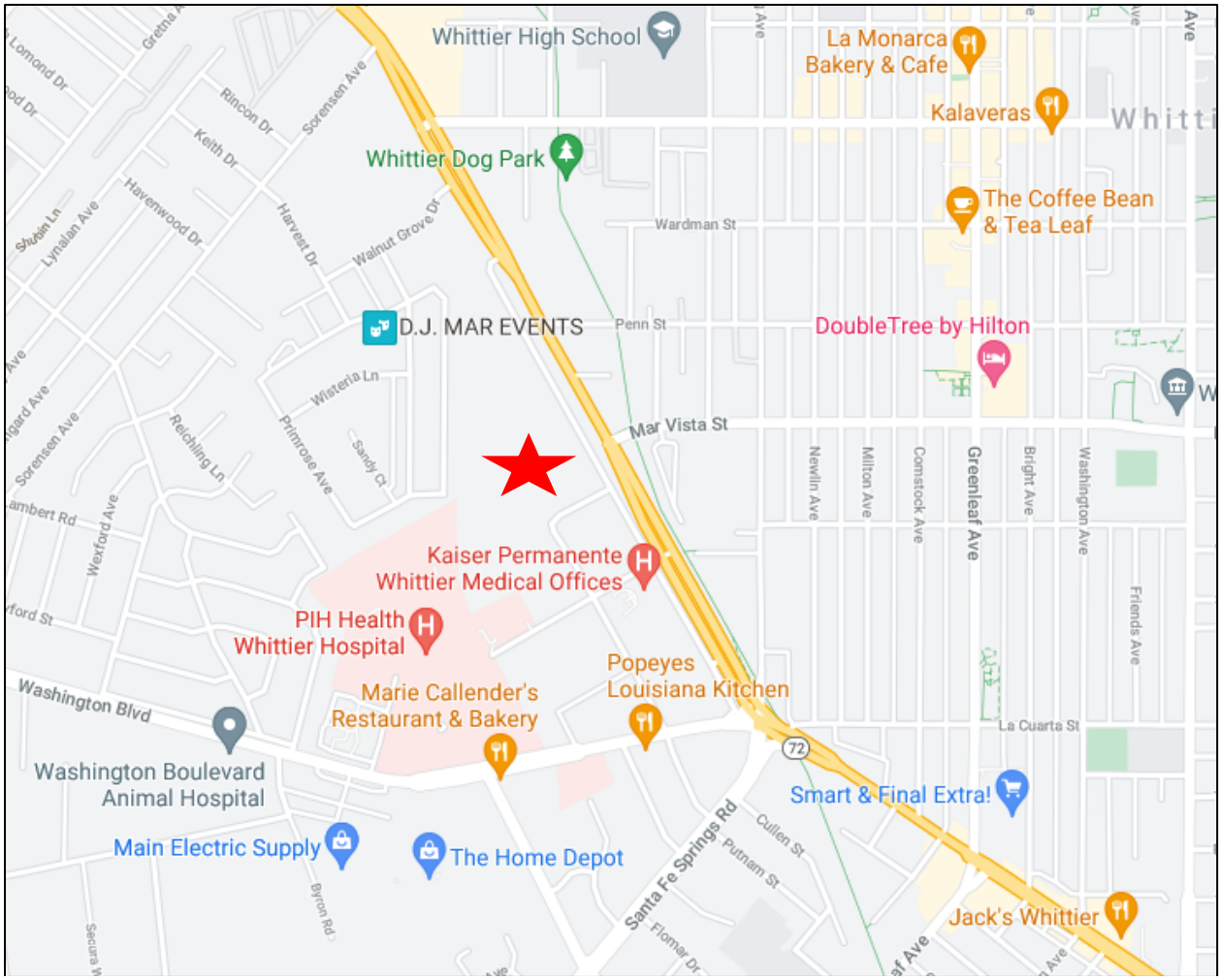


Figure 1 - Vicinity Map (North↑)

The project will treat stormwater runoff generated by the project through the use of a WetlandMod biofiltration device and an underground detention system sized to treat 1.5 times the Stormwater Quality Design volume (SWQDv). The 1.5x SWQDv is achieved by multiplying the 85th percentile rainfall depth by 1.5 times. Refer to Appendix A for references and calculations.

1.1 Existing Site Description

The existing condition of the site is fully developed with an industrial building. The site drains to gutters which drain to the on-site storm drain system before discharging into the open channel along the westerly property line.

1.2 Proposed Site Description

Runoff from the landscaped areas along the east side of the building will sheet flow into area drains before being conveyed westerly via a proposed storm drain (Line "A") and connecting to Ex. SD Line "A" (owned by the property owner) located at the southwesterly corner of the site. Ex. SD Line "A" then connects to the existing storm drain located along the westerly property line.

Runoff from the southerly half of the building, the truck yard and the southerly and southwesterly vehicle parking areas will sheet flow into a proposed catch basin located at the southerly tip of the project site. A proposed storm drain lateral (Lat "A1") will then convey runoff to Line "A" prior to connecting to Ex. SD Line "A".

Runoff from a small area located west of the building will sheet flow into a proposed catch basin within the vehicle parking area. A proposed storm drain (Line "B") will convey runoff into Ex. SD Line "B" (owned by the property owner) which then discharges into the existing concrete channel.

Runoff from the northerly half of the building and the northerly vehicle parking areas will drain to two catch basins located along the westerly property line. Proposed storm drain Lines "C1" and "C2" will then convey runoff into private Ex. SD Line "C" (owned by the property owner) before discharging offsite into the existing MTD No. 1734 storm drain system. Runoff from MTD No. 1734 is then conveyed further south into the existing concrete channel and then to the existing storm drain located at the southwest corner of the site.

Before any of these areas discharge offsite, the 1.5x SWQDv will be diverted to the underground chambers for detention purposes. The detained stormwater will slowly pump up to at-grade WetlandMOD biofiltration devices for treatment over the allotted 96 hours. The WetlandMOD biofiltration devices will utilize plants and soil media from MS4 Permit's Attachment H to biotreat pollutants. Drain inserts will be utilized in catch basins for pretreatment.

Approximately 0.45 acres consisting of existing vegetated sloped area and a concrete channel along the westerly property line (Subarea 1D) and another 0.15 acres of proposed vegetated slopes along the southerly property line (Subarea 1C) will sheet flow offsite without being routed to the LID BMP. These areas are considered self-treating.

The project is not located in or directly adjacent to any known Significant Ecological Area (SEA). The project does not discharge directly into any known SEA.

The project will not transfer any infrastructure to public agencies.

1.3 Geological Investigation/Infiltration Feasibility

The soil type, as found in the Los Angeles County Hydrology Manual, is 017 for Yolo Clay Loam.

Phase I Environmental Site Assessment
Per the Phase I Environmental Site Assessment (ESA) by Hazard Management Consulting dated December 12, 2019, the site has the following environmental concerns:

- The site has an open leaking underground storage tank (LUST) case with the Regional Water Quality Control Board (RWQCB) due to releases from former underground storage tanks (USTs). While groundwater has been closed by the RWQCB, soil remains an open issue.
- The site has a history of industrial use including the use of chlorinated solvents since the 1950's that have not been investigated to date.
- Evidence exists that the plumes of chlorinated solvents from the Omega Chemical facility and Sunrise Properties extends below the site
- There is a significant chance that a vapor intrusion condition may exist due to past releases on-site as well as the impacted groundwater from off-site facilities.

Based on the information presented above, infiltration is not recommended. See Appendix F for a copy of the Phase I ESA.

2.0 Project Specific Requirements

The proposed site is a redevelopment project and the entire site must meet the requirements of Los Angeles County's Low Impact Development Standards Manual (February 2014).

2.1 Peak Storm Water Runoff Discharge Rates

Runoff from the project site will continue to discharge to the existing storm drain along the westerly property. The proposed project will not increase impervious areas, flow rates, volumes, or time of concentration compared to existing conditions. See "Preliminary Hydrology Calculations for Whittier Boulevard Business Park" prepared by Thienes Engineering and prepared October 25, 2021 (a separate report) for more information.

2.2 Source Controls

Source control measures are designed to prevent pollutants from contacting stormwater runoff or prevent discharge of contaminated stormwater runoff to the storm drain system and/or receiving water. This section describes structural-type, source control measures that must be considered for implementation in conjunction with appropriate nonstructural source control measures, such as good housekeeping and employee training, to optimize pollution prevention.

Source control measures should be implemented to the maximum extent practicable to mitigate pollutant mobilization from the project site in stormwater and non-stormwater runoff. A summary of the source control measures that should be implemented for each type of project is summarized below.

2.2.A Storm Drain Message and Signage (S-1)

All proposed and any existing inlets to remain will be stenciled with prohibitive language and/or graphical icons to prevent dumping. Legibility of the stencils/markers will be maintained on a yearly basis, or as needed.

2.2.B Outdoor Material Storage Area (S-2)

There are no proposed outdoor material storage areas for this project. Any and all materials will be stored indoors.

2.2.C Outdoor Trash Storage/Waste Handling Areas (S-3)

Trash enclosure is located in an area that minimizes any run-on. The bin's lid will remain closed when not in use and will be walled off.

2.2.D Outdoor Loading/Unloading Dock Area (S-4)

The project proposes to construct aboveground loading docks with dock high doors which will remain closed when not in use. The concrete surface is designed to drain away from the building and minimize run-on to the loading docks. This area will be treated via underground chambers (detention only) and WetlandMOD biofiltration. Dock area flows are captured by an inlet that utilizes drain inserts to filter out pollutants prior to entering the biofiltration facilities. Additionally, the proposed building will be utilized as a warehouse for finished goods and consequently, items being loaded/unloaded do not have the potential to contribute to stormwater pollution. Please refer to Appendix B for loading dock locations.

2.2.F Outdoor Vehicle/Equipment Repair/Maintenance Area (S-5)

Not applicable

2.2.G Outdoor Vehicle/Equipment Accessory Wash Area (S-6)

Not applicable

2.2.H Fuel & Maintenance Area (S-7)

Not applicable

2.2.I Landscape Irrigation Practices (S-8)

Install irrigation systems that utilize a weather-based smart irrigation controller to minimize water usage and reduce dry weather urban runoff.

2.2.J Building Materials (S-9)

Not applicable

2.2.K Animal Care and Handling Facilities (S-10)

Not applicable

2.2.L Outdoor Horticulture Areas (S-11)

Not applicable

2.3 Low Impact Development (LID)

2.3.A Infiltration

Refer to section 1.3 Geotechnical Investigation/Infiltration Feasibility.

2.3.B Harvest and Use

This concept was not utilized because the project consists of a light industrial facility where the amount of impervious area is much greater than landscape and toilet use. However, stormwater is detained for biofiltration prior to discharging into the storm drain system.

2.3.C Biofiltration

A separate "low flow" storm drain will divert the 1.5x SWQDv towards the underground detention chambers. From the chambers, the SWQDv will be pumped into at-grade proprietary biofiltration devices (WetlandMODs) that utilizes the MS4 Permit's Attachment H soils for treatment. The pump is designed to pump a low flowrate that is equal to or slightly greater than the WetlandMOD's treatment flowrate. This flowrate is intended to drain/treat the 1.5x SWQDv within the allotted 96 hours. Pumped flows exceeding the WetlandMOD's treatment flowrate will overflow into a return pipe and outlet back into the upstream pump's wet well. Since the pump's flowrate is small, stormwater is designed/expected to back-up and fill the detention chambers. Once the chambers are full, it is understood that the 1.5x SWQDv has been achieved and stormwater will again back-up into the main storm drain lines (serving the site) that ultimately discharges into the existing storm drain along the westerly property line. After the storm event has passed, no additional flows will enter the chambers and the chambers will slowly deplete as stormwater is being pumped through the WetlandMOD for treatment over 96 hours. Treated flows will outlet into the vegetated slopes near the existing concrete channel. See Appendix A for detailed calculations.

2.4 Hydromodification

The proposed site is tributary to an engineered channel (Coyote Creek) that is regularly maintained and is not susceptible to hydromodification impacts. In addition, the onsite water quality BMPs will assist in increasing the time of concentration and discharging flows at a controlled rate.

2.5 Conserve Natural Areas

During the subdivision design and approval process, the site layout must be consistent with the applicable General Plan and Local Area Plan policies and implement the following:

- *Concentrate or cluster development on portions of the site while leaving the remaining land in a natural undisturbed condition;*

- *Limit clearing and grading of native vegetation at the site to the minimum amount needed to build lots, allow access, and provide fire protection;*
- *Maximize trees and other vegetation at the site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants;*
- *Promote natural vegetation by using parking lot islands and other landscaped areas;*
- *Preserve riparian areas and wetlands.*

The property was previously developed with no natural areas to conserve.

2.6 Minimize Storm Water Pollutants of Concern

Stormwater runoff from a site has the potential to contribute oil and grease, suspended solids, metals, gasoline, pesticides, and pathogens to the stormwater conveyance system. The development must be designed so as to minimize, to the maximum extent practicable, the introduction of pollutants of concern that may result in significant impacts, generated from site runoff of directly connected impervious areas (DCIA), to the stormwater conveyance system as approved by the building official. Pollutants of concern, consist of any pollutants that exhibit one or more of the following characteristics: current loadings or historic deposits of the pollutant are impacting the beneficial uses of a receiving water, elevated levels of the pollutant are found in sediments of a receiving water and/or have the potential to bioaccumulate in organisms therein, or the detectable inputs of the pollutant are at concentrations or loads considered potentially toxic to humans and/or flora and fauna.

In meeting this specific requirement, "minimization of the pollutants of concern" will require the incorporation of a BMP or combination of BMPs best suited to maximize the reduction of pollutant loadings in that runoff to the Maximum Extent Practicable.

Anticipated pollutants generated from the proposed development are:

- Suspended Solids
- Total Phosphorus
- Total Nitrogen
- Total Kjeldahl Nitrogen
- Cadmium, Total
- Chromium, Total
- Copper, Total
- Lead, Total
- Zinc, Total

The receiving waters and their impairments are:

- Coyote Creek, North Fork: Indicator Bacteria, Selenium
- Coyote Creek: Dissolved Copper, Indicator Bacteria, Iron, Melathion, pH, Toxicity
- San Gabriel River (Reach 1): Temperature (water),
- San Gabriel River Estuary: Copper, Dioxin, Indicator Bacteria, Nickel, Dissolved Oxygen

- San Pedro Bay Near/Off Shore Zones: Chlordane, PCBs (Polychlorinated biphenyls), Total DDT, Toxicity
- Pacific Ocean: None

The pollutants of concern of the project site are:

- Heavy Metals
- Trash and Debris

The proposed project will disconnect runoff from impervious areas by WetlandMOD biofiltration systems and underground detention. Inlets are used to intercept low flows towards the biofiltration systems for treatment prior to discharging offsite.

2.7 Protect Slopes and Channels

Project plans must include BMPs consistent with local codes and ordinances and LID to decrease the potential of slopes and/or channels from eroding and impacting stormwater runoff:

- *Convey runoff safely from the tops of slopes and stabilize disturbed slopes.*
- *Utilize natural drainage systems to the maximum extent practicable.*
- *Control or reduce or eliminate flow to natural drainage systems to the maximum extent practicable.*
- *Stabilize permanent channel crossings.*
- *Vegetate slopes with native or drought tolerant vegetation.*
- *Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion, with the approval of all agencies with jurisdiction, e.g., the U.S. Army Corps of Engineers and the California Department of Fish and Game.*

The proposed project site is located on a flat terrain. There are no slopes, natural drainage systems, or channel crossings to protect.

2.8 Provide Proof of Ongoing BMP Maintenance

Improper maintenance is one of the most common reasons why water quality controls will not function as designed or which may cause the system to fail entirely. It is important to consider who will be responsible for maintenance of a permanent BMP, and what equipment is required to perform the maintenance properly. If Structural or Treatment Control BMPs are required or included in project plans, the applicant must provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits.

The verification will include the developer's signed statement, as part of the project application, accepting responsibility for all Structural and Treatment Control BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public entity

assuming responsibility for Structural or Treatment Control BMP maintenance. The transfer of property to a private or public owner must have conditions requiring the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP to be included in the sales or lease agreement for that property, and will be the owner's responsibility. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year and retain proof of inspection. For residential properties where the Structural or Treatment Control BMPs are located within a common area, which will be maintained by a homeowner's association, language regarding the responsibility for maintenance must be included in the project's conditions, covenants and restrictions (CC&Rs). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what stormwater management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed, and assistance that the Permittee can provide. The transfer of this information shall also be required with any subsequent sale of the property.

Structural or Treatment Control BMPs located within a public area proposed for transfer will be the responsibility of the developer until accepted for transfer by the appropriate public agency. Structural or Treatment Control BMPs proposed for transfer must meet design standards adopted by the public entity for the BMP installed and should be approved by the appropriate public agency prior to its installation.

The property owner/operator will maintain proof of ongoing maintenance at the site as recorded in the covenant and agreement (see Appendix D).

2.9 Design Standards for Structural or Treatment Controls BMPs

The proposed site is a redevelopment project and the entire site must meet the requirements of Los Angeles County's Low Impact Development Standards Manual (February 2014).

Drain inserts: Runoff draining to the WetlandMOD (including roof runoff) will first flow through drain inserts for pretreatment. The drain inserts are designed to remove high levels of trash, debris, sediment and hydrocarbons.

WetlandMOD biofiltration with underground chambers: A separate "low flow" storm drain will divert the 1.5x SWQDv towards the underground detention chambers. From the chambers, the SWQDv will be pumped into at-grade proprietary biofiltration devices (WetlandMODs) that utilizes the MS4 Permit's Attachment H soils for treatment. The pump is designed to pump a low flowrate that is equal to or slightly greater than the WetlandMOD's treatment flowrate. This flowrate is intended to drain/treat the 1.5x SWQDv within the allotted 96 hours. Pumped flows exceeding the WetlandMOD's treatment flowrate will overflow into a return pipe and outlet back into the upstream pump's wet well. Since the pump's flowrate is small, stormwater is designed/expected to back-up and fill the detention chambers. Once the chambers are full, it is understood that the 1.5x SWQDv has been achieved and stormwater will again back-up into the main storm drain lines (serving the site) that ultimately discharges into the existing storm drain along the westerly property line. After the storm event has passed, no additional flows will enter the chambers and the chambers will slowly deplete as stormwater is being pumped through the

WetlandMOD for treatment over 96 hours. Treated flows will outlet into the vegetated slopes near the existing concrete channel. See Appendix A for detailed calculations.

2.10 Provisions Applicable to Individual Priority Project Categories

2.10.A Parking Lots

2.10.A.1 Properly Design Parking Area

Parking lots contain pollutants such as heavy metals, oil and grease, and polycyclic aromatic hydrocarbons that are deposited on parking lot surfaces by motor-vehicles. These pollutants are directly transported to surface waters. To minimize the offsite transport of pollutants, the following design criteria are required:

- *Reduce impervious land coverage of parking areas.*
- *Infiltrate runoff before it reaches storm drain system.*
- *Treat runoff before it reaches storm drain system.*

The proposed project is designed so that pollutants from the impervious surfaces are disconnected prior to discharging offsite. Runoff from the parking lots is conveyed to the biofiltration units for treatment.

2.10.A.2 Properly Design to Limit Oil Contamination and Perform Maintenance

Parking lots may accumulate oil, grease, and water insoluble hydrocarbons from vehicle drippings and engine system leaks.

- *Treat to remove oil and petroleum hydrocarbons at parking lots that are heavily used (e.g. fast food outlets, lots with 25 or more parking spaces, sports event parking lots, shopping malls, grocery stores, discount warehouse stores).*
- *Ensure adequate operation and maintenance of treatment systems particularly sludge and oil removal, and system fouling and plugging prevention control.*

The project owner will ensure that grease and oil are contained. The parking lot will be swept on a monthly basis, minimum, and before any rain events. Absorbent materials will be used to collect any spilled oil, and disposed of properly, to ensure they do not contaminate stormwater. Drain inserts will be installed at all onsite catch basins. Hydrocarbon booms from the drain inserts are highly effective in the removal of hydrocarbons.

2.11 Waiver

A Permittee may, through adoption of an ordinance or code incorporating the treatment requirements of LID, provide for a waiver from the requirement if impracticability for a specific property can be established. A waiver of impracticability shall be granted only when all other Structural or Treatment Control BMPs have been considered and rejected as infeasible.

Recognized situations of impracticability include, (i) extreme limitations of space for treatment on a redevelopment project, (ii) unfavorable or unstable soil conditions at a site to attempt infiltration, and (iii) risk of ground water contamination because a known unconfined aquifer lies beneath the land surface or an existing or potential underground source of drinking water is less than 10 feet from the soil surface. Any other justification for impracticability must be separately petitioned by the Permittee and submitted to the Regional Board for consideration. The Regional Board may consider approval of the waiver justification or may delegate the authority to approve a class of waiver justifications to the Regional Board Executive Officer. The supplementary waiver justification becomes recognized and effective only after approval by the Regional Board or the Regional Board Executive Officer. A waiver granted by a Permittee to any development or redevelopment project may be revoked by the Regional Board Executive Officer for cause and with proper notice upon petition.

The proposed project does not require a waiver of impracticability from any LID conditions.

2.12 Mitigation Funding

The Permittees may propose a management framework, for endorsement by the Regional Board Executive Officer, to support regional or sub-regional solutions to storm water pollution, where any of the following situations occur:

- *A waiver for impracticability is granted;*
- *Legislative funds become available;*
- *Off-site mitigation is required because of loss of environmental habitat; or*
- *An approved watershed management plan or a regional storm water mitigation plan exists that incorporates an equivalent or improved strategy for storm water mitigation.*

No management framework for mitigation funding is necessary for the proposed project.

Funding will be the responsibility of the owner:

WESTERN REALCO, LLC
500 NEWPORT CENTER DRIVE, SUITE 630
NEWPORT BEACH, CA 92660
PHONE: (949) 720-3788
CONTACT: JEREMY MAPE

2.13 Limitation on Use of Infiltration BMPs

Three factors significantly influence the potential for storm water to contaminate ground water. They are (i) pollutant mobility, (ii) pollutant abundance in storm water, (iii) and soluble fraction of pollutant. The risk of contamination of groundwater may be reduced by pretreatment of storm water. A discussion of limitations and guidance for infiltration practices is contained in, Potential Groundwater Contamination from Intentional and Non-Intentional Stormwater Infiltration, Report No. EPA/600/R-94/051, USEPA (1994).

In addition, the distance of the groundwater table from the infiltration BMP may also be a factor determining the risk of contamination. A water table distance separation of ten feet depth in California presumptively poses negligible risk for storm water not associated with industrial activity or high vehicular traffic.

Infiltration BMPs are not recommended for areas of industrial activity or areas subject to high vehicular traffic (25,000 or greater average daily traffic (ADT) on main roadway or 15,000 or more ADT on any intersecting roadway) unless appropriate pretreatment is provided to ensure groundwater is protected and the infiltration BMP is not rendered ineffective by overload.

See Section 1.3 of this LID report for details.

2.14 Alternative Certification for Storm Water Treatment Mitigation

In lieu of conducting detailed BMP review to verify Structural or Treatment Control BMPs adequacy, a Permittee may elect to accept a signed certification from a Civil Engineer or a Licensed Architect registered in the State of California, that the plan meets the criteria established herein. The Permittee is encouraged to verify that certifying person(s) have been trained on BMP design for water quality, not more than two years prior to the signature date. Training conducted by an organization with storm water BMP design expertise (e.g., a University, American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, or the California Water Environment Association) may be considered qualifying.

A California licensed civil engineer has provided a detailed BMP review of this report.

2.15 Resources and Reference

California Storm Water Best Management Practices Handbooks for Construction Activity (2009), Municipal (2003), and Industrial/Commercial (2003).

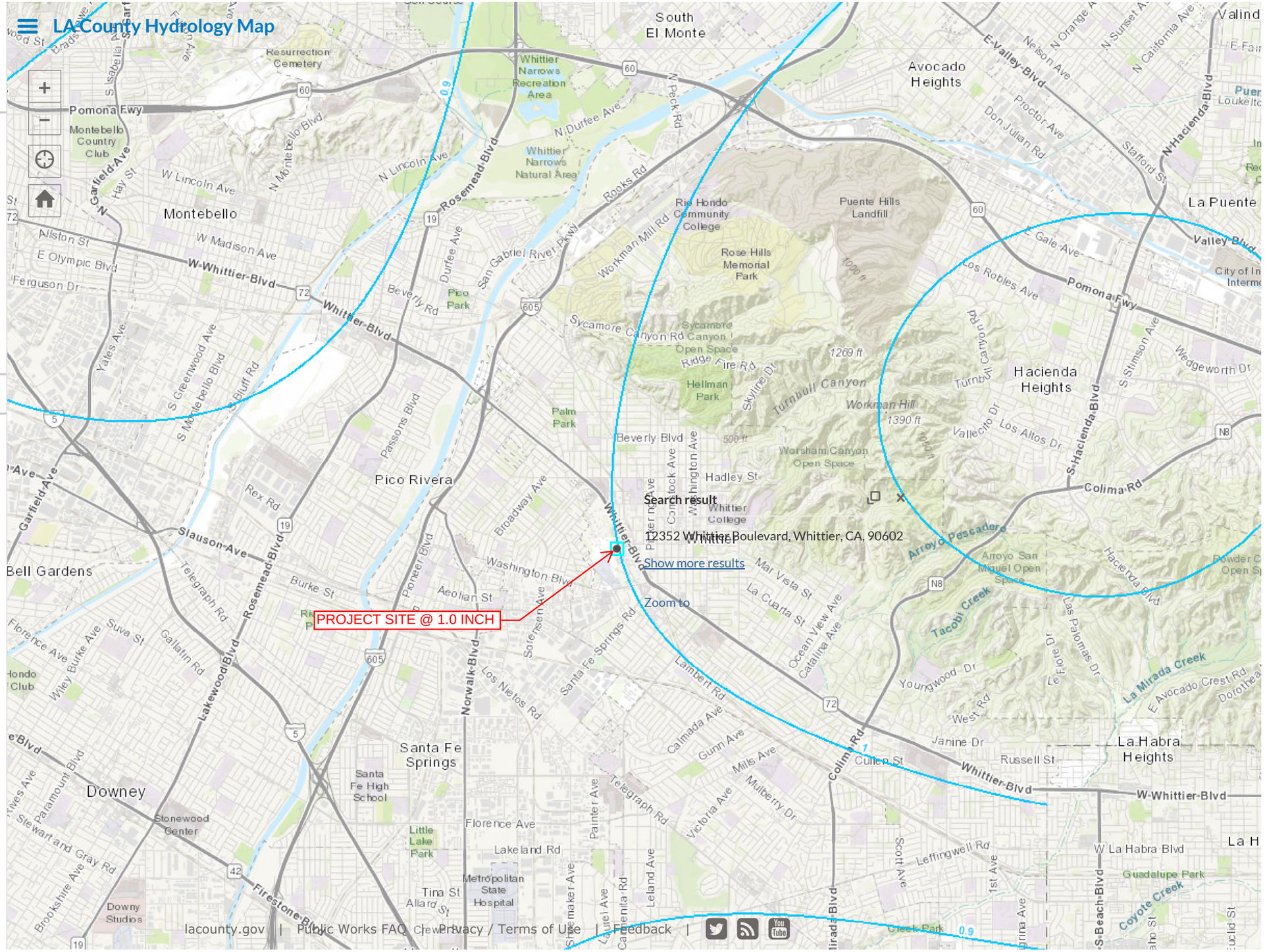
APPENDIX A

Stormwater Quality Design Calculations (SWQDv)

About | Legend | Layers

Layers

- [x] Hydrology GIS
  - [ ] 50yr Two Tenths (Rainfall)
  - [ ] DPA Zones
  - [ ] Soils 2004
  - [x] Final 85th Percentile, 24-hr Rainfall
  - [ ] 1-year, 1-hour Rainfall Intensity
  - [ ] Final 95th Percentile, 24-hr Rainfall
- [ ] LA County Parcels



Peak Flow Hydrologic Analysis

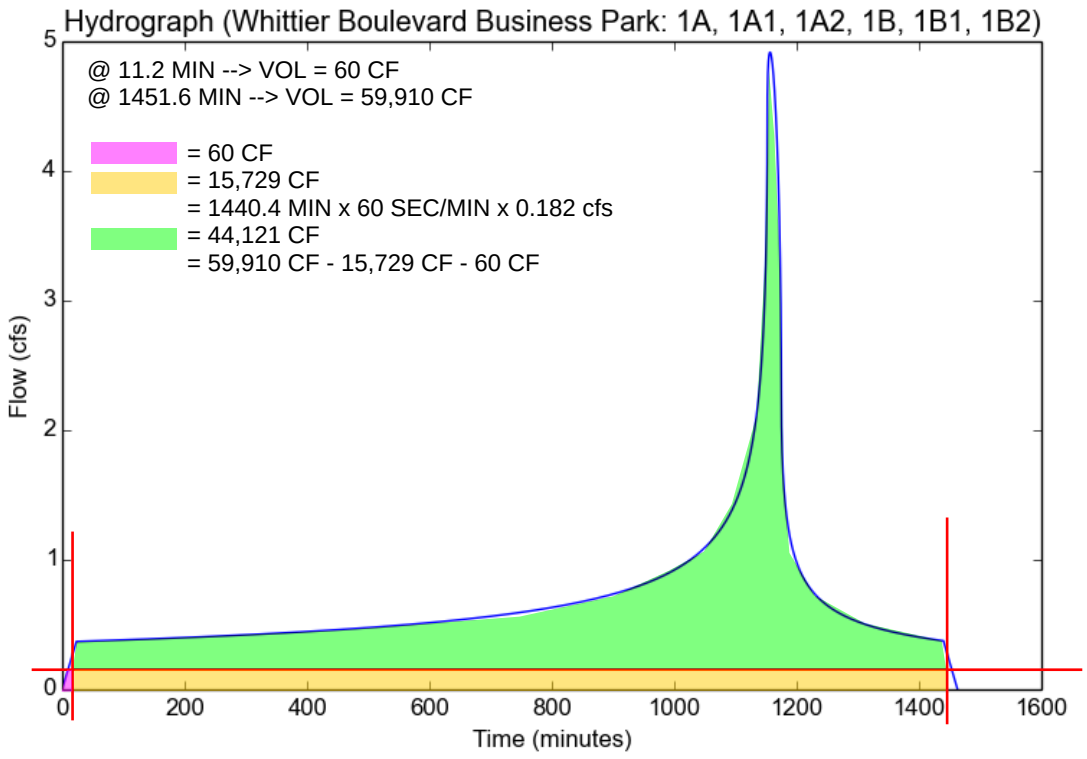
File location: O:/3800-3899/3868/SUSMP/2021-10-XX 1st Submittal LID/Appendices/Appendix A - SWQDv Calculations/HydroCalc/Whittier Boulevard Bu
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Whittier Boulevard Business Park
Subarea ID	1A, 1A1, 1A2, 1B, 1B1, 1B2
Area (ac)	12.9
Flow Path Length (ft)	743.0
Flow Path Slope (vft/hft)	0.01
85th Percentile Rainfall Depth (in)	1.5
Percent Impervious	0.95
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.5
Peak Intensity (in/hr)	0.4368
Undeveloped Runoff Coefficient (Cu)	0.3495
Developed Runoff Coefficient (Cd)	0.8725
Time of Concentration (min)	23.0
Clear Peak Flow Rate (cfs)	4.9163
Burned Peak Flow Rate (cfs)	4.9163
24-Hr Clear Runoff Volume (ac-ft)	1.3768
24-Hr Clear Runoff Volume (cu-ft)	59972.6973



Inputs: Whittier Boulevard Business Park

Subarea ID	Area (ac)	Flow Path L	Flow Path S	85th Perce	Percent Im	Soil Type	Design Sto	Fire Factor
1A, 1A1, 1A	12.9	743	0.01	1.5	0.95	17	85th perce	0

Outputs: Whittier Boulevard Business Park

Area (ac)	Modeled (8	Time of Co	Clear Peak	24-Hr Clear	Burned Pea	Peak Intens	Undevelop	Developed
1A, 1A1, 1A	1.5	23	4.916325	1.376784	4.916325	0.436816	0.349484	0.872474

Hydrograph: Whittier Boulevard Business Park - 1A, 1A1, 1A2, 1B, 1B1, 1B2

Time (min)	Incrementa	Incrementa	Intensity (i	Undevelop	Developed	Clear Peak	Incrementa	Cumulative
0	0	0	0	0	0	0	0	0
0.2	7.36E-05	0.00011	0	0	0	0.003211	0.019264	0.019264
0.4	0.000147	0.000221	0	0	0	0.006421	0.057793	0.077057
0.6	0.000221	0.000331	0	0	0	0.009632	0.096321	0.173378
0.8	0.000294	0.000442	0	0	0	0.012843	0.134849	0.308227
1	0.000368	0.000552	0	0	0	0.016053	0.173378	0.481604
1.2	0.000442	0.000663	0	0	0	0.019264	0.211906	0.69351
1.4	0.000515	0.000773	0	0	0	0.022475	0.250434	0.943945
1.6	0.000589	0.000884	0	0	0	0.025686	0.288963	1.232907
1.8	0.000663	0.000994	0	0	0	0.028896	0.327491	1.560398
2	0.000736	0.001105	0	0	0	0.032107	0.366019	1.926418
2.2	0.00081	0.001215	0	0	0	0.035318	0.404548	2.330965
2.4	0.000884	0.001326	0	0	0	0.038528	0.443076	2.774041
2.6	0.000957	0.001436	0	0	0	0.041739	0.481604	3.255646
2.8	0.001031	0.001547	0	0	0	0.04495	0.520133	3.775778
3	0.001105	0.001657	0	0	0	0.04816	0.558661	4.334439
3.2	0.001179	0.001768	0	0	0	0.051371	0.597189	4.931629
3.4	0.001252	0.001878	0	0	0	0.054582	0.635718	5.567347
3.6	0.001326	0.001989	0	0	0	0.057793	0.674246	6.241593
3.8	0.0014	0.0021	0	0	0	0.061003	0.712774	6.954367
4	0.001473	0.00221	0	0	0	0.064214	0.751303	7.70567
4.2	0.001547	0.002321	0	0	0	0.067425	0.789831	8.495501
4.4	0.001621	0.002431	0	0	0	0.070635	0.82836	9.323861
4.6	0.001695	0.002542	0	0	0	0.073846	0.866888	10.19075
4.8	0.001768	0.002653	0	0	0	0.077057	0.905416	11.09616
5	0.001842	0.002763	0	0	0	0.080267	0.943945	12.04011
5.2	0.001916	0.002874	0	0	0	0.083478	0.982473	13.02258
5.4	0.00199	0.002985	0	0	0	0.086689	1.021001	14.04358
5.6	0.002063	0.003095	0	0	0	0.089899	1.05953	15.10311
5.8	0.002137	0.003206	0	0	0	0.09311	1.098058	16.20117
6	0.002211	0.003317	0	0	0	0.096321	1.136586	17.33776
6.2	0.002285	0.003427	0	0	0	0.099532	1.175115	18.51287
6.4	0.002359	0.003538	0	0	0	0.102742	1.213643	19.72652
6.6	0.002432	0.003649	0	0	0	0.105953	1.252171	20.97869
6.8	0.002506	0.003759	0	0	0	0.109164	1.2907	22.26939

7	0.00258	0.00387	0	0	0	0.112374	1.329228	23.59861
7.2	0.002654	0.003981	0	0	0	0.115585	1.367756	24.96637
7.4	0.002728	0.004092	0	0	0	0.118796	1.406285	26.37266
7.6	0.002802	0.004202	0	0	0	0.122006	1.444813	27.81747
7.8	0.002875	0.004313	0	0	0	0.125217	1.483342	29.30081
8	0.002949	0.004424	0	0	0	0.128428	1.52187	30.82268
8.2	0.003023	0.004535	0	0	0	0.131639	1.560398	32.38308
8.4	0.003097	0.004645	0	0	0	0.134849	1.598927	33.98201
8.6	0.003171	0.004756	0	0	0	0.13806	1.637455	35.61946
8.8	0.003245	0.004867	0	0	0	0.141271	1.675983	37.29544
9	0.003319	0.004978	0	0	0	0.144481	1.714512	39.00996
9.2	0.003392	0.005089	0	0	0	0.147692	1.75304	40.763
9.4	0.003466	0.0052	0	0	0	0.150903	1.791568	42.55456
9.6	0.00354	0.00531	0	0	0	0.154113	1.830097	44.38466
9.8	0.003614	0.005421	0	0	0	0.157324	1.868625	46.25328
10	0.003688	0.005532	0	0	0	0.160535	1.907153	48.16044
10.2	0.003762	0.005643	0	0	0	0.163745	1.945682	50.10612
10.4	0.003836	0.005754	0	0	0	0.166956	1.98421	52.09033
10.6	0.00391	0.005865	0	0	0	0.170167	2.022738	54.11307
10.8	0.003984	0.005976	0	0	0	0.173378	2.061267	56.17434
11	0.004058	0.006087	0	0	0	0.176588	2.099795	58.27413
11.2	0.004132	0.006198	0	0	0	0.179799	2.138323	60.41245
11.4	0.004206	0.006308	0	0	0	0.18301	2.176852	62.58931
11.6	0.00428	0.006419	0	0	0	0.18622	2.21538	64.80469
11.8	0.004354	0.00653	0	0	0	0.189431	2.253909	67.05859
12	0.004428	0.006641	0	0	0	0.192642	2.292437	69.35103
12.2	0.004502	0.006752	0	0	0	0.195852	2.330965	71.682
12.4	0.004575	0.006863	0	0	0	0.199063	2.369494	74.05149
12.6	0.004649	0.006974	0	0	0	0.202274	2.408022	76.45951
12.8	0.004723	0.007085	0	0	0	0.205485	2.44655	78.90606
13	0.004797	0.007196	0	0	0	0.208695	2.485079	81.39114
13.2	0.004871	0.007307	0	0	0	0.211906	2.523607	83.91475
13.4	0.004946	0.007418	0	0	0	0.215117	2.562135	86.47688
13.6	0.00502	0.007529	0	0	0	0.218327	2.600664	89.07755
13.8	0.005094	0.00764	0	0	0	0.221538	2.639192	91.71674
14	0.005168	0.007751	0	0	0	0.224749	2.67772	94.39446
14.2	0.005242	0.007862	0	0	0	0.227959	2.716249	97.11071
14.4	0.005316	0.007973	0	0	0	0.23117	2.754777	99.86548
14.6	0.00539	0.008085	0	0	0	0.234381	2.793305	102.6588
14.8	0.005464	0.008196	0	0	0	0.237591	2.831834	105.4906
15	0.005538	0.008307	0	0	0	0.240802	2.870362	108.361
15.2	0.005612	0.008418	0	0	0	0.244013	2.90889	111.2699
15.4	0.005686	0.008529	0	0	0	0.247224	2.947419	114.2173
15.6	0.00576	0.00864	0	0	0	0.250434	2.985947	117.2032
15.8	0.005834	0.008751	0	0	0	0.253645	3.024476	120.2277
16	0.005908	0.008862	0	0	0	0.256856	3.063004	123.2907
16.2	0.005982	0.008974	0	0	0	0.260066	3.101532	126.3923

1445.2	1	1.5	0.02602	0.1	0.86	0.288665	3.483743	59819.32
1445.4	1	1.5	0.025723	0.1	0.86	0.285373	3.444229	59822.76
1445.6	1	1.5	0.025427	0.1	0.86	0.282082	3.404729	59826.17
1445.8	1	1.5	0.02513	0.1	0.86	0.278792	3.365242	59829.53
1446	1	1.5	0.024834	0.1	0.86	0.275503	3.32577	59832.86
1446.2	1	1.5	0.024537	0.1	0.86	0.272215	3.286311	59836.15
1446.4	1	1.5	0.024241	0.1	0.86	0.268929	3.246865	59839.39
1446.6	1	1.5	0.023945	0.1	0.86	0.265643	3.207434	59842.6
1446.8	1	1.5	0.023649	0.1	0.86	0.262359	3.168015	59845.77
1447	1	1.5	0.023353	0.1	0.86	0.259076	3.128611	59848.9
1447.2	1	1.5	0.023057	0.1	0.86	0.255794	3.08922	59851.99
1447.4	1	1.5	0.022761	0.1	0.86	0.252513	3.049843	59855.04
1447.6	1	1.5	0.022466	0.1	0.86	0.249233	3.01048	59858.05
1447.8	1	1.5	0.02217	0.1	0.86	0.245955	2.97113	59861.02
1448	1	1.5	0.021875	0.1	0.86	0.242677	2.931793	59863.95
1448.2	1	1.5	0.021579	0.1	0.86	0.239401	2.89247	59866.84
1448.4	1	1.5	0.021284	0.1	0.86	0.236126	2.853161	59869.7
1448.6	1	1.5	0.020989	0.1	0.86	0.232852	2.813865	59872.51
1448.8	1	1.5	0.020694	0.1	0.86	0.229579	2.774583	59875.28
1449	1	1.5	0.020399	0.1	0.86	0.226307	2.735314	59878.02
1449.2	1	1.5	0.020104	0.1	0.86	0.223036	2.696058	59880.72
1449.4	1	1.5	0.019809	0.1	0.86	0.219767	2.656817	59883.37
1449.6	1	1.5	0.019515	0.1	0.86	0.216498	2.617588	59885.99
1449.8	1	1.5	0.01922	0.1	0.86	0.213231	2.578373	59888.57
1450	1	1.5	0.018926	0.1	0.86	0.209964	2.539171	59891.11
1450.2	1	1.5	0.018632	0.1	0.86	0.206699	2.499983	59893.61
1450.4	1	1.5	0.018337	0.1	0.86	0.203435	2.460808	59896.07
1450.6	1	1.5	0.018043	0.1	0.86	0.200172	2.421647	59898.49
1450.8	1	1.5	0.017749	0.1	0.86	0.196911	2.382499	59900.87
1451	1	1.5	0.017455	0.1	0.86	0.19365	2.343364	59903.22
1451.2	1	1.5	0.017162	0.1	0.86	0.19039	2.304243	59905.52
1451.4	1	1.5	0.016868	0.1	0.86	0.187132	2.265134	59907.78
1451.6	1	1.5	0.016574	0.1	0.86	0.183875	2.22604	59910.01
1451.8	1	1.5	0.016281	0.1	0.86	0.180618	2.186958	59912.2
1452	1	1.5	0.015987	0.1	0.86	0.177363	2.14789	59914.35
1452.2	1	1.5	0.015694	0.1	0.86	0.174109	2.108835	59916.45
1452.4	1	1.5	0.015401	0.1	0.86	0.170856	2.069793	59918.52
1452.6	1	1.5	0.015108	0.1	0.86	0.167604	2.030765	59920.56
1452.8	1	1.5	0.014815	0.1	0.86	0.164354	1.991749	59922.55
1453	1	1.5	0.014522	0.1	0.86	0.161104	1.952747	59924.5
1453.2	1	1.5	0.014229	0.1	0.86	0.157856	1.913758	59926.41
1453.4	1	1.5	0.013936	0.1	0.86	0.154608	1.874783	59928.29
1453.6	1	1.5	0.013644	0.1	0.86	0.151362	1.83582	59930.12
1453.8	1	1.5	0.013351	0.1	0.86	0.148117	1.796871	59931.92
1454	1	1.5	0.013059	0.1	0.86	0.144872	1.757934	59933.68
1454.2	1	1.5	0.012766	0.1	0.86	0.141629	1.719011	59935.4
1454.4	1	1.5	0.012474	0.1	0.86	0.138387	1.680101	59937.08

1454.6	1	1.5	0.012182	0.1	0.86	0.135147	1.641204	59938.72
1454.8	1	1.5	0.01189	0.1	0.86	0.131907	1.60232	59940.32
1455	1	1.5	0.011598	0.1	0.86	0.128668	1.56345	59941.89
1455.2	1	1.5	0.011306	0.1	0.86	0.125431	1.524592	59943.41
1455.4	1	1.5	0.011014	0.1	0.86	0.122194	1.485747	59944.9
1455.6	1	1.5	0.010723	0.1	0.86	0.118959	1.446915	59946.34
1455.8	1	1.5	0.010431	0.1	0.86	0.115724	1.408097	59947.75
1456	1	1.5	0.01014	0.1	0.86	0.112491	1.369291	59949.12
1456.2	1	1.5	0.009848	0.1	0.86	0.109259	1.330498	59950.45
1456.4	1	1.5	0.009557	0.1	0.86	0.106028	1.291719	59951.74
1456.6	1	1.5	0.009266	0.1	0.86	0.102798	1.252952	59952.99
1456.8	1	1.5	0.008975	0.1	0.86	0.099569	1.214198	59954.21
1457	1	1.5	0.008684	0.1	0.86	0.096341	1.175457	59955.38
1457.2	1	1.5	0.008393	0.1	0.86	0.093114	1.136729	59956.52
1457.4	1	1.5	0.008102	0.1	0.86	0.089888	1.098014	59957.62
1457.6	1	1.5	0.007812	0.1	0.86	0.086664	1.059312	59958.68
1457.8	1	1.5	0.007521	0.1	0.86	0.08344	1.020623	59959.7
1458	1	1.5	0.007231	0.1	0.86	0.080218	0.981946	59960.68
1458.2	1	1.5	0.00694	0.1	0.86	0.076996	0.943283	59961.62
1458.4	1	1.5	0.00665	0.1	0.86	0.073776	0.904632	59962.53
1458.6	1	1.5	0.00636	0.1	0.86	0.070557	0.865994	59963.4
1458.8	1	1.5	0.00607	0.1	0.86	0.067338	0.827369	59964.22
1459	1	1.5	0.00578	0.1	0.86	0.064121	0.788756	59965.01
1459.2	1	1.5	0.00549	0.1	0.86	0.060905	0.750157	59965.76
1459.4	1	1.5	0.0052	0.1	0.86	0.05769	0.71157	59966.47
1459.6	1	1.5	0.00491	0.1	0.86	0.054476	0.672996	59967.15
1459.8	1	1.5	0.004621	0.1	0.86	0.051263	0.634435	59967.78
1460	1	1.5	0.004331	0.1	0.86	0.048051	0.595886	59968.38
1460.2	1	1.5	0.004042	0.1	0.86	0.04484	0.55735	59968.93
1460.4	1	1.5	0.003753	0.1	0.86	0.041631	0.518827	59969.45
1460.6	1	1.5	0.003463	0.1	0.86	0.038422	0.480317	59969.93
1460.8	1	1.5	0.003174	0.1	0.86	0.035214	0.441819	59970.37
1461	1	1.5	0.002885	0.1	0.86	0.032008	0.403334	59970.78
1461.2	1	1.5	0.002596	0.1	0.86	0.028802	0.364861	59971.14
1461.4	1	1.5	0.002307	0.1	0.86	0.025598	0.326402	59971.47
1461.6	1	1.5	0.002019	0.1	0.86	0.022394	0.287954	59971.76
1461.8	1	1.5	0.00173	0.1	0.86	0.019192	0.24952	59972.01
1462	1	1.5	0.001441	0.1	0.86	0.015991	0.211098	59972.22
1462.2	1	1.5	0.001153	0.1	0.86	0.012791	0.172688	59972.39
1462.4	1	1.5	0.000865	0.1	0.86	0.009591	0.134292	59972.52
1462.6	1	1.5	0.000576	0.1	0.86	0.006393	0.095907	59972.62
1462.8	1	1.5	0.000288	0.1	0.86	0.003196	0.057536	59972.68
1463	1	1.5	0	0.1	0.86	0	0.019176	59972.7

1463 min x 60 (sec/min) x 0.182 cfs = 15,976 cf biofiltered

WetlandMOD - 24" Media Thickness, Volume Based

Project ID:	14937
Project Name:	12352 Whittier BLVD (TEI 3868)
City, State, ZIP:	Whittier, CA
Date:	

Blue = User Input
Gray = Formula
Green = Proceed
Red = Redo

WetlandMOD Size	**WM-28-23-V**

	User Input Data		
LA County 24"; Bay Area 18"	Media Thickness (in)	24	
Volume By EOR	Treatment Volume (CF)	59973	
Drain Down Time in hours	Drain Down Time (hrs)	96	
LA 5-12in/hr; Bay Area 5-12in/hr	Infiltration Rate (in/hr)	12	
Add Row(s) to change footprint	Number of Row(s)	5.0	For half row, use 0.5
RIM/FG to Outlet pipe	WM Vault Depth (ft)	5.0	Single Max depth 7ft, Double Max depth 5ft
Includes 1" grout above pipe	Overflow/Return Pipe (in)	6	Includes 1" spacing above return pipe
	Overflow/Return below Top Slab (ft)	-1.42	
If using pump upstream	Operating head (ft)	3.58	Standard operating head = RIM - 9.5"

	Treatment Data	
Treatment volume x 448.8 =	Treatment Flow (gpm)	77.88
in/hr / 100 =	Media Loading Rate (gpm/sf)	0.12
Treatment flow / Loading rate =	Requried Media Surface Area (sf)	649.01

	Cage, HGL Height	
Provding 3" Multch on top	Cage Height (ft)	4.75
Reduced by 4" from FS	HGL Height (ft)	3.58
Length of cage in each row	Cage Length/ Row (ft)	19.0

	Final Checks	
Based on HGL head build up	Provided Media Surface Area (sf)	680.83
Unit discharge rate	Discharge Rate (cfs)	0.182
Orifice Diameter in inches	Orifice Diameter per Row (in)	0.85

Provided >= Required surface area, unit dimensions in good standing.

	Unit Dimensions		
Length of Media row + Baffle wall	Length Media chamber (ft)	19.0	
Pre-treatment + Filtration chm.	Total Length of Unit (ft)	23.0	4"/6" baffle wall part of Pre-treatment chamber
Total width of unit	Width of Unit (ft)	28.0	

Media, Gravel Volume	
WM Media Volume (cy)	66.85
Gravel Layer Volume (cy)	14.48

Feel free to fax or email proposed sizing calculations to BioClean, for assistance with sizing, compliance, and design.
Phone: 760.433.7640 | Fax: 760.433.3176
Email: Info@modularwetlands.com

BioClean
A Forterra Company

StormTech
Detention • Retention • Recharge
Subsurface Stormwater Management℠

MC-4500 Site Calculator

Project Information:

Project Name:	Whittier Blvd. Business Park
Location:	12352 Whittier Boulevard
Date:	28-Mar
Engineer:	Thienes Engineering, Inc
StormTech RPM:	

System Requirements

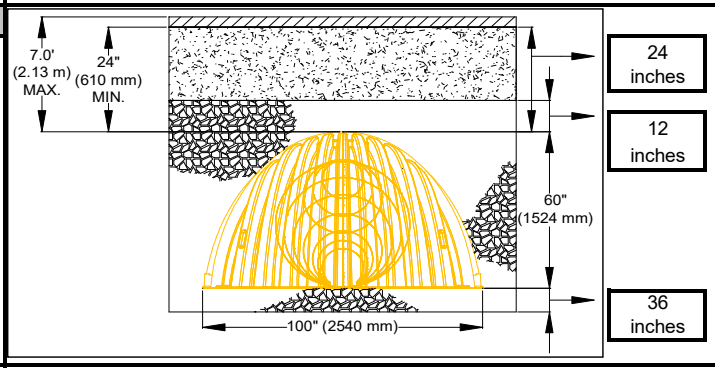
Units		Imperial	
Required Storage Volume		44121	CF
Stone Porosity (Industry Standard = 40%)		40	%
Stone Above Chambers	(12 inch min.)	12	inches
Stone Foundation Depth	(9 inch min.)	36	inches
Average Cover over Chambers	(24 inch min.)	24	inches
Bed size controlled by WIDTH or LENGTH?		WIDTH	
Limiting WIDTH or LENGTH dimension		47	feet
Storage Volume per Chamber		195.5	CF
Storage Volume per End Cap		137.7	CF

System Sizing

Number of Chambers Required	219	each
Number of End Caps Required	10	each
Bed Size (including perimeter stone)	8,542	square feet
Stone Required (including perimeter stone)	2793	tons
Volume of Excavation	3164	cubic yards
Non-woven Filter Fabric Required (20% Safety Factor)	2832	square yards
Length of Isolator Row	184.2	feet
Woven Isolator Row Fabric (20% Safety Factor)	506	square yards
Installed Storage Volume	44,192	cubic feet

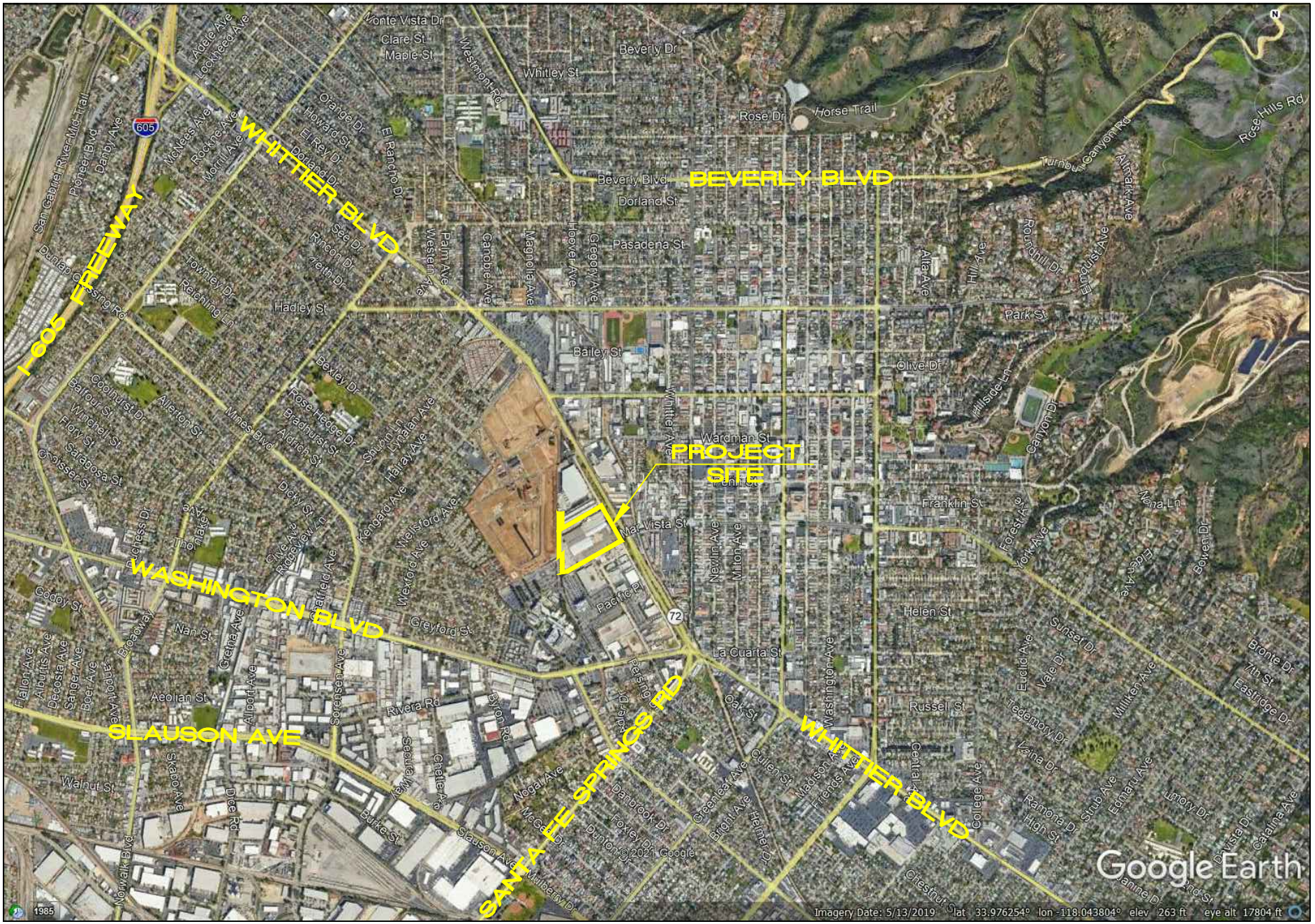
Controlled by Width (Rows)

Maximum Width =	47	feet
4 rows of 44 chambers		
1 row of 43 chambers		
Maximum Length =	184.2	feet
Maximum Width =	46.7	feet



APPENDIX B

LID Site Plan



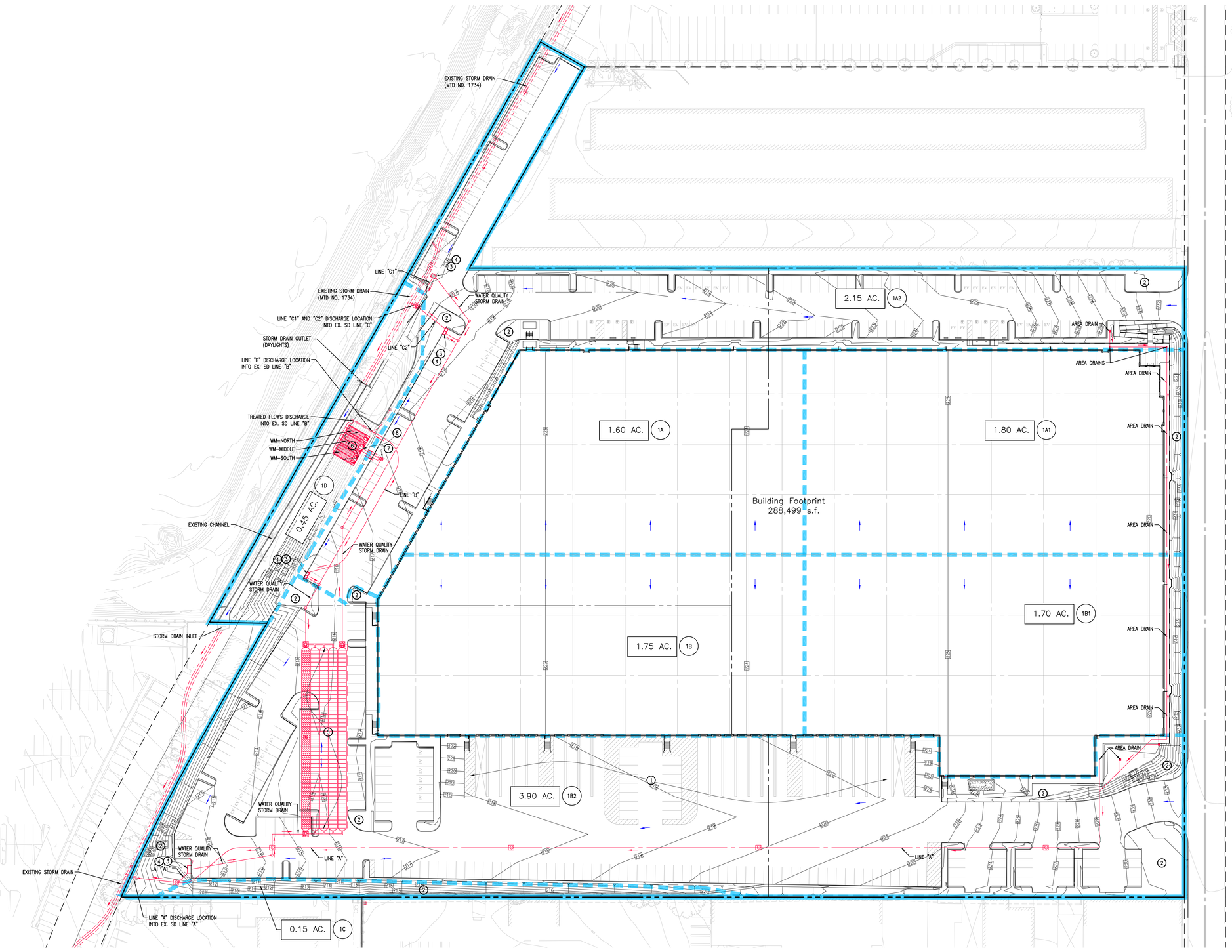
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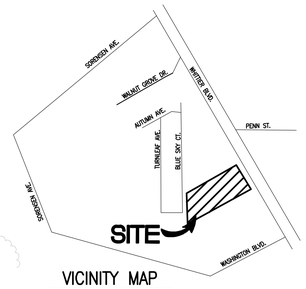
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

VICINITY MAP

FOR

12352 WHITTIER BLVD.
WHITTIER, CA





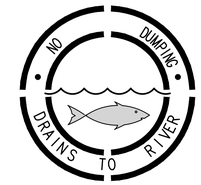
VICINITY MAP

N.T.S.

LEGEND

1. ABOVEGROUND LOADING DOCKS
2. LANDSCAPE/EFFICIENT IRRIGATION
3. STORM DRAIN SYSTEM SIGNS "NO DUMPING – DRAINS TO RIVER"
4. DRAIN INSERT(S)
5. STORMTECH MC-4500 CHAMBERS W/ IMPERMEABLE LINER
6. PROPRIETARY BIOFILTRATION UNIT MODEL PER PLAN
7. SUMP PUMP
8. PUMP DISCHARGE LOCATION
9. TRASH ENCLOSURE
10. NOT USED

RD ROOF DRAIN
BOUNDARY
DRAINAGE AREAS
SURFACE FLOW LINE
SD FLOW LINE



SAMPLE STENCIL TO BE USED NEAR GRATE AND CURB OPENING INLETS

SAMPLE CATCH BASIN STENCIL

0 20 40 80 120

SCALE:1"=40'

Last Update: 3/28/22
D:\3800-3899\3868\3868BMPSITEMAP.dwg

CITY OF WHITTIER
PUBLIC WORKS DEPARTMENT

LID SITE MAP

WHITTIER BOULEVARD BUSINESS PARK

12352 WHITTIER BLVD.

3868/1 OF 3 SHEET

PREPARED FOR:
WESTERN REALCO, LLC
500 NEWPORT CENTER DRIVE, SUITE 630
NEWPORT BEACH, CA 92660
PHONE: (949) 720-3788

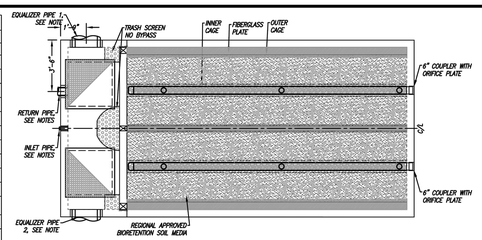
PREPARED BY:
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CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

Designed by _____ Date _____
Checked by _____ Date _____
Designed by _____ Date _____
Checked by _____ Date _____

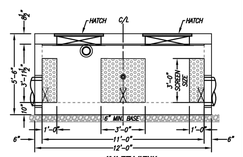
Approved by _____ Date _____
Public Works Director _____ R.C.E. _____

Sheet 1 of 3 Sheets

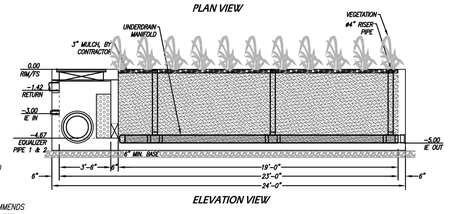
SITE SPECIFIC DATA			
PROJECT ID		14937	
PROJECT NAME		12352 WHITTIER BLVD (TEI 3868)	
PROJECT LOCATION		WHITTIER, CA	
STRUCTURE ID		WM-MIDDLE	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
24000 OF 59973		---	
TREATMENT HGL AVAILABLE (FT)			---
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE	-3.00	N/K	2"
RETURN PIPE	-1.42	N/K	6"
EQUALIZER PIPE 1 & 2	-4.67	N/K	18"
OUTLET PIPE	-5.00	PVC-SDR35	6"
	PRETREATMENT	BIOFILTRATION	N/A
RIM ELEVATION	0.00	0.00	N/A
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	N/A
FRAME & COVER	(2) 36"X36"	N/A	N/A
LA COUNTY MEDIA MIX VOLUME (CY)			67.00
GRAVEL LAYER WITHIN MEDIA CHAMBER (CY)			15.00
ORIFICE DIAMETER (IN)			ø0.85"
NOTES: PRELIMINARY, NOT FOR CONSTRUCTION.			



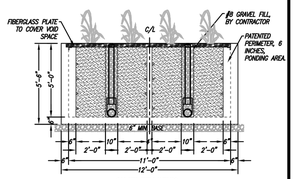
PLAN VIEW



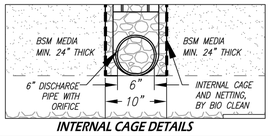
INLET VIEW



ELEVATION VIEW



OUTLET VIEW



INTERNAL CAGE DETAILS

REQUIRED HORIZ. MEDIA THICKNESS (INCHES)	24
TREATMENT VOLUME (CF)	24000
TARGETED DRAINDOWN DURATION (HR)	96
WETLANDMEDIA INFILTRATION RATE (IN/HR) OR	12
WETLANDMEDIA LOADING RATE (GPM/SF)	0.12
DISCHARGE RATE (CFS)	0.069
REQUIRED TOTAL MEDIA SURFACE AREA (SF)	259.72
PROVIDED TOTAL MEDIA SURFACE AREA (SF)	136.00
NUMBER OF ROW(S)	2

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
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4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

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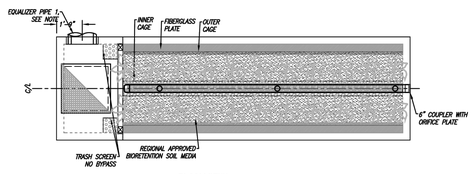
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Bio Clean
A Forterra Company

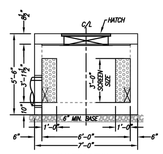
WetlandMOD-11'-23'-5'-0"-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

WM-MIDDLE

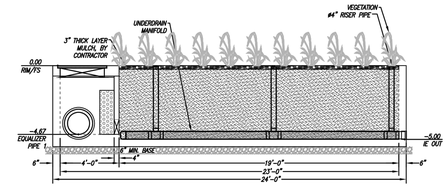
SITE SPECIFIC DATA			
PROJECT ID		14937	
PROJECT NAME		12352 WHITTIER BLVD (TEI 3868)	
PROJECT LOCATION		WHITTIER, CA	
STRUCTURE ID		WM-NORTH	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
12000 OF 59973		---	
TREATMENT HGL AVAILABLE (FT)			---
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE	N/A	N/A	N/A
EQUALIZER PIPE 1	-4.67	N/K	18"
OUTLET PIPE	-5.00	PVC-SDR35	6"
	PRETREATMENT	BIOFILTRATION	N/A
RIM ELEVATION	0.00	0.00	N/A
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	N/A
FRAME & COVER	36" X 36"	N/A	N/A
LA COUNTY MEDIA MIX VOLUME (CY)			13.50
GRAVEL LAYER WITHIN MEDIA CHAMBER (CY)			3.50
ORIFICE DIAMETER (IN)			ø0.85"
NOTES: PRELIMINARY, NOT FOR CONSTRUCTION.			



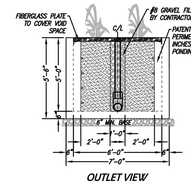
PLAN VIEW



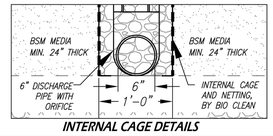
INLET VIEW



ELEVATION VIEW



OUTLET VIEW



INTERNAL CAGE DETAILS

REQUIRED HORIZ. MEDIA THICKNESS (INCHES)	24
TREATMENT VOLUME (CF)	12000
TARGETED DRAINDOWN DURATION (HR)	96
WETLANDMEDIA INFILTRATION RATE (IN/HR) OR	12
WETLANDMEDIA LOADING RATE (GPM/SF)	0.12
DISCHARGE RATE (CFS)	0.036
REQUIRED TOTAL MEDIA SURFACE AREA (SF)	129.86
PROVIDED TOTAL MEDIA SURFACE AREA (SF)	136.00
NUMBER OF ROW(S)	1

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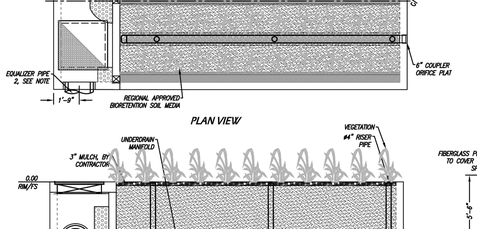
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Bio Clean
A Forterra Company

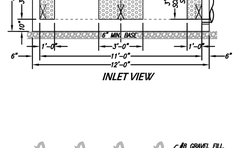
WetlandMOD-6'-23'-5'-0"-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

WM-NORTH

SITE SPECIFIC DATA			
PROJECT ID		14937	
PROJECT NAME		12352 WHITTIER BLVD (TEI 3868)	
PROJECT LOCATION		WHITTIER, CA	
STRUCTURE ID		WM-SOUTH	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
24000 OF 59973		---	
TREATMENT HGL AVAILABLE (FT)			---
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
EQUALIZER PIPE 1	-4.67	N/K	18"
OUTLET PIPE	-5.00	PVC-SDR35	6"
	PRETREATMENT	BIOFILTRATION	N/A
RIM ELEVATION	0.00	0.00	N/A
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	N/A
FRAME & COVER	(2) 36"X36"	N/A	N/A
LA COUNTY MEDIA MIX VOLUME (CY)			67.00
GRAVEL LAYER WITHIN MEDIA CHAMBER (CY)			15.00
ORIFICE DIAMETER (IN)			ø0.85"
NOTES: PRELIMINARY, NOT FOR CONSTRUCTION.			

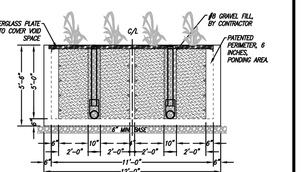


PLAN VIEW

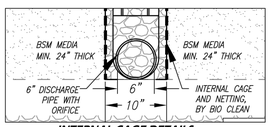


INLET VIEW

ELEVATION VIEW



OUTLET VIEW



INTERNAL CAGE DETAILS

REQUIRED HORIZ. MEDIA THICKNESS (INCHES)	24
TREATMENT VOLUME (CF)	24000
TARGETED DRAINDOWN DURATION (HR)	96
WETLANDMEDIA INFILTRATION RATE (IN/HR) OR	12
WETLANDMEDIA LOADING RATE (GPM/SF)	0.12
DISCHARGE RATE (CFS)	0.069
REQUIRED TOTAL MEDIA SURFACE AREA (SF)	259.72
PROVIDED TOTAL MEDIA SURFACE AREA (SF)	136.00
NUMBER OF ROW(S)	2

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Bio Clean
A Forterra Company

WetlandMOD-11'-23'-5'-0"-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

WM-SOUTH

StormTech | ADS

MC-4500 CHAMBER

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



STORMTECH MC-4500 CHAMBER
(not to scale)

Nominal Chamber Specifications

Size (L x W x H)
52" x 100" x 60"
1,321 mm x 2,540 mm x 1,524 mm

Chamber Storage
106.5 ft³ (3.01 m³)

Min. Installed Storage*
162.6 ft³ (4.60 m³)

Weight
120 lbs (54.4 kg)

Shipping
7 chambers/pallet
11 pallets/truck

*Assumes a minimum of 12" (300 mm) of stone above, 9" (230 mm) of stone below chambers, 9" (230 mm) of stone between chambers/end caps and 40% stone porosity.

STORMTECH MC-4500 END CAP
(not to scale)

Nominal End Cap Specifications

Size (L x W x H)
35.1" x 90.2" x 59.4"
891 mm x 2,291 mm x 1,509 mm

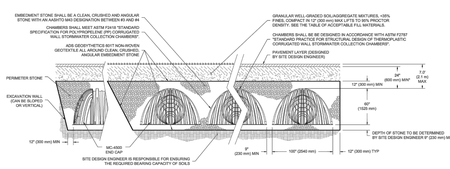
End Cap Storage
35.7 ft³ (1.01 m³)

Min. Installed Storage*
108.7 ft³ (3.08 m³)

Weight
120 lbs (54.4 kg)

Shipping
7 end caps/pallet
11 pallets/truck

*Assumes a minimum of 12" (300 mm) of stone above, 9" (230 mm) of stone below, 6" (150 mm) of stone perimeter, 9" (230 mm) of stone between chambers/end caps and 40% stone porosity.



StormTech | ADS

MC-4500 CHAMBER SPECIFICATIONS

STORAGE VOLUME PER CHAMBER FT³ (M³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Foundation Depth in. (mm)			
		9" (230 mm)	12" (300 mm)	15" (375 mm)	18" (450 mm)
MC-4500 Chamber	106.5 (3.02)	162.6 (4.60)	166.3 (4.71)	169.6 (4.81)	173.6 (4.91)
MC-4500 End Cap	35.7 (1.0)	108.7 (3.08)	111.9 (3.17)	115.2 (3.26)	118.4 (3.35)

Note: Assumes 9" (230 mm) row spacing, 40% stone porosity, 12" (300 mm) stone above and includes the bare chamber/end cap volume. End cap volume assumes 12" (300 mm) stone perimeter.

AMOUNT OF STONE PER CHAMBER

ENGLISH TONS (yds³)	Stone Foundation Depth			
	9"	12"	15"	18"
MC-4500 Chamber	7.4 (5.2)	7.8 (5.5)	8.3 (5.9)	8.8 (6.2)
MC-4500 End Cap	9.6 (6.8)	10.0 (7.1)	10.4 (7.4)	10.9 (7.7)
METRIC-KILOGRAMS (m³)	230 min	300 min	375 min	450 min
MC-4500 Chamber	6,681 (4.6)	7,117 (4.2)	7,552 (4.5)	7,987 (4.7)
MC-4500 End Cap	8,691 (5.2)	9,075 (5.4)	9,460 (5.6)	9,845 (5.9)

Note: Assumes 12" (300 mm) of stone above and 9" (230 mm) row spacing and 12" (300 mm) of perimeter stone in front of end caps.

VOLUME EXCAVATION PER CHAMBER YD³ (M³)

	Stone Foundation Depth			
	9" (230 mm)	12" (300 mm)	15" (375mm)	18" (450 mm)
MC-4500 Chamber	10.5 (8.0)	10.8 (8.3)	11.2 (8.5)	11.5 (8.8)
MC-4500 End Cap	9.3 (7.1)	9.6 (7.3)	9.9 (7.6)	10.2 (7.8)

Note: Assumes 9" (230 mm) of separation between chamber rows, 12" (300 mm) of perimeter in front of the end caps, and 24" (600 mm) of cover. The volume of excavation will varyas depth of cover increases.

StormTech DESIGN TOOL

Working on a project?
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STORMTECH MC-4500 CHAMBERS

Last Update: 3/28/22
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CITY OF WHITTIER
PUBLIC WORKS DEPARTMENT

LID SITE MAP

WHITTIER BOULEVARD
BUSINESS PARK

12352 WHITTIER BLVD.

PREPARED FOR:
WESTERN REALCO, LLC
500 NEWPORT CENTER DRIVE, SUITE 630
NEWPORT BEACH, CA 92660
PHONE: (949) 720-3788

PREPARED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

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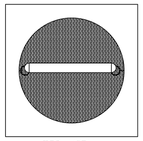
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Sheet 2 of 3 Sheets

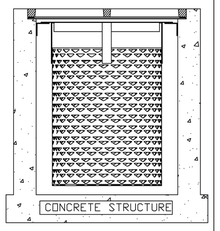
3868/2 OF 3 SHEET

BIO CLEAN FULL CAPTURE FILTER

FOR USE IN GRATE INLETS

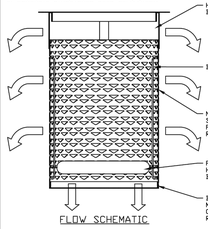


TOP VIEW



NOTES:

1. ALL HARDWARE, FLANGE, FRAME, SCREENS SHALL BE STAINLESS STEEL.
2. HYDROCARBON BOOM SHALL BE 2" DIAMETER AND CONNECTED, MECHANICALLY TO THE FILTER FRAME WITH RAILS ALLOWING IT TO FLOAT ON THE WATER SURFACE, REGARDLESS OF HEIGHT.
3. SEE PERFORMANCE REPORTS IN MANUFACTURES SPECIFICATIONS.
4. CUSTOM STANDARD AND CUSTOM MODEL SIZES AVAILABLE – CONTACT BIO CLEAN FOR MORE INFORMATION.
5. BASED ON 37% OPEN AREA.
6. CONSIDERS A SAFETY FACTOR OF 2.0.
7. CONSIDERS A LOCAL DEPRESSION PONDING DEPTH OF 6 INCHES.
8. STORAGE CAPACITY BASED ON THE BASKET HALF FULL.
9. CONCRETE STRUCTURES SOLD SEPARATELY.



FLOW SCHEMATIC

MODEL #	TREATMENT FLOW (CFS)	BYPASS FLOW (CFS)	SOLIDS STORAGE CAPACITY (CF)
BIO-GRATE-FULL 12-12-12	1.55	1.55	0.27
BIO-GRATE-FULL 18-18-18	4.32	3.68	1.05
BIO-GRATE-FULL 24-24-24	7.67	4.83	2.41
BIO-GRATE-FULL 30-30-24	12.97	6.21	3.98
BIO-GRATE-FULL 25-38-24	13.53	6.59	4.16
BIO-GRATE-FULL 36-36-24	19.64	7.60	5.94
BIO-GRATE-FULL 48-48-18	25.59	10.13	7.92

DRAWING: BIO CLEAN GRATE INLET FILTER DETAILS		MEETS FULL CAPTURE REQUIREMENTS	
TYPICAL MODEL DETAIL			
WARRANTY: 8 YEAR MANUFACTURERS		PROJECT:	
BIO CLEAN ENVIRONMENTAL SERVICES, INC. 398 VIA EL CENTRO, OCEANSIDE CA 92058 PHONE: 760-433-7640 FAX: 760-433-3176		REVISIONS:	DATE:
DATE: 10/12/17	SCALED: 9" = 1'5	REVISIONS:	DATE:
DRAFTER: M.C.P.	UNITS = INCHES	REVISIONS:	DATE:

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PAGE 1

BIO CLEAN FULL CAPTURE FILTER WITH TROUGH SYSTEM

FOR USE IN CURB INLETS

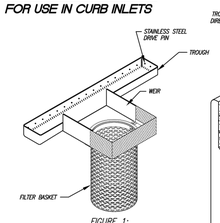


FIGURE 1:
DETAIL OF PARTS

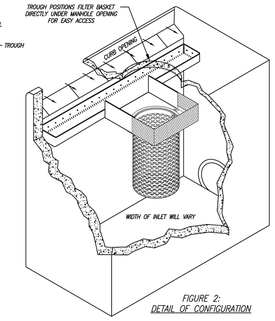


FIGURE 2:
DETAIL OF CONFIGURATION

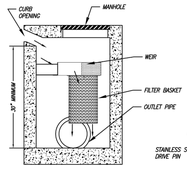


FIGURE 4:
DETAIL OF PROFILE

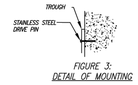


FIGURE 3:
DETAIL OF MOUNTING

MODEL NUMBER	TREATMENT FLOW (cfs)*	SOLIDS STORAGE CAPACITY (cu ft)
BIO-CURB-FULL-24	2.85	1.40
BIO-CURB-FULL-18	2.85	1.05
BIO-CURB-FULL-12	2.85	0.70

*SEE PAGE 2 FOR EXPLANATION OF FLOW RATES

NOTES:

1. TROUGH SYSTEM PROVIDES FOR ENTIRE COVERAGE OF INLET OPENING SO TO DIVERT ALL FLOW TO FILTER.
2. TROUGH SYSTEM MANUFACTURED FROM MARINE GRADE FIBERGLASS, GEL COATED FOR UV PROTECTION.
3. SYSTEM ATTACHED TO THE CATCH BASIN WITH NON-CORROSIVE HARDWARE.
4. FILTER MANUFACTURED OF 1008 STAINLESS STEEL.
5. FILTER MADE OF NON-CLOGGIN SCREEN WITH 4.7 MM OPENINGS AND MEETS FULL CAPTURE REQUIREMENTS.
6. FILTER CAN BE FITTED WITH HYDROCARBON ABSORBENT BOOM
7. FILTER IS LOCATED DIRECTLY UNDER THE MANHOLE FOR EASY REMOVAL AND MAINTENANCE.
8. LENGTH OF TROUGH CAN VARY FROM 2' TO 30'
9. OTHER STANDARD AND CUSTOM MODEL SIZES AVAILABLE – CONTACT BIO CLEAN FOR MORE INFORMATION.
10. CONSIDERS A SAFETY FACTOR OF 2.0
11. BYPASS IS FACILITATED VIA OVERFLOW OF THE TROUGH SYSTEM AND IS EQUAL TO THE CAPACITY OF THE CURB OPENING
12. STORAGE CAPACITY BASED ON THE BASKET HALF FULL.
13. ADDITIONAL TREATMENT AND STORAGE CAPACITY CAN BE ACHIEVED BY UTILIZING MULTIPLE FILTER BASKETS.

DRAWING: BIO CLEAN CURB INLET FILTER DETAILS		MEETS FULL CAPTURE REQUIREMENTS	
TREATMENT FLOW RATE: 2.85 cfs		MODEL #: BIO-CURB-FULL	
WARRANTY: 8 YEAR MANUFACTURERS		PROJECT:	
BIO CLEAN ENVIRONMENTAL SERVICES, INC. 398 VIA EL CENTRO, OCEANSIDE CA 92058 PHONE: 760-433-7640 FAX: 760-433-3176		REVISIONS:	DATE:
DATE: 10/12/2017	SCALE: NTS	REVISIONS:	DATE:
DRAFTER: M.C.P.	UNITS = INCHES	REVISIONS:	DATE:

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PAGE 1

DRAIN INSERTS

Last Update: 3/28/22
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CITY OF WHITTIER
PUBLIC WORKS DEPARTMENT

LID SITE MAP

WHITTIER BOULEVARD BUSINESS PARK

12352 WHITTIER BLVD.

3868/3 OF 3 SHEET

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Designed by _____ Approved by _____ Date _____
Date _____
Checked by _____
Date _____
Designed by _____
Date _____
Checked by _____
Date _____

Public Works Director R.C.E. _____

Sheet 3 of 3 Sheets

APPENDIX C

BMP Operation and Maintenance

BMP Operation and Maintenance			
BMP	**Operation/Maintenance**	**Inspection Frequency**	**Responsibility**
Storm Drain Stencil and Signage	➢ Visually inspect for legibility and replace/repaint as necessary.	Annually	Owner
Parking Lot Sweeping	➢ At a minimum, sweep on a monthly basis.	Monthly (minimum)	Owner
WetlandMOD System	➢ All work to be done by the supplier or by a supplier approved contractor. ➢ Clean separation (sediment) chamber. The chamber is located directly under the manhole. ➢ Replace media in pre-filtration cartridges. Media life depends on the loading conditions and can easily be replaced and disposed of without any equipment. The BioMediaGREEN filter can be ordered from the manufacturer. ➢ Replace drain down filter media. Replacement of media takes approximately 5 minutes and is performed without any equipment. ➢ Replace wetland media. The life of the media can be up to 20 years. Remove spent media with shovel or vacuum truck and replace with new media. Media can be ordered from the manufacturer. ➢ See manufacturer's maintenance requirements for additional information.	Semi-annually (October 1st and February 1st) through maintenance service contract with the vendor or equally qualified contractor.	Owner
Underground Chambers	➢ The isolator row shall be inspected semi-annually (October 1st and February 1st) and maintained once sediment depth is greater than 3-inches. The isolator row shall be inspected and maintained by a qualified technician and he/she will properly dispose of all wastes. A manhole is installed in order to inspect and maintain the isolator row. It is installed per OSHA codes to ensure operator and inspector safety.	Semi-annually (October 1st and February 1st) through maintenance service contract with the vendor or equally qualified contractor.	Owner
Drain Inserts	➢ Visually inspect for defects and illegal dumping. Notify proper authorities if illegal dumping has occurred. ➢ Using an industrial vacuum, the collected materials shall be removed from the filter basket and disposed of properly. ➢ Inspect biosorb hydrocarbon boom and replace as necessary.	Semi-annually (October 1st and February 1st) through maintenance service contract with the vendor or equally qualified contractor.	Owner

BMP Operation and Maintenance			
BMP	**Operation/Maintenance**	**Inspection Frequency**	**Responsibility**
Maintenance Log	➢ Keep a log of all inspection and maintenance performed on the above mentioned BMPs for at least 5 years. Keep this log on-site.	Ongoing	Owner

Storm Drain Signage SD-13



Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

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

Designing New Installations

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

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

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

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

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

Redeveloping Existing Installations

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

Additional Information

Maintenance Considerations

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

Placement

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

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

Supplemental Information

Examples

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

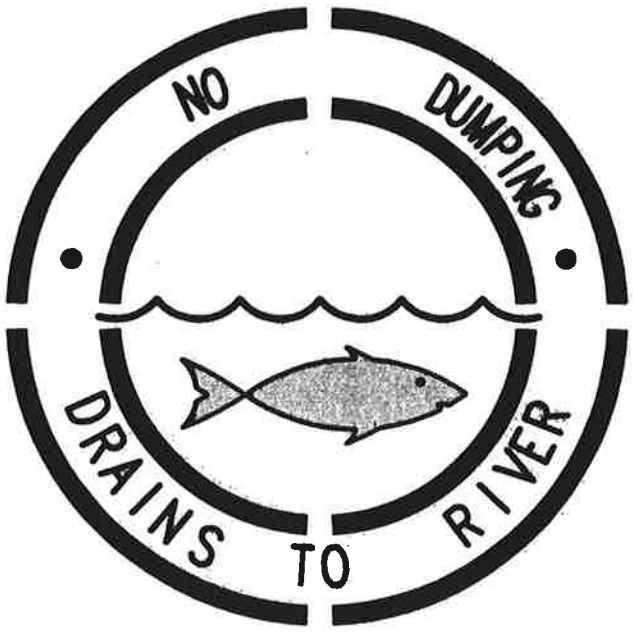
Other Resources

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

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

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

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



SAMPLE STENCIL TO BE USED NEAR GRATE AND CURB OPENING INLETS

SYMBOL TO BE 24" IN DIAMETER

Thienes Engineering
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

SAMPLE CATCH BASIN STENCIL
PER BMP SD-13

Drain Inserts MP-52

Description

Drain inserts are manufactured filters or fabric placed in a drop inlet to remove sediment and debris. There are a multitude of inserts of various shapes and configurations, typically falling into one of three different groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are one box; that is, the setting area and filtration through media occur in the same box. Some products consist of one or more trays or mesh grates. The trays may hold different types of media. Filtration media vary by manufacturer. Types include polypropylene, porous polymer, treated cellulose, and activated carbon.

California Experience

The number of installations is unknown but likely exceeds a thousand. Some users have reported that these systems require considerable maintenance to prevent plugging and bypass.

Advantages

- Does not require additional space as inserts as the drain inlets are already a component of the standard drainage systems.
- Easy access for inspection and maintenance.
- As there is no standing water, there is little concern for mosquito breeding.
- A relatively inexpensive retrofit option.

Limitations

Performance is likely significantly less than treatment systems that are located at the end of the drainage system such as ponds and vaults. Usually not suitable for large areas or areas with trash or leaves than can plug the insert.

Design and Sizing Guidelines

Refer to manufacturer's guidelines. Drain inserts come any many configurations but can be placed into three general groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are

Design Considerations

- Use with other BMPs
- Fit and Seal Capacity within Inlet

Targeted Constituents

- ☑ Sediment
- ☑ Nutrients
- ☑ Trash
- ☑ Metals
- Bacteria
- ☑ Oil and Grease
- ☑ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

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one box; that is, the setting area and filtration through media occurs in the same box. One manufacturer has a double-box. Stormwater enters the first box where setting occurs. The stormwater flows into the second box where the filter media is located. Some products consist of one or more trays or mesh grates. The trays can hold different types of media. Filtration media vary with the manufacturer: types include polypropylene, porous polymer, treated cellulose, and activated carbon.

Construction/Inspection Considerations

Be certain that installation is done in a manner that makes certain that the stormwater enters the unit and does not leak around the perimeter. Leakage between the frame of the insert and the frame of the drain inlet can easily occur with vertical (drop) inlets.

Performance

Few products have performance data collected under field conditions.

Siting Criteria

It is recommended that inserts be used only for retrofit situations or as pretreatment where other treatment BMPs presented in this section area used.

Additional Design Guidelines

Follow guidelines provided by individual manufacturers.

Maintenance

Likely require frequent maintenance, on the order of several times per year.

Cost

- The initial cost of individual inserts ranges from less than $100 to about $2,000. The cost of using multiple units in curb inlet drains varies with the size of the inlet.
- The low cost of inserts may tend to favor the use of these systems over other, more effective treatment BMPs. However, the low cost of each unit may be offset by the number of units that are required, more frequent maintenance, and the shorter structural life (and therefore replacement).

References and Sources of Additional Information

Hrachovec, R., and G. Minton, 2001, Field testing of a sock-type catch basin insert, Planet CPR, Seattle, Washington

Interagency Catch Basin Insert Committee, Evaluation of Commercially-Available Catch Basin Inserts for the Treatment of Stormwater Runoff from Developed Sites, 1995

Larry Walker Associates, June 1998, NDMP Inlet/In-Line Control Measure Study Report

Manufacturers literature

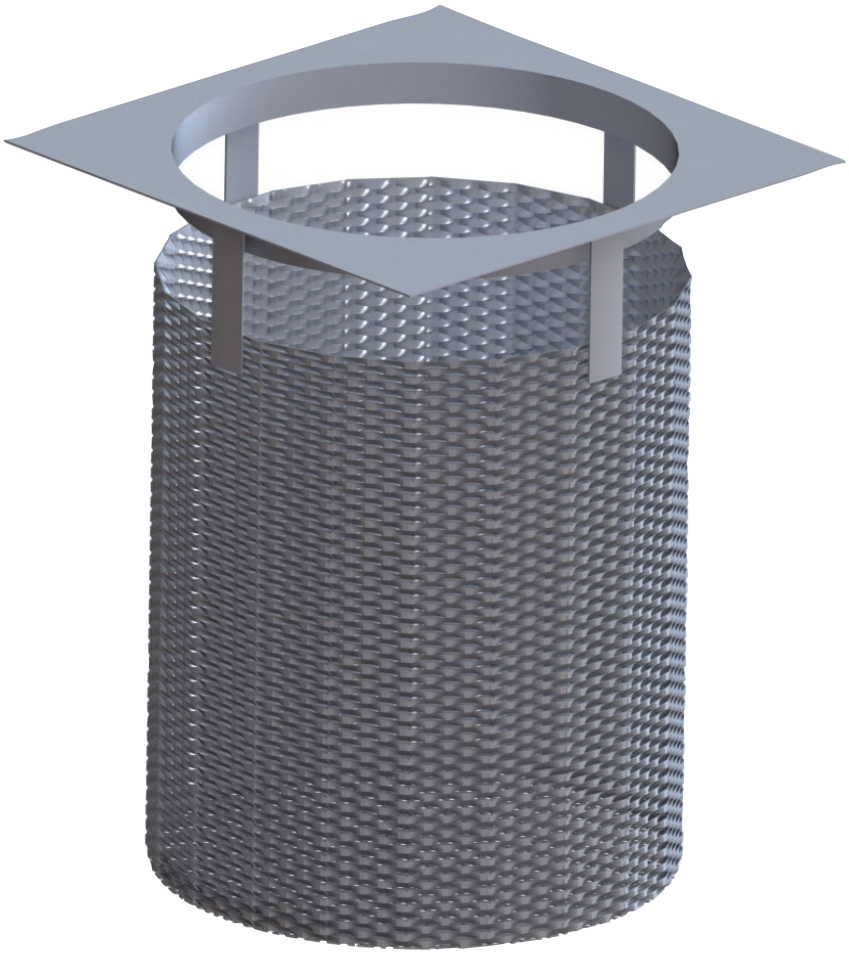
Santa Monica (City), Santa Monica Bay Municipal Stormwater/Urban Runoff Project - Evaluation of Potential Catch basin Retrofits, Woodward Clyde, September 24, 1998

Woodward Clyde, June 11, 1996, Parking Lot Monitoring Report, Santa Clara Valley Nonpoint Source Pollution Control Program.

Grate Inlet Filter

Bio Clean
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OPERATION & MAINTENANCE



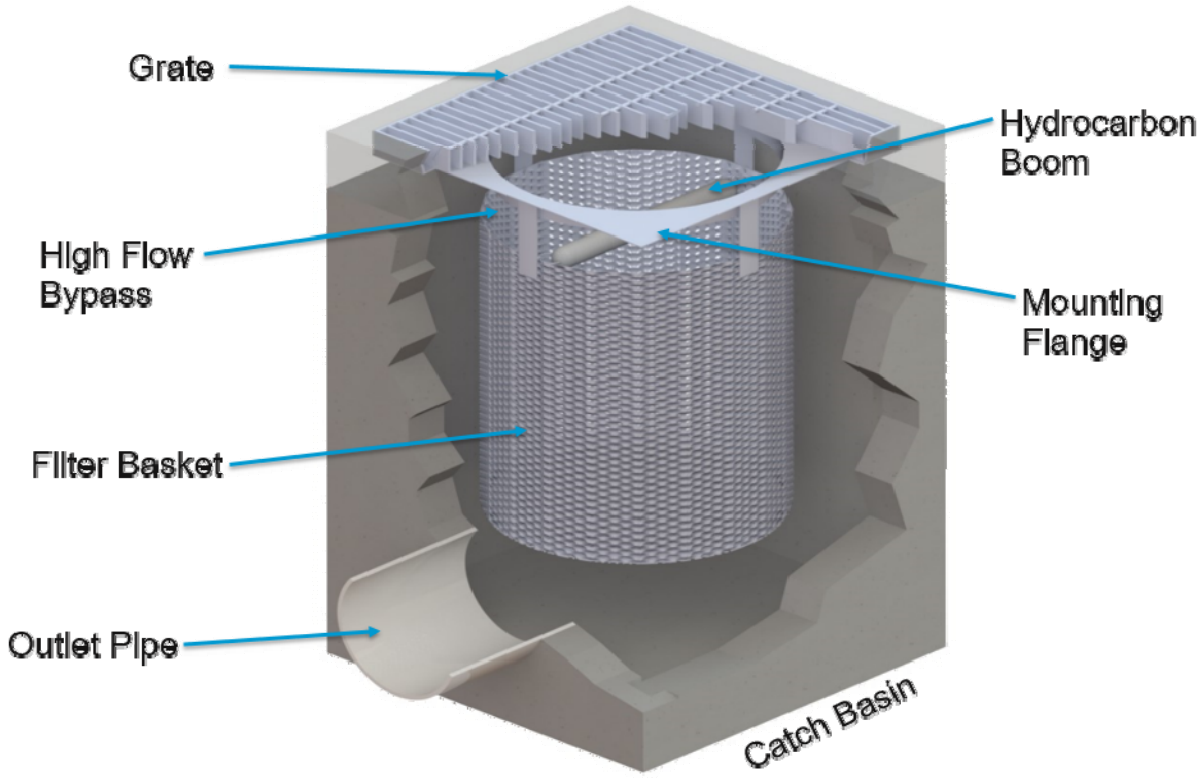
Bio Clean Environmental Services, Inc.
398 Via El Centro
Oceanside, CA 92058

www.BioCleanEnvironmental.com
p: 760.433.7640
f: 760.433.3176

OPERATION & MAINTENANCE

The Bio Clean Grate Inlet Filter is a stormwater device designed to remove high levels of trash, debris, sediments and hydrocarbons. The filter is available in several configurations including trash full capture, multi-level screening, Kraken membrane filter and media filter variations. This manual covers maintenance procedures of the trash full capture and multi-level screening configurations. A supplemental manual is available for the Kraken and media filter variations. This filter is made of 100% stainless steel and is available and various sizes and depths allowing it to fit in any grated catch basin inlet. The filters heavy duty construction allows for cleaning with any vacuum truck. The filet can also easily be cleaned by hand.

As with all stormwater BMPs, inspection and maintenance on the Grate Inlet Filter is necessary. Stormwater regulations require BMPs be inspected and maintained to ensure they are operating as designed to allow for effective pollutant removal and provide protection to receiving water bodies. It is recommended that inspections be performed multiple times during the first year to assess site-specific loading conditions. This is recommended because pollutant loading can vary greatly from site to site. Variables such as nearby soil erosion or construction sites, winter sanding of roads, amount of daily traffic and land use can increase pollutant loading on the system. The first year of inspections can be used to set inspection and maintenance intervals for subsequent years. Without appropriate maintenance a BMP can exceed its storage capacity which can negatively affect its continued performance in removing and retaining captured pollutants.



System Diagram:

Inspection Equipment

Following is a list of equipment to allow for simple and effective inspection of the Grate Inlet Filter:

- Bio Clean Environmental Inspection Form (contained within this manual).
- Manhole hook or appropriate tools to remove access hatches and covers.
- Appropriate traffic control signage and procedures.
- Protective clothing and eye protection.
- Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections or maintenance of the system.



Inspection Steps

The core to any successful stormwater BMP maintenance program is routine inspections. The inspection steps required on the Grate Inlet Filter are quick and easy. As mentioned above the first year should be seen as the maintenance interval establishment phase. During the first year more frequent inspections should occur in order to gather loading data and maintenance requirements for that specific site. This information can be used to establish a base for long-term inspection and maintenance interval requirements.

The Grate Inlet Filter can be inspected though visual observation. All necessary pre-inspection steps must be carried out before inspection occurs, such as safety measures to protect the inspector and nearby pedestrians from any dangers associated with an open grated inlet. Once the grate has been safely removed the inspection process can proceed:

- Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other info (see inspection form).
- Observe the filter with the grate removed.
- Look for any out of the ordinary obstructions on the grate or in the filter and its bypass. Write down any observations on the inspection form.
- Through observation and/or digital photographs estimate the amount of trash, foliage and sediment accumulated inside the filter basket. Record this information on the inspection form.
- Observe the condition and color of the hydrocarbon boom. Record this information on the inspection form.
- Finalize inspection report for analysis by the maintenance manager to determine if maintenance is required.

Maintenance Indicators

Based upon observations made during inspection, maintenance of the system may be required based on the following indicators:

- Missing or damaged internal components.
- Obstructions in the filter basket and its bypass.
- Excessive accumulation of trash, foliage and sediment in the filter basket. Maintenance is required when the basket is greater than half-full.
- The following chart shows the 50% and 100% storage capacity of each filter height:

Model	Filter Basket Diameter (in)	Filter Basket Height (in)	50% Storage Capacity (cu ft)	100% Storage Capacity (cu ft)
BC-GRATE-12-12-12	10.00	12.00	0.27	0.55
BC-GRATE-18-18-18	16.00	18.00	1.05	2.09
BC-GRATE-24-24-24	21.00	24.00	2.41	4.81
BC-GRATE-30-30-24	27.00	24.00	3.98	7.95
BC-GRATE-36-36-24	33.00	24.00	5.94	11.88
BC-GRATE-48-48-18	44.00	18.00	7.92	15.84

Maintenance Equipment

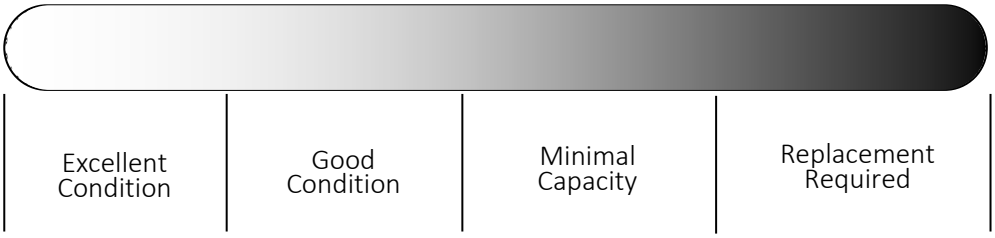
It is recommended that a vacuum truck be utilized to minimize the time required to maintain the Curb Inlet Filter, though it can easily cleaned by hand:

- Bio Clean Environmental Maintenance Form (contained in O&M Manual).
- Manhole hook or appropriate tools to remove the grate.
- Appropriate safety signage and procedures.
- Protective clothing and eye protection.
- Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine maintenance of the system. Small or large vacuum truck (with pressure washer attachment preferred).

Maintenance Procedures

It is recommended that maintenance occurs at least two days after the most recent rain event to allow debris and sediments to dry out. Maintaining the system while flows are still entering it will increase the time and complexity required for maintenance. Cleaning of the Grate Inlet Filter can be performed utilizing a vacuum truck. Once all safety measures have been set up cleaning of the Grate Inlet Filter can proceed as followed:

- Remove grate (traffic control and safety measures to be completed prior).
- Using an extension on a vacuum truck position the hose over the opened catch basin. Insert the vacuum hose down into the filter basket and suck out trash, foliage and sediment. A pressure wash is recommended and will assist in spraying of any debris stuck on the side or bottom of the filter basket. Power wash off the filter basket sides and bottom.
- Next remove the hydrocarbon boom that is attached to the inside of the filter basket. The hydrocarbon boom is fastened to rails on two opposite sides of the basket (vertical rails). Assess the color and condition of the boom using the following information in the next bullet point. If replacement is required install and fasten on a new hydrocarbon boom. Booms can be ordered directly from the manufacturer.
- Follow is a replacement indication color chart for the hydrocarbon booms:



- The last step is to replace the grate and remove all traffic control.
- All removed debris and pollutants shall be disposed of following local and state requirements.
- Disposal requirements for recovered pollutants may vary depending on local guidelines. In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste.
- In the case of damaged components, replacement parts can be ordered from the manufacturer. Hydrocarbon booms can also be ordered directly from the manufacturer as previously noted.

Maintenance Sequence

Remove grate and set up vacuum truck to clean the filter basket.



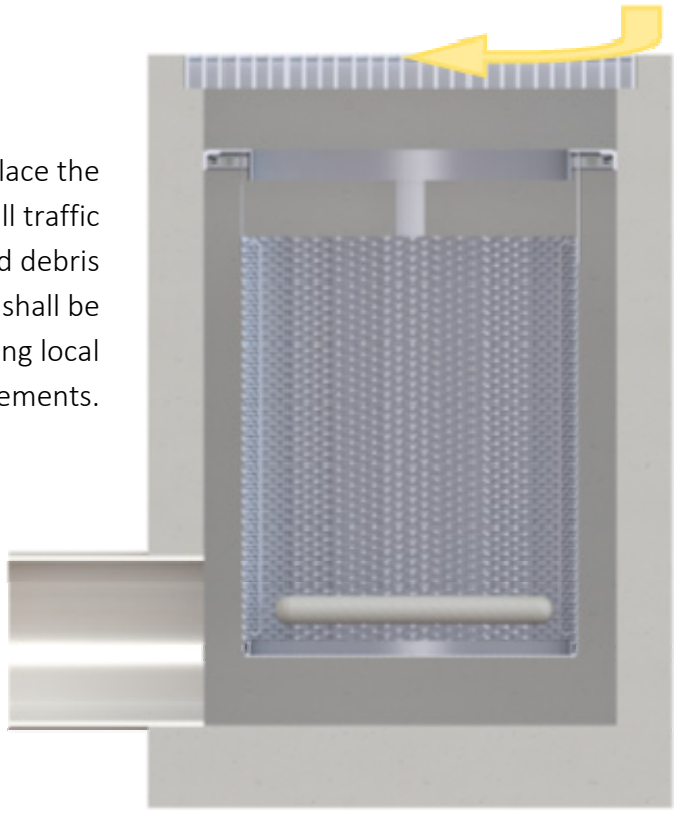


Insert the vacuum hose down into the filter basket and suck out debris. Use a pressure washer to assist in vacuum removal. Pressure wash off screens.



Remove the hydrocarbon boom that is attached to the inside of the filter basket. The hydrocarbon boom is fastened to rails on two opposite sides of the basket (vertical rails). Assess the color and condition of the boom using the following information in the next bullet point. If replacement is required install and fasten on a new hydrocarbon boom.

Close up and replace the grate and remove all traffic control. All removed debris and pollutants shall be disposed of following local and state requirements.



For Maintenance Services or Information Please Contact Us At:
760-433-7640
Or Email:
info@biocleanenvironmental.com

Bio Clean
A Forterra Company

Inspection and Maintenance Report
Catch Basin Only

Project Name _____

Project Address _____ (city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ollow Up ☐omplaint ☐torm Storm Event in Last 72-hours? ☐ ☐s

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	Catch Basin Size	Evidence of Illicit Discharge?	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Signs of Structural Damage?	Functioning Properly or Maintenance Needed?
1	Lat: Long:							
2	Lat: Long:							
3	Lat: Long:							
4	Lat: Long:							
5	Lat: Long:							
6	Lat: Long:							
7	Lat: Long:							
8	Lat: Long:							
10	Lat: Long:							
11	Lat: Long:							
12	Lat: Long:							

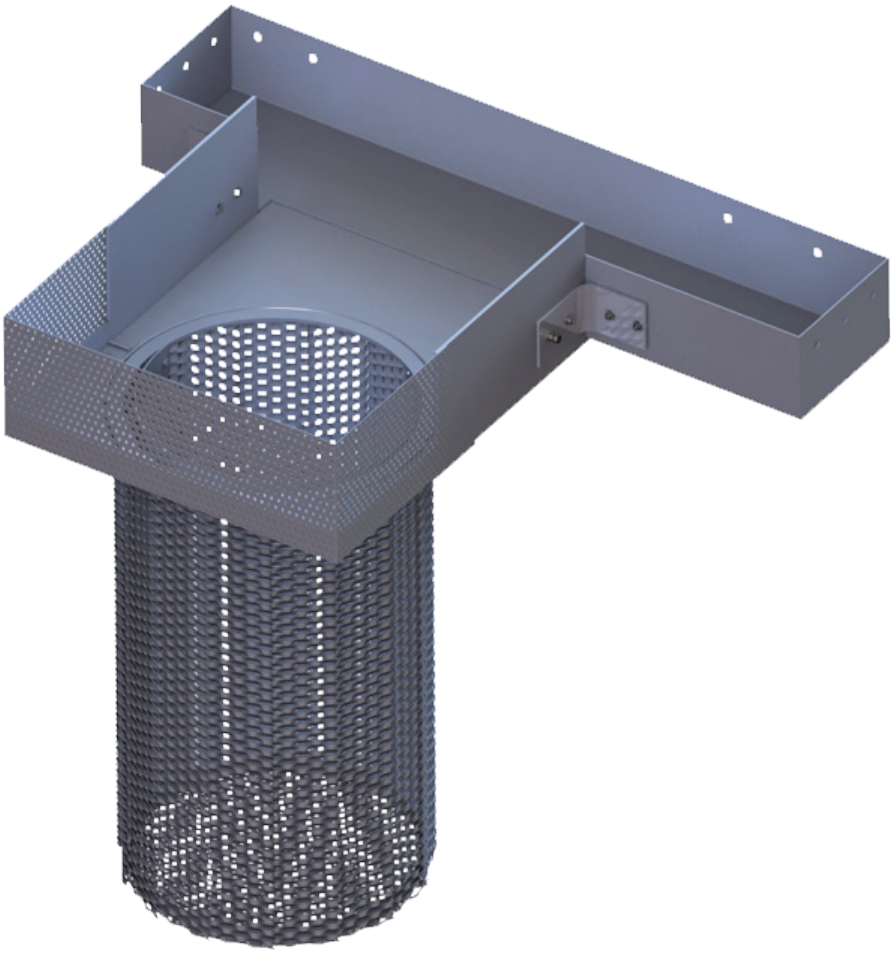
Comments:

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Curb Inlet Filter

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OPERATION & MAINTENANCE



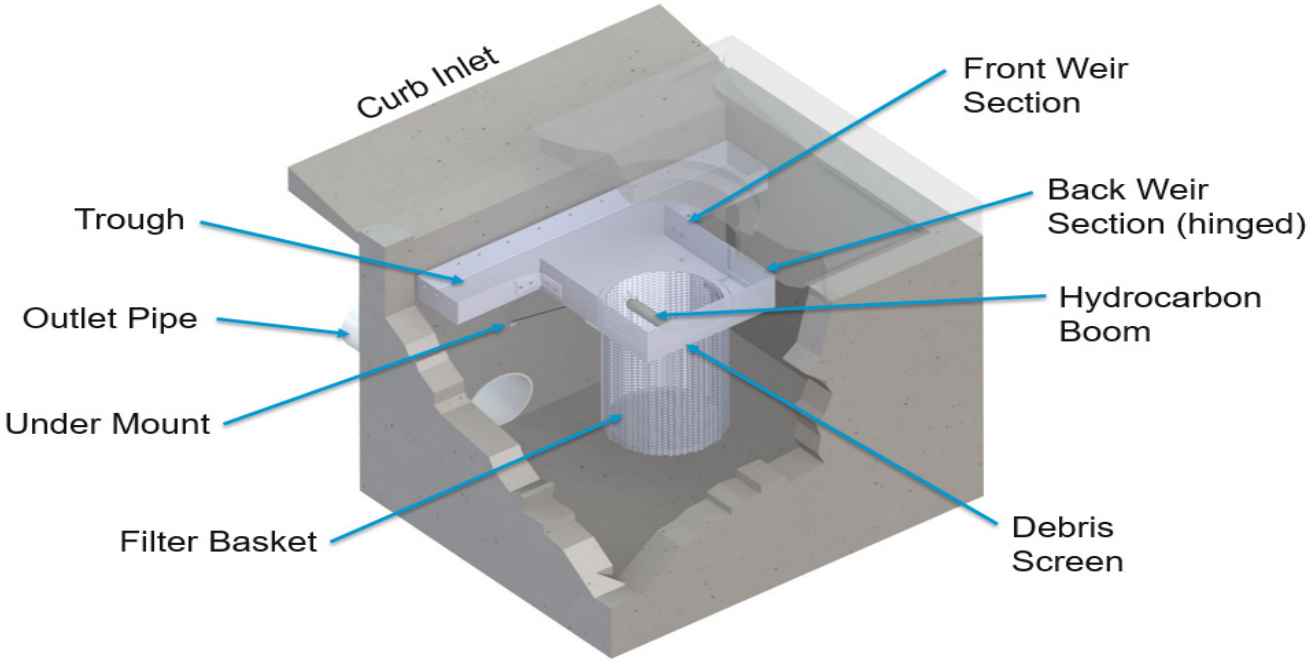
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398 Via El Centro
Oceanside, CA 92058

www.BioCleanEnvironmental.com
p: 760.433.7640
f: 760.433.3176

OPERATION & MAINTENANCE

The Bio Clean Curb Inlet Filter is a stormwater device designed to remove high levels of trash, debris, sediments and hydrocarbons. The filter is available in several configurations including trash full capture, multi-level screening, Kraken membrane filter and media filter variations. This manual covers maintenance procedures of the trash full capture and multi-level screening configurations. A supplemental manual is available for the Kraken and media filter variations. The innovative trough & weir system is mounted along the curb face and directs incoming stormwater toward the filter basket which is positioned "directly" under the manhole access opening regardless of its location in the catch basin. This innovative design allows the filter to be cleaned from finish surface without access into the catch basin, therefore drastically reducing maintenance time and eliminating confined space entry. The filter has a lifting handle allowing for the filter to be removed easily through the manhole. The weir also folds up to allow for unimpeded access into the basin for routine maintenance or pipe jetting.

As with all stormwater BMPs, inspection and maintenance on the Curb Inlet Filter is necessary. Stormwater regulations require BMPs be inspected and maintained to ensure they are operating as designed to allow for effective pollutant removal and provide protection to receiving water bodies. It is recommended that inspections be performed multiple times during the first year to assess site-specific loading conditions. This is recommended because pollutant loading can vary greatly from site to site. Variables such as nearby soil erosion or construction sites, winter sanding of roads, amount of daily traffic and land use can increase pollutant loading on the system. The first year of inspections can be used to set inspection and maintenance intervals for subsequent years. Without appropriate maintenance a BMP can exceed its storage capacity which can negatively affect its continued performance in removing and retaining captured pollutants.



System Diagram:

Inspection Equipment

Following is a list of equipment to allow for simple and effective inspection of the Curb Inlet Filter:

- Bio Clean Environmental Inspection Form (contained within this manual).
- Manhole hook or appropriate tools to remove access hatches and covers.
- Appropriate traffic control signage and procedures.
- Protective clothing and eye protection.
- Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections or maintenance of the system.



Inspection Steps

The core to any successful stormwater BMP maintenance program is routine inspections. The inspection steps required on the Curb Inlet Fitler are quick and easy. As mentioned above the first year should be seen as the maintenance interval establishment phase. During the first year more frequent inspections should occur in order to gather loading data and maintenance requirements for that specific site. This information can be used to establish a base for long-term inspection and maintenance interval requirements.

The Curb Inlet Filter can be inspected though visual observation without entry into the catch basin. All necessary pre-inspection steps must be carried out before inspection occurs, such as safety measures to protect the inspector and nearby pedestrians from any dangers associated with an open access hatch or manhole. Once the manhole has been safely opened the inspection process can proceed:

- Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other info (see inspection form).
- Observe the inside of the catch basin through the manhole. If minimal light is available and vision into the unit is impaired utilize a flashlight to see inside the catch basin.
- Look for any out of the ordinary obstructions in the catch basin, trough, weir, filter basket, basin floor our outlet pipe. Write down any observations on the inspection form.
- Through observation and/or digital photographs estimate the amount of trash, foliage and sediment accumulated inside the filter basket. Record this information on the inspection form.
- Observe the condition and color of the hydrocarbon boom. Record this information on the inspection form.

- Finalize inspection report for analysis by the maintenance manager to determine if maintenance is required.

Maintenance Indicators

Based upon observations made during inspection, maintenance of the system may be required based on the following indicators:

- Missing or damaged internal components.
- Obstructions in the trough, weir, filter basket or catch basin.
- Excessive accumulation of trash, foliage and sediment in the filter basket and/or trough and weir sections. Maintenance is required when the basket is greater than half-full.
- The following chart shows the 50% and 100% storage capacity of each filter height:

Model	Filter Basket Diameter (in)	Filter Basket Height (in)	50% Storage Capacity (cu ft)	100% Storage Capacity (cu ft)
BC-CURB-30	18	30	2.21	4.42
BC-CURB-24	18	24	1.77	3.53
BC-CURB-18	18	18	1.33	2.65
BC-CURB-12	18	12	0.88	1.77

Maintenance Equipment

It is recommended that a vacuum truck be utilized to minimize the time required to maintain the Curb Inlet Filter though it can easily cleaned by hand:

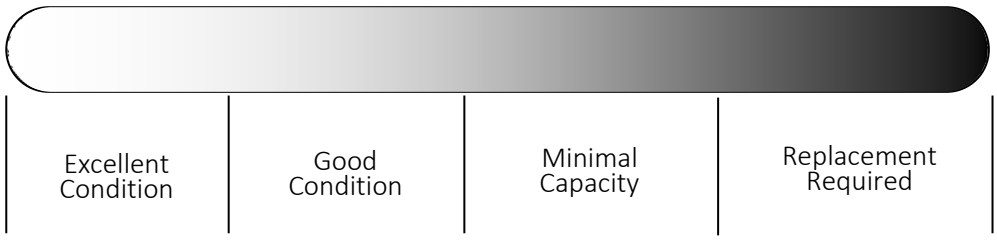
- Bio Clean Environmental Maintenance Form (contained in O&M Manual).
- Manhole hook or appropriate tools to access hatches and covers.
- Appropriate safety signage and procedures.
- Protective clothing and eye protection.
- Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine maintenance of the system. Small or large vacuum truck (with pressure washer attachment preferred).

Maintenance Procedures

It is recommended that maintenance occurs at least two days after the most recent rain event to allow debris and sediments to dry out. Maintaining the system while flows are still entering it will increase the time and complexity required for maintenance. Cleaning of the Curb Inlet Filter can be performed from finish surface without entry into catch basin utilizing a vacuum truck. Some unique

and custom configurations may create conditions which would require entry for some or all of the maintenance procedures. Once all safety measures have been set up cleaning of the Curb Inlet Filter can proceed as followed:

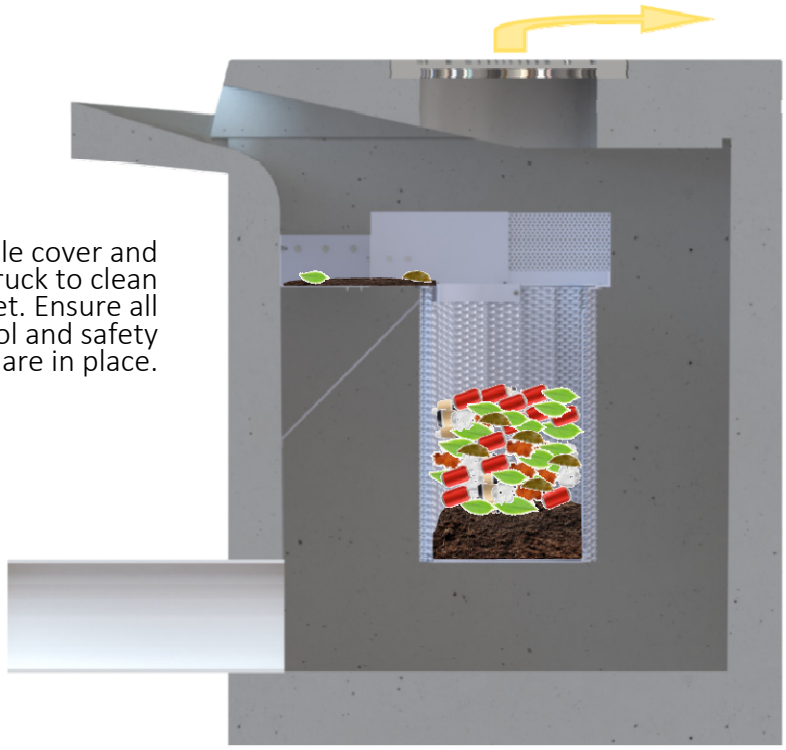
- Remove all manhole cover or access hatches (traffic control and safety measures to be completed prior).
- Using an extension on a vacuum truck position the hose over the opened manhole or hatch opening. Insert the vacuum hose down into the filter basket and suck out trash, foliage and sediment. A pressure wash is recommended and will assist in spraying of any debris stuck on the side or bottom of the filter basket. If the filter basket is full, trash, sediment, and debris will accumulate inside the trough and weir sections of the system. Once the filter basket is clean power wash the weir and trough pushing these debris into the filter basket (leave the hose in the filter basket during this process so entering debris will be sucked out). Power wash off the trough, weir, debris screen, and filter basket sides and bottom.
- Next remove the hydrocarbon boom that is attached to the inside of the filter basket. The hydrocarbon boom is fastened to rails on two opposite sides of the basket (vertical rails). Assess the color and condition of the boom using the following information in the next bullet point. If replacement is required install and fasten on a new hydrocarbon boom. Booms can be ordered directly from the manufacturer.
- Follow is a replacement indication color chart for the hydrocarbon booms:



- The last step is to close up and replace the manhole or hatch and remove all traffic control.
- All removed debris and pollutants shall be disposed of following local and state requirements.
- Disposal requirements for recovered pollutants may vary depending on local guidelines. In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste.
- In the case of damaged components, replacement parts can be ordered from the manufacturer. Hydrocarbon booms can also be ordered directly from the manufacturer as previously noted.

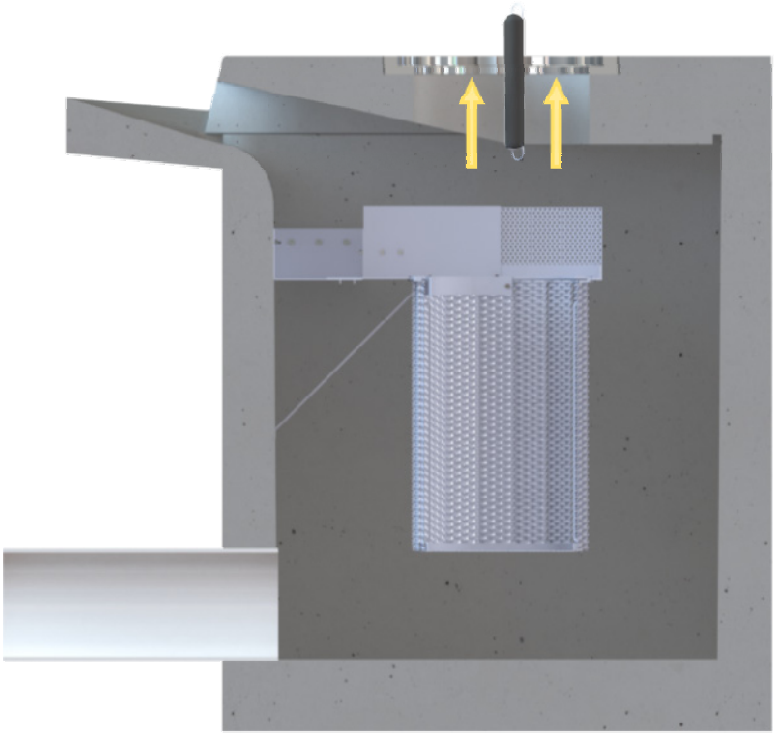
Maintenance Sequence

Remove manhole cover and set up vacuum truck to clean the filter basket. Ensure all traffic control and safety measures are in place.



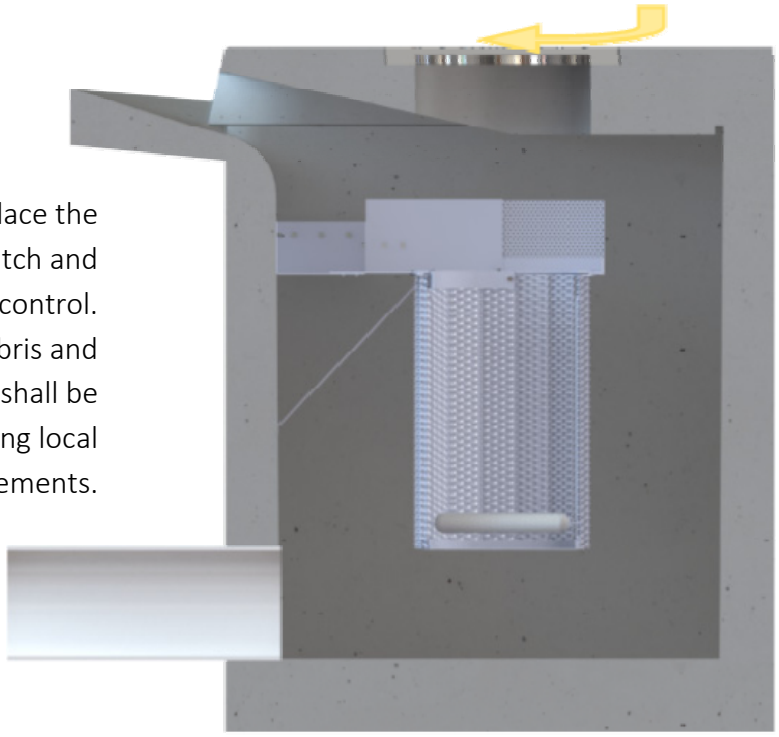


Insert the vacuum hose down into the filter basket and suck out debris. Use a pressure washer to assist in vacuum removal. Pressure wash off the weir and trough and vacuum out any remaining debris.



Remove the hydrocarbon boom that is attached to the inside of the filter basket. The hydrocarbon boom is fastened to rails on two opposite sides of the basket (vertical rails). Assess the color and condition of the boom using the following information in the next bullet point. If replacement is required install and fasten on a new hydrocarbon boom.

Close up and replace the manhole or hatch and remove all traffic control. All removed debris and pollutants shall be disposed of following local and state requirements.



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Or Email: info@biocleanenvironmental.com

Bio Clean
A Forterra Company

Inspection and Maintenance Report
Catch Basin Only

Project Name _____

Project Address _____ (city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ollow Up ☐omplaint ☐torm Storm Event in Last 72-hours? ☐ ☐s

Weather Condition _____ Additional Notes _____

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

Site Map #	GPS Coordinates of Insert	Catch Basin Size	Evidence of Illicit Discharge?	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Signs of Structural Damage?	Functioning Properly or Maintenance Needed?
1	Lat: Long:							
2	Lat: Long:							
3	Lat: Long:							
4	Lat: Long:							
5	Lat: Long:							
6	Lat: Long:							
7	Lat: Long:							
8	Lat: Long:							
10	Lat: Long:							
11	Lat: Long:							
12	Lat: Long:							

Comments:

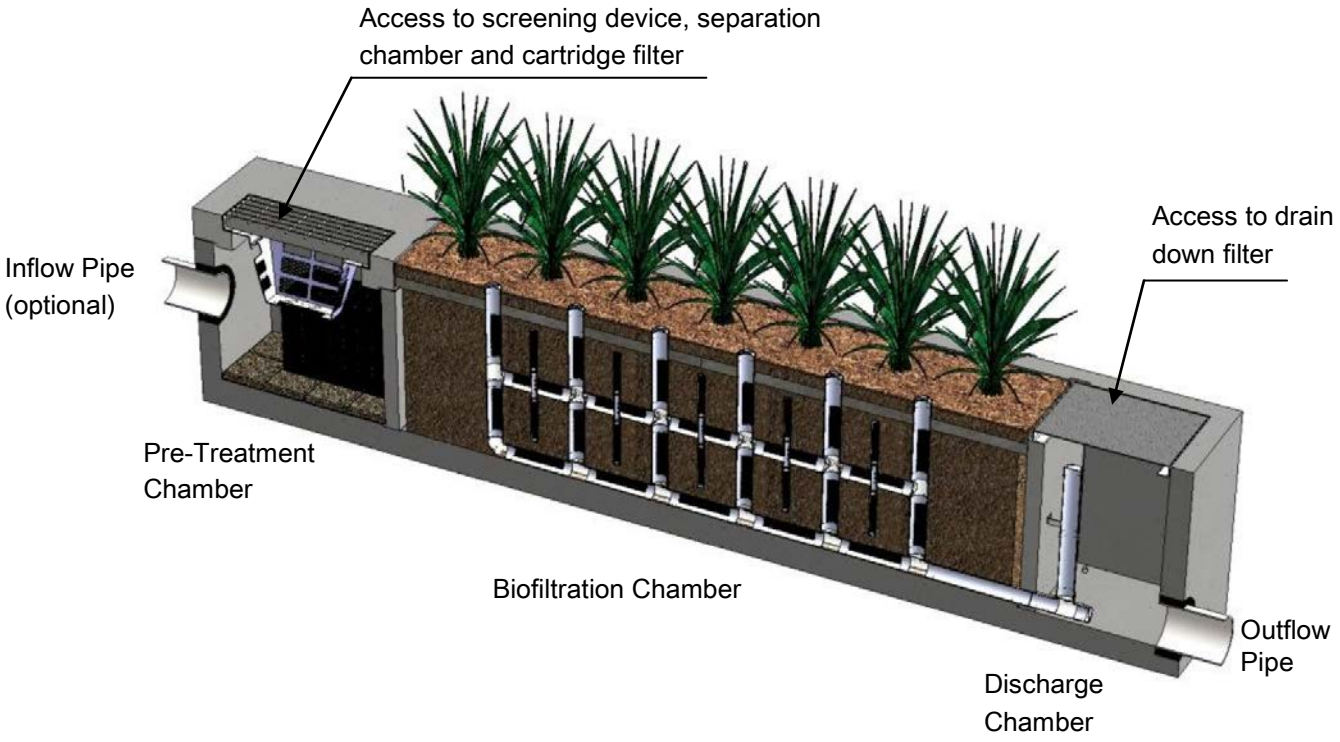
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Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

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

System Diagram



Maintenance Procedures

Screening Device

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

Separation Chamber

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

Cartridge Filters

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

Drain Down Filter

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

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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

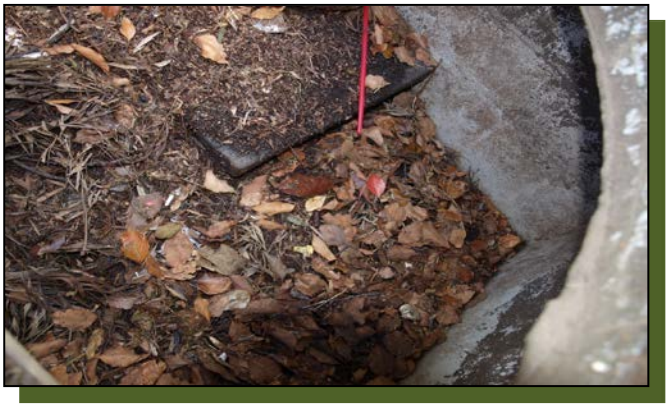
Screening Device

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.



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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



Bio Clean
P. 855-566-3938
F. 760-433-3176
E. Info@BioCleanEnvironmental.com

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A Forterra Company

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: _____

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Maintenance Report



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E. Info@BioCleanEnvironmental.com

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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:

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MC-4500 CHAMBER

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



STORMTECH MC-4500 CHAMBER
(not to scale)

Nominal Chamber Specifications

Size (L x W x H)
52” x 100” x 60”
1,321 mm x 2,540 mm x 1,524 mm

Chamber Storage
106.5 ft^3 (3.01 m^3)

Min. Installed Storage*
162.6 ft^3 (4.60 m^3)

Weight
120 lbs (54.4 kg)

Shipping
7 chambers/pallet
11 pallets/truck

*Assumes a minimum of 12” (300 mm) of stone above, 9” (230 mm) of stone below chambers, 9” (230 mm) of stone between chambers/end caps and 40% stone porosity.

STORMTECH MC-4500 END CAP
(not to scale)

Nominal End Cap Specifications

Size (L x W x H)
35.1” x 90.2” x 59.4”
891 mm x 2,291 mm x 1,509 mm

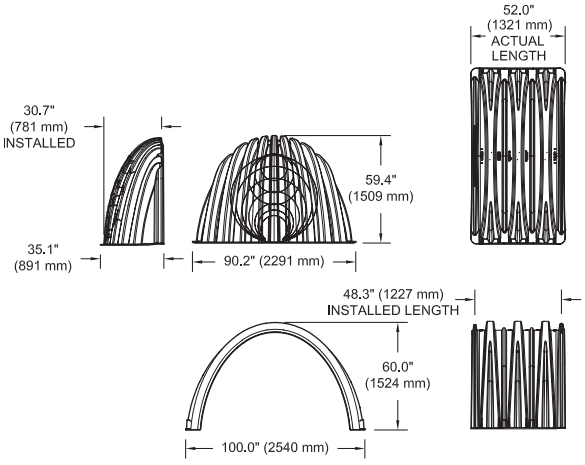
End Cap Storage
35.7 ft^3 (1.01 m^3)

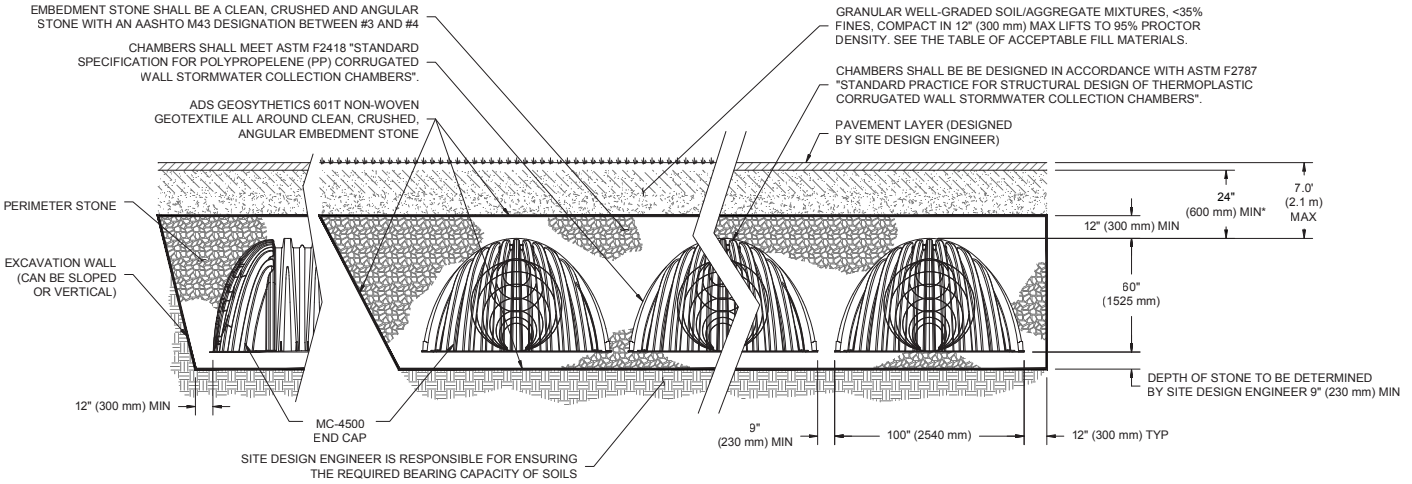
Min. Installed Storage*
108.7 ft^3 (3.08 m^3)

Weight
120 lbs (54.4 kg)

Shipping
7 end caps/pallet
11 pallets/truck

*Assumes a minimum of 12” (300 mm) of stone above, 9” (230 mm) of stone below, 6” (150 mm) of stone perimeter, 9” (230 mm) of stone between chambers/end caps and 40% stone porosity.





*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 30" (750 mm).

MC-4500 CHAMBER SPECIFICATIONS

STORAGE VOLUME PER CHAMBER FT³ (M³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Foundation Depth in. (mm)			
		9" (230 mm)	12" (300 mm)	15" (375 mm)	18" (450 mm)
MC-4500 Chamber	106.5 (3.02)	162.6 (4.60)	166.3 (4.71)	169.6 (4.81)	173.6 (4.91)
MC-4500 End Cap	35.7 (1.0)	108.7 (3.08)	111.9 (3.17)	115.2 (3.26)	118.4 (3.35)

Note: Assumes 9" (230 mm) row spacing, 40% stone porosity, 12" (300 mm) stone above and includes the bare chamber/end cap volume. End cap volume assumes 12" (300 mm) stone perimeter.

AMOUNT OF STONE PER CHAMBER

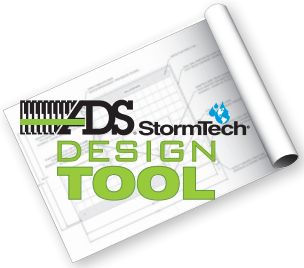
ENGLISH TONS (yds³)	Stone Foundation Depth			
	9"	12"	15"	18"
MC-4500 Chamber	7.4 (5.2)	7.8 (5.5)	8.3 (5.9)	8.8 (6.2)
MC-4500 End Cap	9.6 (6.8)	10.0 (7.1)	10.4 (7.4)	10.9 (7.7)
METRIC KILOGRAMS (m³)	230 mm	300 mm	375 mm	450 mm
MC-4500 Chamber	6,681 (4.0)	7,117 (4.2)	7,552 (4.5)	7,987 (4.7)
MC-4500 End Cap	8,691 (5.2)	9,075 (5.4)	9,460 (5.6)	9,845 (5.9)

Note: Assumes 12" (300 mm) of stone above and 9" (230 mm) row spacing and 12" (300 mm) of perimeter stone in front of end caps.

VOLUME EXCAVATION PER CHAMBER YD³ (M³)

	Stone Foundation Depth			
	9" (230 mm)	12" (300 mm)	15" (375mm)	18" (450 mm)
MC-4500 Chamber	10.5 (8.0)	10.8 (8.3)	11.2 (8.5)	11.5 (8.8)
MC-4500 End Cap	9.3 (7.1)	9.6 (7.3)	9.9 (7.6)	10.2 (7.8)

Note: Assumes 9" (230 mm) of separation between chamber rows, 12" (300 mm) of perimeter in front of the end caps, and 24" (600 mm) of cover. The volume of excavation will varyas depth of cover increases.



Working on a project?
Visit us at www.stormtech.com
and utilize the StormTech Design Tool

For more information on the StormTech MC-4500 Chamber and other ADS products, please contact our Customer Service Representatives at 1-800-821-6710

*THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS™*

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4640 Trueman Blvd., Hilliard, OH 43026
1-800-821-6710 www.ads-pipe.com

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StormTech
Detention • Retention • Water Quality
An ADS company

Isolator® Row O&M Manual







THE MOST ADVANCED NAME IN WATER MANAGEMENT SOLUTIONS™

ADS®

THE ISOLATOR® ROW

INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a technique to inexpensively enhance Total Suspended Solids (TSS) removal and provide easy access for inspection and maintenance.

THE ISOLATOR ROW

The Isolator Row is a row of StormTech chambers, either SC-160LP, SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-4500 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC- 310-3 and SC-740 models) allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

Two different fabrics are used for the Isolator Row. A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The tough geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of the underlying stone and remain intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber. The non-woven fabric is not required over the SC-160LP, DC-780, MC-3500 or MC-4500 models as these chambers do not have perforated side walls.

The Isolator Row is typically designed to capture the “first flush” and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole not only provides access to the Isolator Row but typically includes a high flow weir such that storm water flowrates or volumes that exceed the capacity of the Isolator Row overtop the over flow weir and discharge through a manifold to the other chambers.

The Isolator Row may also be part of a treatment train. By treating storm water prior to entry into the chamber system, the service life can be extended and pollutants such as hydrocarbons can be captured. Pre-treatment best management practices can be as simple as deep sump catch basins, oil-water separators or can be innovative storm water treatment devices. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

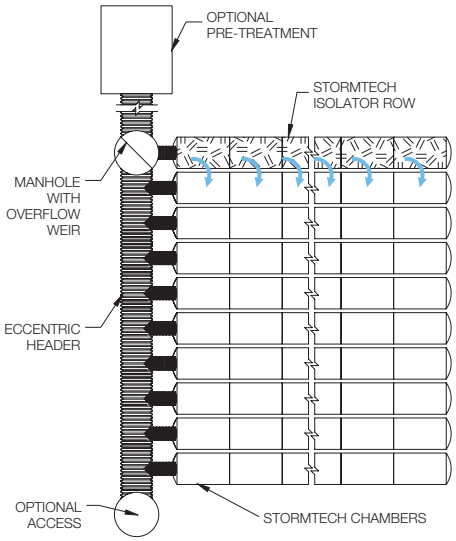
Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.



Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.



StormTech Isolator Row with Overflow Spillway (not to scale)





ISOLATOR ROW INSPECTION/MAINTENANCE

INSPECTION

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

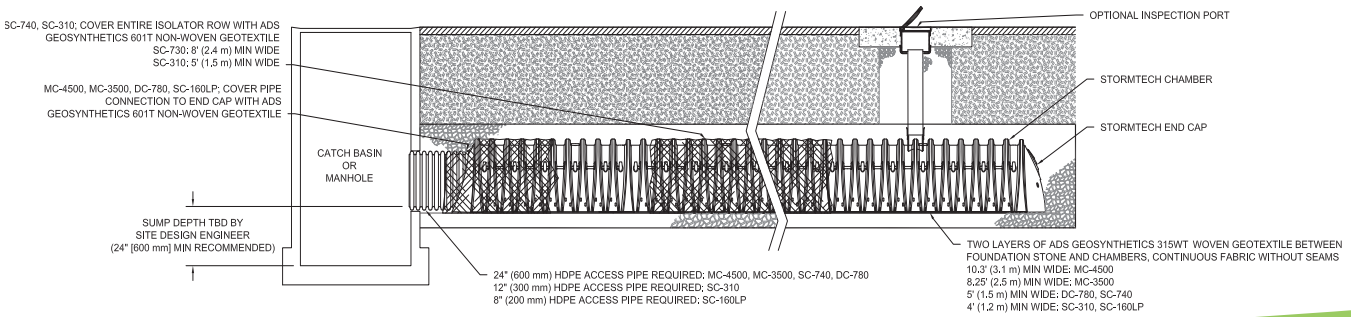
MAINTENANCE

The Isolator Row was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row (not to scale)

Note: Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-4500 chamber models and is not required over the entire Isolator Row.



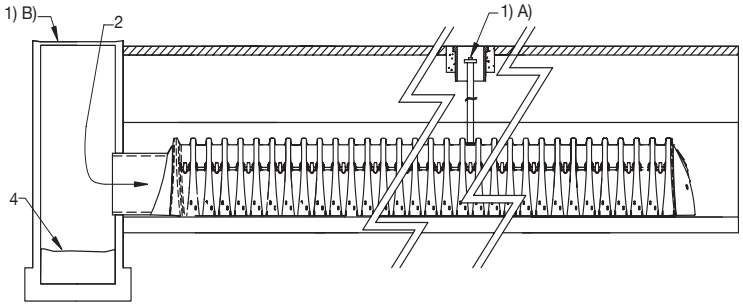
ISOLATOR ROW STEP BY STEP MAINTENANCE PROCEDURES

STEP 1
Inspect Isolator Row for sediment.
- A) Inspection ports (if present)
  - i. Remove lid from floor box frame
  - ii. Remove cap from inspection riser
  - iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
  - iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.
- B) All Isolator Rows
  - i. Remove cover from manhole at upstream end of Isolator Row
  - ii. Using a flashlight, inspect down Isolator Row through outlet pipe
    1. Mirrors on poles or cameras may be used to avoid a confined space entry
    2. Follow OSHA regulations for confined space entry if entering manhole
  - iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

STEP 2
Clean out Isolator Row using the JetVac process.
- A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
- B) Apply multiple passes of JetVac until backflush water is clean
- C) Vacuum manhole sump as required

STEP 3
Replace all caps, lids and covers, record observations and actions.

STEP 4
Inspect & clean catch basins and manholes upstream of the StormTech system.



SAMPLE MAINTENANCE LOG

Date	Stadia Rod Readings		Sediment Depth (1)–(2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

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PSI Pacific Southwest Industries

ENGINEERED - PUMPS/FLUID HANDLING & DISPOSAL SYSTEMS - PACKAGED LIFT STATIONS

LIFT STATION REQUIRED MAINTENANCE

The lift station should be inspected twice a year for proper operation, and should be checked for overabundance of solid matter such as grease and soap buildup.

Proper operation and inspection would include the following:

1) Automatic operation of the system by float activation. One pump starting at lead on levels, second pump starting at high level conditions; manual operation by use of the selector switches.

2) Inspect floats for proper elevation and for proper movement. Correct any obstructions.

3) Check incoming power for proper voltage. Check voltage at motor connections.

4) Check amperage of each motor.

5) Hose down lift station to clean the walls of the wet well, pumps and floats.

MECHANICAL SEAL INSPECTION OF PUMPS

Inspection of the mechanical seals should be done every two years.

The inspection will include the following:

Pull pump out of wet well. Remove oil seal plug and inspect the oil for clarity. Clear oil indicates no water intrusion and chamber is to be topped off with 30 weight turbine oil. If oil is cloudy the mechanical seal and oil needs to be replaced.

PSI recommends that preventive maintenance and service be performed by a qualified technician.

Any question regarding your lift station should be directed to Scott Richardson at 800-358-9095.

P O Box 520 Lake Elsinore, CA 92531 – 18541 Collier Ave., Lake Elsinore, CA 92530
(800) 358-9095 (909) 674-2144 fax (909) 674-9444 CSL #583052
www.psipumps.com Email: info@psipumps.com

APPENDIX D

Maintenance and Covenant Agreement

RECORDING REQUESTED BY:
City Clerk

WHEN RECORDED MAIL TO:

City of Whittier
13230 Penn Street
Whittier, CA 90602

SPACE ABOVE THIS LINE FOR RECORDER'S USE

MAINTENANCE COVENANT
FOR ON-SITE BMP MAINTENANCE

Pursuant to Chapter 8.36 of the Municipal Code of the City of Whittier relating to the control of pollutants carried by stormwater runoff, structural and/or treatment control Best Management Practices (BMPs) have been installed on the following property:

LEGAL DESCRIPTION

NAME OF BUSINESS: Whittier Boulevard Business Park

ASSESSOR'S ID # 8170-026-011 and 015 PARCEL MAP NO. _____ LOT NO. _____

ADDRESS: 12352 Whittier Boulevard, Whittier, CA 90602

I (we) Western Realco, LLC , hereby certify that I (we) am (are) the legal
(Legal Name of Property Owners)
owner(s) of property indicated above, and as such owners for the mutual benefit of future purchasers, their heirs, successors, and assigns, do hereby fix the following protective conditions to which their property, or portions thereof, shall be held, sold and/or conveyed.

That owner(s) shall maintain the drainage devices on the property indicated above and as shown on plans permitted by the City of Whittier, in a good functional condition to safeguard the property owners and adjoining properties from damage and pollution.

That owner(s) shall conduct maintenance inspection of all Structural or Treatment Control BMPs on the property at least once a year and retain proof of the inspection. Said maintenance inspection shall verify the legibility of all required stencils and signs and shall repaint and label as necessary.

That owner(s) shall hereby consent to inspection of the Property by an inspector authorized by the City Manager, or his or her designee, for the purpose of verifying compliance with the provisions of this Agreement.

That owner(s) shall provide printed educational materials with any sale of the property which provide information on what stormwater management facilities are present, the type(s) and location(s) of maintenance signs that are required, and how the necessary maintenance can be performed.

That owner(s) shall provide actual notice of this Agreement and its terms to any respective successor(s) in interest to the Property prior to transfer of said interest to such successor(s) in interest. This covenant and agreement shall run with the land and shall be binding upon any future owners, encumbrances, their successors, heirs or assigns and shall continue in effect until the City of Whittier approves its termination.

Owner(s): Western Realco, LLC / Vance Mape

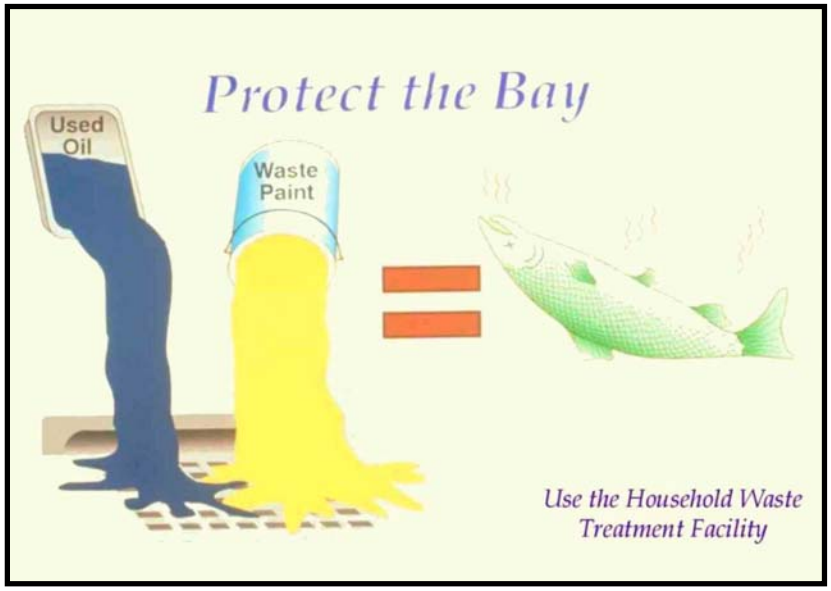
By: _____ Date: _____

By: _____ Date: _____
(PLEASE ATTACH NOTARY)

APPENDIX E

Educational Materials

Non-Stormwater Discharges SC-10



Art Credit: Margie Winter

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Description

Non-stormwater discharges are those flows that do not consist entirely of stormwater. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing, air conditioner condensate, etc. However there are certain non-stormwater discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains. They can generally be detected through a combination of detection and elimination. The ultimate goal is to effectively eliminate non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of pollutants on streets and into the storm drain system and creeks.

Approach

Initially the industry must make an assessment of non-stormwater discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is in the elimination of non-stormwater discharges.

CASQA California Stormwater Quality Association

Pollution Prevention

- Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented. Encourage litter control.

Suggested Protocols

Recommended Complaint Investigation Equipment

- Field Screening Analysis
  - pH paper or meter
  - Commercial stormwater pollutant screening kit that can detect for reactive phosphorus, nitrate nitrogen, ammonium nitrogen, specific conductance, and turbidity
  - Sample jars
  - Sample collection pole
  - A tool to remove access hole covers
- Laboratory Analysis
  - Sample cooler
  - Ice
  - Sample jars and labels
  - Chain of custody forms
- Documentation
  - Camera
  - Notebook
  - Pens
  - Notice of Violation forms
  - Educational materials

General

- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially those that are not classified as hazardous. These are often not responded to as effectively as they need to be.
- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” stenciled or demarcated next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

- See SC44 Stormwater Drainage System Maintenance for additional information.

Illicit Connections

- Locate discharges from the industrial storm drainage system to the municipal storm drain system through review of "as-built" piping schematics.
- Isolate problem areas and plug illicit discharge points.
- Locate and evaluate all discharges to the industrial storm drain system.

Visual Inspection and Inventory

- Inventory and inspect each discharge point during dry weather.
- Keep in mind that drainage from a storm event can continue for a day or two following the end of a storm and groundwater may infiltrate the underground stormwater collection system. Also, non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

- A review of the "as-built" piping schematic is a way to determine if there are any connections to the stormwater collection system.
- Inspect the path of floor drains in older buildings.

Smoke Testing

- Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two systems.
- During dry weather the stormwater collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the stormwater system.

Dye Testing

- A dye test can be performed by simply releasing a dye into either your sanitary or process wastewater system and examining the discharge points from the stormwater collection system for discoloration.

TV Inspection of Drainage System

- TV Cameras can be employed to visually identify illicit connections to the industrial storm drainage system.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Once a site has been cleaned:

- Post "No Dumping" signs with a phone number for reporting dumping and disposal.
- Landscaping and beautification efforts of hot spots may also discourage future dumping, as well as provide open space and increase property values.
- Lighting or barriers may also be needed to discourage future dumping.
- See fact sheet SC11 Spill Prevention, Control, and Cleanup.

Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Conduct field investigations of the industrial storm drain system for potential sources of non-stormwater discharges.
- Pro-actively conduct investigations of high priority areas. Based on historical data, prioritize specific geographic areas and/or incident type for pro-active investigations.

Reporting

- A database is useful for defining and tracking the magnitude and location of the problem.
- Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.
- Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.
- Document and report annually the results of the program.
- Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

Training

- Training of technical staff in identifying and documenting illegal dumping incidents is required.
- Consider posting the quick reference table near storm drains to reinforce training.
- Train employees to identify non-stormwater discharges and report discharges to the appropriate departments.

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Determine and implement appropriate outreach efforts to reduce non-permissible non-stormwater discharges.
- Conduct spill response drills annually (if no events occurred to evaluate your plan) in cooperation with other industries.
- When a responsible party is identified, educate the party on the impacts of his or her actions.

Spill Response and Prevention

- See SC11 Spill Prevention Control and Cleanup.

Other Considerations

- Many facilities do not have accurate, up-to-date schematic drawings.

Requirements

Costs (including capital and operation & maintenance)

- The primary cost is for staff time and depends on how aggressively a program is implemented.
- Cost for containment and disposal is borne by the discharger.
- Illicit connections can be difficult to locate especially if there is groundwater infiltration.
- Indoor floor drains may require re-plumbing if cross-connections to storm drains are detected.

Maintenance (including administrative and staffing)

- Illegal dumping and illicit connection violations requires technical staff to detect and investigate them.

Supplemental Information

Further Detail of the BMP

Illegal Dumping

- Substances illegally dumped on streets and into the storm drain systems and creeks include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. All of these wastes cause stormwater and receiving water quality problems as well as clog the storm drain system itself.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots

- Types and quantities (in some cases) of wastes
- Patterns in time of occurrence (time of day/night, month, or year)
- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people at the facility who are aware of the problem and who have the tools to at least identify the incident, if not correct it. Therefore, train field staff to recognize and report the incidents.

What constitutes a "non-stormwater" discharge?

- Non-stormwater discharges to the stormwater collection system may include any water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

- Facilities subject to stormwater permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The State's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

Performance Evaluation

- Review annually internal investigation results; assess whether goals were met and what changes or improvements are necessary.
- Obtain feedback from personnel assigned to respond to, or inspect for, illicit connections and illegal dumping incidents.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Spill Prevention, Control & Cleanup SC-11



Photo Credit: Geoff Brosseau

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Many activities that occur at an industrial or commercial site have the potential to cause accidental or illegal spills. Preparation for accidental or illegal spills, with proper training and reporting systems implemented, can minimize the discharge of pollutants to the environment.

Spills and leaks are one of the largest contributors of stormwater pollutants. Spill prevention and control plans are applicable to any site at which hazardous materials are stored or used. An effective plan should have spill prevention and response procedures that identify potential spill areas, specify material handling procedures, describe spill response procedures, and provide spill clean-up equipment. The plan should take steps to identify and characterize potential spills, eliminate and reduce spill potential, respond to spills when they occur in an effort to prevent pollutants from entering the stormwater drainage system, and train personnel to prevent and control future spills.

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Approach

Pollution Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

- Develop a Spill Prevention Control and Countermeasure (SPCC) Plan. The plan should include:

- Description of the facility, owner and address, activities and chemicals present
- Facility map
- Notification and evacuation procedures
- Cleanup instructions
- Identification of responsible departments
- Identify key spill response personnel

- Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of process materials that are brought into the facility.

Suggested Protocols (including equipment needs)

Spill Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

- If consistent illegal dumping is observed at the facility:
  - Post "No Dumping" signs with a phone number for reporting illegal dumping and disposal. Signs should also indicate fines and penalties applicable for illegal dumping.
  - Landscaping and beautification efforts may also discourage illegal dumping.
  - Bright lighting and/or entrance barriers may also be needed to discourage illegal dumping.

- Store and contain liquid materials in such a manner that if the tank is ruptured, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.

- If the liquid is oil, gas, or other material that separates from and floats on water, install a spill control device (such as a tee section) in the catch basins that collects runoff from the storage tank area.

- Routine maintenance:
  - Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.
  - Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area; and ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
  - Sweep and clean the storage area monthly if it is paved, *do not hose down the area to a storm drain.*

  - Check tanks (and any containment sumps) daily for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.

- Label all containers according to their contents (e.g., solvent, gasoline).
- Label hazardous substances regarding the potential hazard (corrosive, radioactive, flammable, explosive, poisonous).
- Prominently display required labels on transported hazardous and toxic materials (per US DOT regulations).
- Identify key spill response personnel.

Spill Control and Cleanup Activities

- Follow the Spill Prevention Control and Countermeasure Plan.
- Clean up leaks and spills immediately.
- Place a stockpile of spill cleanup materials where it will be readily accessible (e.g., near storage and maintenance areas).
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste. Physical methods for the cleanup of dry chemicals include the use of brooms, shovels, sweepers, or plows.
- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Chemical cleanups of material can be achieved with the use of adsorbents, gels, and foams. Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Reporting

- Report spills that pose an immediate threat to human health or the environment to the Regional Water Quality Control Board.
- Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).
- Report spills to local agencies, such as the fire department; they can assist in cleanup.
- Establish a system for tracking incidents. The system should be designed to identify the following:

  - Types and quantities (in some cases) of wastes

  - Patterns in time of occurrence (time of day/night, month, or year)

- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)

- Responsible parties

Training

- Educate employees about spill prevention and cleanup.

- Well-trained employees can reduce human errors that lead to accidental releases or spills:

  - The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.

  - Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.

- Employees should be educated about aboveground storage tank requirements. Employees responsible for aboveground storage tanks and liquid transfers should be thoroughly familiar with the Spill Prevention Control and Countermeasure Plan and the plan should be readily available.

- Train employees to recognize and report illegal dumping incidents.

Other Considerations (Limitations and Regulations)

- State regulations exist for facilities with a storage capacity of 10,000 gallons or more of petroleum to prepare a Spill Prevention Control and Countermeasure (SPCC) Plan (Health & Safety Code Chapter 6.67).

- State regulations also exist for storage of hazardous materials (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the releases or threatened releases.

- Consider requiring smaller secondary containment areas (less than 200 sq. ft.) to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

Requirements

Costs (including capital and operation & maintenance)

- Will vary depending on the size of the facility and the necessary controls.

- Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil or water can be quite expensive.

Maintenance (including administrative and staffing)

- This BMP has no major administrative or staffing requirements. However, extra time is needed to properly handle and dispose of spills, which results in increased labor costs.

Supplemental Information

Further Detail of the BMP

Reporting

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the facility and the effectiveness of BMPs. A good record keeping system helps the facility minimize incident recurrence, correctly respond with appropriate cleanup activities, and comply with legal requirements. A record keeping and reporting system should be set up for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm sewer. These records should contain the following information:

- Date and time of the incident
- Weather conditions
- Duration of the spill/leak/discharge
- Cause of the spill/leak/discharge
- Response procedures implemented
- Persons notified
- Environmental problems associated with the spill/leak/discharge

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

- The date and time the inspection was performed
- Name of the inspector
- Items inspected
- Problems noted
- Corrective action required
- Date corrective action was taken

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

Aboveground Tank Leak and Spill Control

Accidental releases of materials from aboveground liquid storage tanks present the potential for contaminating stormwater with many different pollutants. Materials spilled, leaked, or lost from

tanks may accumulate in soils or on impervious surfaces and be carried away by stormwater runoff.

The most common causes of unintentional releases are:

- Installation problems
- Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves)
- External corrosion and structural failure
- Spills and overfills due to operator error
- Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Practices listed below should be employed to enhance the code requirements:

- Tanks should be placed in a designated area.
- Tanks located in areas where firearms are discharged should be encapsulated in concrete or the equivalent.
- Designated areas should be impervious and paved with Portland cement concrete, free of cracks and gaps, in order to contain leaks and spills.
- Liquid materials should be stored in UL approved double walled tanks or surrounded by a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain.
- For used oil or dangerous waste, a dead-end sump should be installed in the drain.
- All other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- Accumulated stormwater in petroleum storage areas should be passed through an oil/water separator.

Maintenance is critical to preventing leaks and spills. Conduct routine inspections and:

- Check for external corrosion and structural failure.
- Check for spills and overfills due to operator error.
- Check for failure of piping system (pipes, pumps, flanger, coupling, hoses, and valves).
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.

- Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Frequently relocate accumulated stormwater during the wet season.
- Periodically conduct integrity testing by a qualified professional.

Vehicle Leak and Spill Control

Major spills on roadways and other public areas are generally handled by highly trained Hazmat teams from local fire departments or environmental health departments. The measures listed below pertain to leaks and smaller spills at vehicle maintenance shops.

In addition to implementing the spill prevention, control, and clean up practices above, use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- Perform all vehicle fluid removal or changing inside or under cover to prevent the run-on of stormwater and the runoff of spills.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Immediately drain all fluids from wrecked vehicles.
- Store wrecked vehicles or damaged equipment under cover.
- Place drip pans or absorbent materials under heavy equipment when not in use.
- Use adsorbent materials on small spills rather than hosing down the spill.
- Remove the adsorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- Oil filters disposed of in trashcans or dumpsters can leak oil and contaminate stormwater. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.

- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- Design the fueling area to prevent the run-on of stormwater and the runoff of spills:
  - Cover fueling area if possible.
  - Use a perimeter drain or slope pavement inward with drainage to a sump.
  - Pave fueling area with concrete rather than asphalt.
- If dead-end sump is not used to collect spills, install an oil/water separator.
- Install vapor recovery nozzles to help control drips as well as air pollution.
- Discourage "topping-off' of fuel tanks.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- Use adsorbent materials on small spills and general cleaning rather than hosing down the area. Remove the adsorbent materials promptly.
- Carry out all Federal and State requirements regarding underground storage tanks, or install above ground tanks.
- Do not use mobile fueling of mobile industrial equipment around the facility; rather, transport the equipment to designated fueling areas.
- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Train employees in proper fueling and cleanup procedures.

Industrial Spill Prevention Response

For the purposes of developing a spill prevention and response program to meet the stormwater regulations, facility managers should use information provided in this fact sheet and the spill prevention/response portions of the fact sheets in this handbook, for specific activities. The program should:

- Integrate with existing emergency response/hazardous materials programs (e.g., Fire Department)
- Develop procedures to prevent/mitigate spills to storm drain systems
- Identify responsible departments
- Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures
- Address spills at municipal facilities, as well as public areas

- Provide training concerning spill prevention, response and cleanup to all appropriate personnel

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Stormwater Managers Resource Center http://www.stormwatercenter.net/

Waste Handling & Disposal SC-34



Photo Credit: Geoff Brosseau

Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, reuse, and recycling; and preventing run-on and runoff.

Approach

Pollution Prevention

- Accomplish reduction in the amount of waste generated using the following source controls:
  - Production planning and sequencing
  - Process or equipment modification
  - Raw material substitution or elimination
  - Loss prevention and housekeeping
  - Waste segregation and separation
  - Close loop recycling
- Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
- Recycle materials whenever possible.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

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Suggested Protocols

General

- Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater run-on and runoff with a berm. The waste containers or piles must be covered except when in use.
- Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.
- Check storage containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- Sweep and clean the storage area regularly. If it is paved, do not hose down the area to a storm drain.
- Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain.
- Transfer waste from damaged containers into safe containers.
- Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide a sufficient number of litter receptacles for the facility.
- Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

- Keep waste collection areas clean.
- Inspect solid waste containers for structural damage regularly. Repair or replace damaged containers as necessary.
- Secure solid waste containers; containers must be closed tightly when not in use.
- Do not fill waste containers with washout water or any other liquid.
- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc., may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).

- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal.

Good Housekeeping

- Use all of the product before disposing of the container.
- Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.
- Use dry methods when possible (e.g., sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.

Chemical/Hazardous Wastes

- Select designated hazardous waste collection areas on-site.
- Store hazardous materials and wastes in covered containers and protect them from vandalism.
- Place hazardous waste containers in secondary containment.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Stencil or demarcate storm drains on the facility's property with prohibitive message regarding waste disposal.

Run-on/Runoff Prevention

- Prevent stormwater run-on from entering the waste management area by enclosing the area or building a berm around the area.
- Prevent waste materials from directly contacting rain.
- Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropyleneor hypalon.
- Cover the area with a permanent roof if feasible.
- Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.
- Move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.

Inspection

- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- Check waste management areas for leaking containers or spills.

- Repair leaking equipment including valves, lines, seals, or pumps promptly.

Training

- Train staff in pollution prevention measures and proper disposal methods.
- Train employees and contractors in proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
- Train employees and subcontractors in proper hazardous waste management.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Have an emergency plan, equipment and trained personnel ready at all times to deal immediately with major spills
- Collect all spilled liquids and properly dispose of them.
- Store and maintain appropriate spill cleanup materials in a location known to all near the designated wash area.
- Ensure that vehicles transporting waste have spill prevention equipment that can prevent spills during transport. Spill prevention equipment includes:
  - Vehicles equipped with baffles for liquid waste
  - Trucks with sealed gates and spill guards for solid waste

Other Considerations (Limitations and Regulations)

Hazardous waste cannot be reused or recycled; it must be disposed of by a licensed hazardous waste hauler.

Requirements

Costs

Capital and O&M costs for these programs will vary substantially depending on the size of the facility and the types of waste handled. Costs should be low if there is an inventory program in place.

Maintenance

- None except for maintaining equipment for material tracking program.

Supplemental Information

Further Detail of the BMP

Land Treatment System

Minimize runoff of polluted stormwater from land application by:

- Choosing a site where slopes are under 6%, the soil is permeable, there is a low water table, it is located away from wetlands or marshes, and there is a closed drainage system

- Avoiding application of waste to the site when it is raining or when the ground is saturated with water
- Growing vegetation on land disposal areas to stabilize soils and reduce the volume of surface water runoff from the site
- Maintaining adequate barriers between the land application site and the receiving waters (planted strips are particularly good)
- Using erosion control techniques such as mulching and matting, filter fences, straw bales, diversion terracing, and sediment basins
- Performing routine maintenance to ensure the erosion control or site stabilization measures are working

Examples

The port of Long Beach has a state-of-the-art database for identifying potential pollutant sources, documenting facility management practices, and tracking pollutants.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

Solid Waste Container Best Management Practices – Fact Sheet On-Line Resources – Environmental Health and Safety. Harvard University. 2002.

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Safer Alternative Products SC-35

Description

Promote the use of less harmful products and products that contain little or no TMDL pollutants. Alternatives exist for most product classes including chemical fertilizers, pesticides, cleaning solutions, janitorial chemicals, automotive and paint products, and consumables (batteries, fluorescent lamps).

Approach

Pattern a new program after the many established programs around the state and country. Integrate this best management practice as much as possible with existing programs at your facility.

Develop a comprehensive program based on:

- The "Precautionary Principle," which is an alternative to the "Risk Assessment" model that says it's acceptable to use a potentially harmful product until physical evidence of its harmful effects are established and deemed too costly from an environmental or public health perspective. For instance, a risk assessment approach might say it's acceptable to use a pesticide until there is direct proof of an environmental impact. The Precautionary Principle approach is used to evaluate whether a given product is safe, whether it is really necessary, and whether alternative products would perform just as well.
- Environmentally Preferable Purchasing Program to minimize the purchase of products containing hazardous ingredients used in the facility's custodial services, fleet maintenance, and facility maintenance in favor of using alternate products that pose less risk to employees and to the environment.
- Integrated Pest Management (IPM) or Less-Toxic Pesticide Program, which uses a pest management approach that minimizes the use of toxic chemicals and gets rid of pests by methods that pose a lower risk to employees, the public, and the environment.
- Energy Efficiency Program including no-cost and low-cost energy conservation and efficiency actions that can reduce both energy consumption and electricity bills, along with long-term energy efficiency investments.

Consider the following mechanisms for developing and implementing a comprehensive program:

- Policies

Objectives

- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

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- Procedures
  - Standard operating procedures (SOPs)
  - Purchasing guidelines and procedures
  - Bid packages (services and supplies)
- Materials
  - Preferred or approved product and supplier lists
  - Product and supplier evaluation criteria
  - Training sessions and manuals
  - Fact sheets for employees

Implement this BMP in conjunction with the Vehicle and Equipment Management fact sheets (SC20 – SC22) and SC41, Building and Grounds Maintenance.

Training

- Employees who handle potentially harmful materials in the use of safer alternatives.
- Purchasing departments should be encouraged to procure less hazardous materials and products that contain little or no harmful substances or TMDL pollutants.

Regulations

This BMP has no regulatory requirements. Existing regulations already encourage facilities to reduce the use of hazardous materials through incentives such as reduced:

- Specialized equipment storage and handling requirements,
- Storm water runoff sampling requirements,
- Training and licensing requirements, and
- Record keeping and reporting requirements.

Equipment

- There are no major equipment requirements to this BMP.

Limitations

- Alternative products may not be available, suitable, or effective in every case.

Requirements

Cost Considerations

- The primary cost is for staff time to: 1) develop new policies and procedures and 2) educate purchasing departments and employees who handle potentially harmful materials about the availability, procurement, and use of safer alternatives.

- Some alternative products may be slightly more expensive than conventional products.

Supplemental Information

Employees and contractors / service providers can both be educated about safer alternatives by using information developed by a number of organizations including the references and resources listed below.

The following discussion provides some general information on safer alternatives. More specific information on particular hazardous materials and the available alternatives may be found in the references and resources listed below.

- Automotive products – Less toxic alternatives are not available for many automotive products, especially engine fluids. But there are alternatives to grease lubricants, car polishes, degreasers, and windshield washer solution. Rerefined motor oil is also available.
- Vehicle/Trailer lubrication – Fifth wheel bearings on trucks require routine lubrication. Adhesive lubricants are available to replace typical chassis grease.
- Cleaners – Vegetables-based or citrus-based soaps are available to replace petroleum-based soaps/detergents.
- Paint products – Water-based paints, wood preservatives, stains, and finishes are available.
- Pesticides – Specific alternative products or methods exist to control most insects, fungi, and weeds.
- Chemical Fertilizers – Compost and soil amendments are natural alternatives.
- Consumables – Manufacturers have either reduced or are in the process of reducing the amount of heavy metals in consumables such as batteries and fluorescent lamps. All fluorescent lamps contain mercury, however low-mercury containing lamps are now available from most hardware and lighting stores. Fluorescent lamps are also more energy efficient than the average incandescent lamp.
- Janitorial chemicals – Even biodegradable soap can harm fish and wildlife before it biodegrades. Biodegradable does not mean non-toxic. Safer products and procedures are available for floor stripping and cleaning, as well as carpet, glass, metal, and restroom cleaning and disinfecting.

Examples

There are a number of business and trade associations, and communities with effective programs. Some of the more prominent are listed below in the references and resources section.

References and Resources

Note: Many of these references provide alternative products for materials that typically are used inside and disposed to the sanitary sewer as well as alternatives to products that usually end up in the storm drain.

General Sustainable Practices and Pollution Prevention Including Pollutant-Specific Information

California Department of Toxic Substances Control (www.dtsc.ca.gov)

California Integrated Waste Management Board (www.ciwmb.ca.gov)

City of Santa Monica (www.santa-monica.org/environment)

City of Palo Alto (www.city.palo-alto.ca.us/cleanbay)

City and County of San Francisco, Department of the Environment (www.ci.sf.ca.us/sfenvironment)

Earth 911 (www.earth911.org/master.asp)

Environmental Finance Center Region IX (www.greenstart.org/efc9)

Flex Your Power (www.flexyourpower.ca.gov)

GreenBiz.com (www.greenbiz.com)

Green Business Program (www.abag.org/bayarea/enviro/gbus/gb.html)

Pacific Industrial and Business Association (www.piba.org)

Sacramento Clean Water Business Partners (www.sacstormwater.org)

USEPA BMP fact sheet – Alternative products (http://cfpub.epa.gov/npdes/stormwater/menuofbmps/poll_2.cfm)

USEPA Region IX Pollution Prevention Program (www.epa.gov/region09/p2)

Western Regional Pollution Prevention Network (www.westp2net.org)

Metals (mercury, copper)

National Electrical Manufacturers Association - Environment, Health and Safety (www.nema.org)

Sustainable Conservation (www.suscon.org)

- Auto Recycling Project
- Brake Pad Partnership

Pesticides and Chemical Fertilizers

Bio-Integral Resource Center (www.birc.org)

California Department of Pesticide Regulation (www.cdpr.ca.gov)

University of California Statewide IPM Program (www.ipm.ucdavis.edu/default.html)

Dioxins

Bay Area Dioxins Project (http://dioxin.abag.ca.gov/)

Building & Grounds Maintenance SC-41



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	
Organics	

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, abnormal pH, and oils and greases. Utilizing the protocols in this fact sheet will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Encourage proper lawn management and landscaping, including use of native vegetation.

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- Encourage use of Integrated Pest Management techniques for pest control.
- Encourage proper onsite recycling of yard trimmings.
- Recycle residual paints, solvents, lumber, and other material as much as possible.

Suggested Protocols

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used, and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement.

Landscaping Activities

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures on exposed soils.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.
- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. If directed off-site, you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- Store toxic material under cover during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures when soils are exposed.
- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Consider an alternative approach when bailing out muddy water: do not put it in the storm drain; pour over landscaped areas.
- Use hand weeding where practical.

Fertilizer and Pesticide Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- Use less toxic pesticides that will do the job when applicable. Avoid use of copper-based pesticides if possible.
- Do not use pesticides if rain is expected.
- Do not mix or prepare pesticides for application near storm drains.
- Use the minimum amount needed for the job.
- Calibrate fertilizer distributors to avoid excessive application.
- Employ techniques to minimize off-target application (e.g., spray drift) of pesticides, including consideration of alternative application techniques.
- Apply pesticides only when wind speeds are low.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Dispose of empty pesticide containers according to the instructions on the container label.

- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.

Training

- Educate and train employees on pesticide use and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.
- Familiarize employees with the Spill Prevention Control and Countermeasure Plan.
- Clean up spills immediately.

Other Considerations

Alternative pest/weed controls may not be available, suitable, or effective in many cases.

Requirements

Costs

- Cost will vary depending on the type and size of facility.
- Overall costs should be low in comparison to other BMPs.

Maintenance

Sweep paved areas regularly to collect loose particles. Wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

Building fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water, though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping, but it is subject to rusting and results in lower quality water. Initially, the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time (typically a year) and between flushes may accumulate iron, manganese, lead, copper, nickel, and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Mobile Cleaners Pilot Program: Final Report. 1997. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Parking/Storage Area Maintenance SC-43



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Description

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants from parking/storage areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

Approach

The goal of this program is to ensure stormwater pollution prevention practices are considered when conducting activities on or around parking areas and storage areas to reduce potential for pollutant discharge to receiving waters. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Encourage alternative designs and maintenance strategies for impervious parking lots. (See New Development and Redevelopment BMP Handbook)
- Keep accurate maintenance logs to evaluate BMP implementation.

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SC-43 Parking/Storage Area Maintenance

Suggested Protocols

General

- Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.
- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low quantities.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.
- Discharge soapy water remaining in mop or wash buckets to the sanitary sewer through a sink, toilet, clean-out, or wash area with drain.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide an adequate number of litter receptacles.
- Clean out and cover litter receptacles frequently to prevent spillage.
- Provide trash receptacles in parking lots to discourage litter.
- Routinely sweep, shovel, and dispose of litter in the trash.

Surface Cleaning

- Use dry cleaning methods (e.g., sweeping, vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system if possible.
- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- Sweep all parking lots at least once before the onset of the wet season.
- Follow the procedures below if water is used to clean surfaces:
  - Block the storm drain or contain runoff.
  - Collect and pump wash water to the sanitary sewer or discharge to a pervious surface. Do not allow wash water to enter storm drains.
  - Dispose of parking lot sweeping debris and dirt at a landfill.
- Follow the procedures below when cleaning heavy oily deposits:
  - Clean oily spots with absorbent materials.
  - Use a screen or filter fabric over inlet, then wash surfaces.

- Do not allow discharges to the storm drain.
- Vacuum/pump discharges to a tank or discharge to sanitary sewer.
- Appropriately dispose of spilled materials and absorbents.

Surface Repair

- Preheat, transfer or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff.
- Cover and seal nearby storm drain inlets where applicable (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.
- Use only as much water as necessary for dust control, to avoid runoff.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Inspection

- Have designated personnel conduct inspections of parking facilities and stormwater conveyance systems associated with parking facilities on a regular basis.
- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Training

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- Clean up fluid spills immediately with absorbent rags or material.
- Dispose of spilled material and absorbents properly.

Other Considerations

Limitations related to sweeping activities at large parking facilities may include high equipment costs, the need for sweeper operator training, and the inability of current sweeper technology to remove oil and grease.

SC-43 Parking/Storage Area Maintenance

Requirements

Costs

Cleaning/sweeping costs can be quite large. Construction and maintenance of stormwater structural controls can be quite expensive as well.

Maintenance

- Sweep parking lot regularly to minimize cleaning with water.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Clean parking facilities regularly to prevent accumulated wastes and pollutants from being discharged into conveyance systems during rainy conditions.

Supplemental Information

Further Detail of the BMP

Surface Repair

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff. Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal. Only use only as much water as is necessary for dust control to avoid runoff.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Drainage System Maintenance SC-44



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	

Approach

Pollution Prevention

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Suggested Protocols

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC34 Waste Handling and Disposal).

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- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:
  - Is there evidence of spills such as paints, discoloring, etc?

- Are there any odors associated with the drainage system?
- Record locations of apparent illegal discharges/illicit connections?
- Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- Eliminate the discharge once the origin of flow is established.

- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Allow only properly trained individuals to handle hazardous materials/wastes.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).

- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Spill Response and Prevention

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.
- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Other Considerations (Limitations and Regulations)

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and prohibition against disposal of flushed effluent to sanitary sewer in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:

  - Purchase and installation of signs.

  - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.

  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.

  - Purchase of landfill space to dispose of illegally-dumped items and material.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

Supplemental Information

Further Detail of the BMP

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

Ferguson, B.K. 1991. Urban Stream Reclamation, p. 324-322, Journal of Soil and Water Conservation.

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line:
http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Drain Insert MP-52

General Description

Drain inserts are manufactured filters or fabric placed in a drop inlet to remove sediment and debris. There are a multitude of inserts of various shapes and configurations, typically falling into one of three different groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are one box; that is, the setting area and filtration through media occur in the same box. Some products consist of one or more trays or mesh grates. The trays may hold different types of media. Filtration media vary by manufacturer. Types include polypropylene, porous polymer, treated cellulose, and activated carbon.

Inspection/Maintenance Considerations

Washout problems increase with rain intensity. Susceptibility of accumulated sediments to be re-suspended at low flow rates, can be corrected with an energy dissipater between gate and treatment areas.

Inspection Activities	Suggested Frequency
■ Inspect for sediment buildup and proper functioning.	At the beginning of the wet season and after significant storms
■ Verify that stormwater enters the unit and does not leak around the perimeter.	After construction.
Maintenance Activities	**Suggested Frequency**
■ Remove sediment as needed.	At the beginning of the wet season and as necessary

Maintenance Concerns, Objectives, and Goals

■ Sediment Removal

Targeted Constituents

- ✓ Sediment
- ✓ Nutrients
- ✓ Trash
- ✓ Metals
- Bacteria
- ✓ Oil and Grease
- ✓ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

Efficient Irrigation SD-12



Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

Designing New Installations

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

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

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

Redeveloping Existing Installations

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

Other Resources

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

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

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

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

Storm Drain Signage SD-13



Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

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

Designing New Installations

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

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

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

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

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

Redeveloping Existing Installations

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

Additional Information

Maintenance Considerations

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

Placement

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

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

Supplemental Information

Examples

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

Other Resources

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

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

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

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

Trash Storage Areas SD-32

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Design Objectives

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

Suitable Applications

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

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

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- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

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

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

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

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

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

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

APPENDIX F

Infiltration Feasibility

PHASE I ENVIRONMENTAL SITE ASSESSMENT

Former Leggett & Platt Facility
12352 Whittier Boulevard
Whittier, California 90602

Prepared for:

Western Realco
500 Newport Center Drive Suite #630
Newport Beach, CA 92660

Prepared by:

Hazard Management Consulting, Inc.
211 W. Avenida Cordoba, Suite 200
San Clemente, CA 92672
(949) 361-3902

December 12, 2019

TABLE OF CONTENTS

EXECUTIVE SUMMARY III
1. INTRODUCTION 1

1.1. Objective 1
1.2. Scope of Services, Methodology and Limitations 2

2. SITE DESCRIPTION 3

2.1. Site Setting 3
2.2. Regional Geology and Hydrogeology 4
2.3. Interviews and User Provided Information 5
2.4. Title Records 5
2.5. User Knowledge 5
2.6. Owner/Occupant Knowledge 5
2.7. Environmental Liens or Activity and Use Limitations 5

3. SITE USE AND HISTORY 5

3.1. Aerial Photograph Review 6
3.2. Topographic Maps 7
3.3. Sanborn Maps 7
3.4. EDR City Directory Review 7
3.5. Summary 8

4. PRIOR INVESTIGATIONS 8

4.1. AMEC PHI ESA L&P Management Company 2012 8
4.2. Discussion 10

5. SITE RECONNAISSANCE 11

5.1. Site Vicinity 13

6. REGULATORY AGENCY DATABASE RESEARCH 13

6.1. Database Records Concerning the Target Property 14
6.2. Database Records Concerning the Site Vicinity 14
6.3. Summary of Off-Site Issues 16

7. LOCAL AGENCY AND OTHER RECORDS REVIEW 17

7.1. Tribal Records 17
7.2. Oil and Gas Wells 17

7.3. State of California 17
7.4. Los Angeles County Fire Department 17
7.5. Los Angeles County Department Public Works Environmental Services 18
7.6. South Coast Air Quality Management District 18
7.7. City Clerk City of Whittier 18

8. VAPOR INTRUSION, ASBESTOS AND OTHER CONCERNS 19

8.1. Vapor Intrusion 19
8.2. Asbestos 19
8.3. Radon 19
8.4. Mold 19

9. SUMMARY OF FINDINGS 19
10. DATA GAPS 22
11. CONCLUSIONS 22
12. RECOMMENDATIONS 22
13. REFERENCES 23
14. QUALIFICATIONS 24

TABLES

Table 1 EDR Records Summary

FIGURES

Figure 1 Site Location
Figure 2 Site & Vicinity Map

APPENDICES

A - Site Photographs
B - EDR Historical Reports
C- Previous Reports

Executive Summary

Hazard Management Consulting, Inc. (HMC) is pleased to submit this Environmental Site Assessment (ESA) for the property referenced above in the City of Whittier, California (Site) (Figures 1 & 2). This ESA was prepared to evaluate the Site for potential Recognized Environmental Conditions (RECs) that may be present and was conducted as part of your efforts to acquire the Site. The Site is noted to be occupied by three vacant, attached structures that comprise the former Leggett and Platt facility, noted to have manufactured bedframes since the 1950's. In 2009, manufacturing operations ceased and the Site was used for storage and distribution of the bedframes. The Site is approximately 13-acres and was noted to be paved with asphalt and concrete. The on-Site buildings were noted to be of steel and concrete construction and measure approximately 213,000 square feet. The Site has been the subject of numerous assessments and investigations due to a release of diesel fuel and naptha paint solvent that was discovered to have been released in the late 1980's and a remedial case is still open with the RWQCB for the Site.

The Site is relatively flat with an elevation of approximately 220 feet above mean sea level (msl) with a regional slope to the southwest. The Site is located in an area zoned by the City of Whittier for the Whittier Boulevard Specific Plan Workplace District and is bound:

- to the north by Whittier Boulevard and a Public Storage facility;
- on the east by Whittier Boulevard across which are several automotive repair shops;
- to the south by Oceanic Arts, BL Wilcox and Associates, and Tool and Jig Plating Company; and,
- to the west by PIH Whittier Health and a construction site (formerly Nellis School for Boys).

Key findings of this Phase I ESA are as follows:

- The Site and Site vicinity was observed to have historically been used for agriculture since at least 1928 until the 1953 aerial photograph when the Site was first seen to be developed with the original single industrial structure. While pesticides or fertilizers may be present in the shallow soil, given the

length of time that has occurred since agricultural activity has taken place and fact that the Site was developed and will be redeveloped for commercial use, there were no RECs found from the former agricultural usage of the Site.

- The Site was noted to have been developed in the mid 1950s and used for industrial operations for approximately 70 year.

- The Site is noted to be occupied by three vacant, attached structures that comprised the former Leggett and Platt facility. The Site is approximately 13-acres and was noted to be paved with asphalt and concrete. The on-Site buildings were noted to be of steel construction and measure approximately 213,000 square feet. The Site is relatively flat with an elevation of approximately 220 feet above mean sea level (msl) with a regional slope to the southwest. The Site is located in the City of Whittier and zoned for the Whittier Boulevard Specific Plan Workplace District.

- The past manufacturing operations utilized chemicals and features including USTs, clarifiers, sumps, and drainage channels that remain at the Site. As noted, the two USTs have been removed. Equipment from the former painting line, including an AST, clarifiers, and an unidentified confined space still remain at the Site. The Site was noted in the EDR report to have disposed of halogenated solvents in the HAZNET database indicating chlorinated solvent use has taken place at the Site.

- No subsurface investigation has been done outside of the northern area where the USTs and the drainage feature in the production area were formerly located.

- The long history of industrial use of the Site is considered an REC.

- The Site has undergone focused investigation and remediation in relation to the known hydrocarbon releases at the Site noted to have originated from the USTs that contained motor vehicle fuel and paint thinner solvent. The chemicals have impacted soil and groundwater. Remedial efforts were undertaken including

soil vapor extraction (SVE) to address soil issues and free product removal from the groundwater. Due to chlorinated solvents showing up in the influent stream to the SVE and fears over pulling impacts from the Omega Chemical Plume onto the Site, SVE activities were terminated though soil remediation was not completed. The groundwater was remediated until only a sheen of petroleum remained on the groundwater and has been granted No Further Action status from the RWQCB (LARWQCB 2017) though the Site remains an open case as soil remediation was not completed.

- Given the presence of residual VOCs in soil and groundwater beneath the Site, a potential soil vapor intrusion condition is present at the Site in our opinion.

- Based on the review of the available regulatory information, the Site is located in an area with a long history of industrial uses. Several facilities were identified to store and use hazardous chemicals and have had releases of petroleum and chlorinated solvent chemicals. The Omega Chemical facility and the Sunrise Properties (TCE Source at Whittier Boulevard) are believed to have had releases of chlorinated solvents that have comingled and migrated below the Site. These off Site facilities would be considered RECs to the Site.

- The EPA recently sent the Owners of the Site a questionnaire referred to as an "EPA 104" letter inquiring about the Site and its potential to have released chlorinated solvents and impacted the Omega Chemical Plume.

- The buildings were reported to have been built in the 1950's through the 1960's during a time when asbestos was commonly found in construction materials. Suspect asbestos containing materials were observed at the Site including drywall, joint compound, ceiling tiles, vinyl floor tile, acoustic ceilings, and mastic.

Conclusions

We have performed a Phase I Environmental Site Assessment in accordance with ASTM E1527-13 Guidelines for the property located at 12352 Whittier Boulevard in Whittier, California. The following RECs were identified during this investigation:

- The Site has an open LUST case with the RWQCB due to releases from former USTs. While groundwater has been closed by the RWQCB, soil remains an open issue.
- The Site has a history of industrial use including the use of chlorinated solvents since the 1950's that have not been investigated to date.
- Evidence exists that the plumes of chlorinated solvents from the Omega Chemical facility and Sunrise Properties extends below the Site;
- There is a significant chance that a vapor intrusion condition may exist due to past releases on Site as well as the impacted groundwater from off Site facilities.

There were no HRECs or CRECs encountered during this assessment.

While not an REC by ASTM standards, the buildings were reported to have been built in the 1950's through the 1960's during a time when asbestos was commonly found in construction materials. Suspect asbestos containing materials were observed at the Site including drywall, joint compound, ceiling tiles, vinyl floor tile, acoustic ceilings, and mastic.

Recommendations

Based on the findings of this ESA, we recommend the following:

- A subsurface investigation including soil, soil vapor, and groundwater sampling should be completed across the Site; and,
- An Asbestos Operations & Management (O&M) plan should be prepared to guide building management with asbestos until such time that all asbestos is removed from the Site. If the buildings are to be demolished, an asbestos survey will be necessary prior to any disturbance to ACMs so that such ACMs can be abated prior to demolition.

PHASE I ENVIRONMENTAL SITE ASSESSMENT
Former Leggett & Platt Facility
12352 Whittier Boulevard
Whittier, California 90602

1. INTRODUCTION

Hazard Management Consulting, Inc. (HMC) is pleased to submit this Environmental Site Assessment (ESA) for the property referenced above in the City of Whittier, California (Site) (Figures 1 & 2). This ESA was prepared to evaluate the Site for potential Recognized Environmental Conditions (RECs) that may be present and was conducted as part of your efforts to acquire the Site. The Site is noted to be occupied by three vacant, attached structures that comprise the former Leggett and Platt facility, noted to have manufactured bedframes since the 1950's. In 2009, manufacturing operations ceased and the Site was used for storage and distribution of the bedframes. The Site is approximately 13-acres and was noted to be paved with asphalt and concrete. The on-Site buildings were noted to be of steel and concrete construction and measure approximately 213,000 square feet. The Site has been the subject of numerous assessments and investigations due to a release of diesel fuel and naptha paint solvent that was discovered to have been released in the late 1980's and a remedial case is still open with the RWQCB for the Site.

The Site is relatively flat with an elevation of approximately 220 feet above mean sea level (msl) with a regional slope to the southwest. The Site is located in the City of Whittier and zoned for the Whittier Boulevard Specific Plan Workplace District.

1.1. Objective

In accordance with the ASTM E 1527-13 Standard Practice for Environmental Site Assessments, the objective of the ESA is to assess, to the extent feasible under the standard, the likelihood that Recognized Environmental Conditions (RECs), as defined by ASTM, are present at the Site.

A Recognized Environmental Condition "means the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground,

groundwater, or surface water of the property. The term is not intended to include de minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies" (ASTM Standard Practice E1527-13). Performance of a Phase I ESA is intended to reduce, but not eliminate, uncertainty regarding the potential for Recognized Environmental Conditions in connection with a property, within reasonable limits of time and cost.

All Appropriate Inquires (AAI) as defined in the Final Rule (40 CFR, Part 312), must be conducted by persons seeking the landowner liability protections under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) prior to acquiring a property or seeking or receiving federal brownfields grants under the authorities of CERCLA. The purpose of AAI, as defined in the AAI Final Rule, is to identify releases and threatened releases of hazardous substances, which cause or threaten to cause the incurrence of response costs. The U.S. Environmental Protection Agency (EPA) has stated that ASTM Standard E-1527-13 is consistent with the Standards and Practices for AAI and is compliant with the statutory criteria for AAI.

1.2. Scope of Services, Methodology and Limitations

The findings of this ESA must be viewed in recognition of certain limiting conditions. The scope of work commissioned for this project does not represent an exhaustive study, but rather a reasonable inquiry, consistent with good commercial practice, in general accordance with ASTM Practice E-1527-13.

The scope of work for this ESA included the following activities:

- A site walk to document the current condition of the Site and neighboring facilities.
- Review of a regulatory database report.
- Review of previously prepared reports for the Site.
- Submittal of questionnaires to the current Owner and User of the report.

- Review of historical references including aerial photographs, city directories, Sanborn Maps and topographic maps.

- On-line research and file review requests concerning the Site and suspect off site sources at the State of California Regional Water Quality Control Board (RWQCB) and Department of Toxic Substances Control (DTSC) websites.

- Review of records maintained by the Los Angeles County Fire Department.

- Review of records maintained by Los Angeles Public Works.

- Review of records kept by the South Coast Air Quality Management District.

- Review of building permit records kept by the City of Whittier.

- Preparation of this report of findings.

In the course of this assessment, HMC has relied on information provided by outside parties, such as regulatory agencies, previous reports and interview sources. For the purpose of this assessment, such third-party information is assumed to be accurate unless contradictory evidence is noted, and HMC does not express or imply any warranty regarding information provided by third-party sources.

2. SITE DESCRIPTION

2.1. Site Setting

The Site is noted to be occupied by three vacant, attached structures that comprised the former Leggett and Platt manufacturing facility. The Site is approximately 13-acres and was noted to be paved with asphalt and concrete. The on Site buildings were noted to be of steel construction and measure approximately 213,000 square feet. The Site is relatively flat with an elevation of approximately 220 feet above mean sea level (msl) with a regional slope to the southwest.

The Site is located in an area zoned by the City of Whittier for the Whittier Boulevard Specific Plan Workplace District and is bound:

- to the north by Whittier Boulevard and a Public Storage facility;

- on the east by Whittier Boulevard across which are several automotive repair shops;
- to the south by Oceanic Arts, BL Wilcox and Associates, and Tool and Jig Plating Company; and,
- to the west by PIH Whittier Health and a construction site (formerly Nellis School for Boys).

Utilities at the Site are provided by:

- Electricity: Southern California Edison
- Natural Gas: Southern California Gas Company
- Water: City of Whittier
- Sewer: Los Angeles County Sewer Maintenance Division

2.2. Regional Geology and Hydrogeology

Information regarding regional geological and hydrogeological conditions was obtained from information included on the California Department of Water Resources website. The Site lies within the Central Subbasin and occupies a large portion of the southeastern part of the Coastal Plain of Los Angeles Groundwater Basin. This subbasin is commonly referred to as the "Central Basin" and is bound on the north by a surface divide called the La Brea high, and on the northeast and east by emergent less permeable Tertiary rocks of the Elysian, Repetto, Merced and Puente Hills. The southeast boundary between Central Basin and Orange County Groundwater Basin roughly follows Coyote Creek, which is a regional drainage province boundary. The southwest boundary is formed by the Newport Inglewood fault system and the associated folded rocks of the Newport Inglewood uplift. The Los Angeles and San Gabriel Rivers drain inland basins and pass across the surface of the Central Basin on their way to the Pacific Ocean. Average precipitation throughout the subbasin ranges from 11 to 13 inches with an average of around 12 inches (CDWR 2004).

The following groundwater information was found on a previous Phase I for the Site. It was reported that groundwater was encountered between 80 and 90 feet bgs and flows westward and a gradient of 0.007 feet per foot (AMEC 2012).

2.3. Interviews and User Provided Information

The User of this report is Western Realco who is looking to acquire the Site and would be considered a "User" of the report per ASTM definitions. We requested all available information from the User and were provided a Preliminary Title Report and select historical investigatory documents.

2.4. Title Records

A Title Report (Report) prepared by Chicago Title Company dated December 27, 2013 was provided to HMC for review. The Report stated that Title was vested in the L&P Property Management Company. The report included information regarding tax obligations, mortgage liens, easements for various utilities and related matters but did not contain any information of an environmental nature.

2.5. User Knowledge

We interviewed Mr. Jeremy Mape of Wester RealCo who indicated that his firm has no previous knowledge or experience with the property and is unaware of any chemical spills or releases or ongoing environmental matters. He indicated that they are paying full market value for the Site.

2.6. Owner/Occupant Knowledge

An Owner/Operator Questionnaire was not returned for HMC's review.

2.7. Environmental Liens or Activity and Use Limitations

We have seen no information to suggest that a Land Use Covenant or deed restriction has been recorded on Title for the Site. However, the current remedial efforts being overseen by the RWQCB appear to be following a path to closure for a commercial/industrial facility and it is our expectation that an LUC will be recorded against Title upon completion of the outstanding remedial actions.

3. SITE USE AND HISTORY

Past usage of the subject Site was assessed through a review of historical aerial photographs, topographic maps and an EDR search of city directories and prior reports. Sanborn maps were generated for the Site.

3.1. Aerial Photograph Review

Aerial photographs covering the Site were obtained from Environmental Data Resources, Inc. (EDR). Photographs were available from the period 1928 through 2016. Copies of the aerial photographs are included in Appendix B. A summary of the observations noted from the aerial photographs are as follows:

1928 The Site and Site vicinity were noted to be in agricultural use in this photograph. A single structure was observed on the northeast border of the Site. Whittier Boulevard was seen across which were industrial buildings.

1938-47 No significant changes were seen at the Site or in the Site vicinity.

1953 A large industrial structure was first seen at the Site in the photo from 1953. Cleared land was seen in the vicinity of the Site as well as industrial development north and south of the Site.

1963 Additional development was seen at the Site. Two structures were seen attached to the structure previously noted at the Site with vehicle parking south of the buildings. The Site appeared in the orientation it is seen in today. Further industrial development was noted north and south of the Site. The Omega Chemical facility was first seen to the south southeast of the Site.

1972 Significant changes to the Site were not seen in this photograph. An additional structure was noted to the south in the Site vicinity.

1979 No significant changes were noted at the Site. Two long industrial buildings were first seen immediately north of the Site.

1981- 2016 No significant changes were noted at the Site or the Site vicinity other than continued development of industrial facilities in the vicinity of the Site.

3.2. Topographic Maps

Historical topographic maps were also reviewed as part of this effort and aided in interpreting the overall Site history. Although, no specific observations were made from the review of these maps.

3.3. Sanborn Maps

Sanborn maps are maps that were created for the insurance industry to document site activities in metropolitan areas of the country and were used in underwriting. They often times contain detailed information about a site. While they were prepared for insurance underwriting and were not environmental maps per se, they often times contain information that is useful in evaluating the historical use of a site. Sanborn maps were generated for the Site in 1961 and 1962. Limited information was available from these maps and only displayed the original industrial building that was labeled to be a steel products manufacturer.

3.4. EDR City Directory Review

EDR performed a search of the City Directory records for the Site addresses provided at the initiation of this Phase I ESA and nearby properties at approximately five-year intervals. Review of this report yielded the following findings:

12352 Whittier Boulevard

Year	*Use*
2014	BEDLINE MFG CO
	CONSUMER PRODUCTS GROUP
	LEGGETT & PLATT INCORPORATED
2010	BEDLINE MFG CO
	CONSUMER PRODUCTS GROUP
	LEGGETT & PLATT INCORPORATED
2005	LEGGETT & PLATT INCORPORATED
2000	LEGGETT & PLATT INCORPORATED
1995	LEGGETT & PLATT INCORPORATED

1992	LEGGETT & PLATT INCORPORATED
1985	BEDLINE MFG CO
1980	BEDLINE MFG CO
1975	BEDLINE MFG CO US DETAILERS INC
1972	GREEN-PENNEY CO
1966	EKCO PRODUCTS CO

3.5. Summary

The Site and Site vicinity was observed to have historically been used for agriculture since 1928 until the 1953 photograph when the Site was first seen to be developed with the original single industrial structure. The Site was noted to have an approximately 70-year history of industrial use from the review of the aerial photographs and the City Directory report. The long history of industrial use of the Site is considered an REC.

4. PRIOR INVESTIGATIONS

We received one prior ESA for the Site which is summarized and presented below. Additional investigations were conducted at the Site as part of the UST investigation as presented in Section 7.3.

4.1. AMEC PHI ESA L&P Management Company 2012

A Phase I investigation was prepared for the Site dated September 8, 2012. The report describes the Site as a 13-acre parcel that contains a bed frame manufacturing plant with an associated warehouse. The Site buildings were constructed between 1950 and 1962. Manufacturing operations were noted to have ceased approximately in 2009 and subsequently served as a distribution warehouse for bedframes.

An environmental evaluation that was performed in 1989 showed that hydrocarbon contamination in conjunction with two USTs that were operated at the Site have impacted

the surrounding soil. These USTs were noted to have contained gasoline, diesel, and paint thinner. The investigation into this contamination was conducted under the direction and oversight of the RWQCB and reported petroleum products in soil and groundwater beneath the Site. Free product recovery began in 1994 with a recovery system being installed in 1997. Soil vapor extraction operations were started in 2009 with a soil vapor extraction (SVE) system. It is our understanding that the SVE was operated until chlorinated solvents were noted in the influent vapor stream to the SVE. Leggett & Platt raised concerns that the system could be pulling in chlorinated solvents from the off-Site Omega Chemical facility plume thereby exacerbating environmental conditions and requested approval to terminate the SVE operations which was approved by the RWQCB. Free product removal was ceased in 2010 and absorbent socks were utilized to remove a hydrocarbon sheen that was observed in the on-Site wells. The Site assessment and remediation activities are currently under the oversight of the Los Angeles Regional Water Quality Control (RWQCB; Spills, Leaks, Investigations and Cleanup (SLIC) case file #0601, SL184731456) which received oversight of the case from the Los Angeles County Department of Public Works (LADPW) in 1997 (file I-14429).

The report findings identified two chlorinated solvent sources, the Omega and Modine facilities as well as 12353 and 12363 Whittier Boulevard (otherwise referred to as "TCE Source at Whittier Boulevard"), that appeared to be present below the Site. The Modine facility located to the north of the Site was noted with a VOC release that has been closed.

The report identified the following RECs:

- The past manufacturing operations utilized chemicals and features including USTs, clarifiers, sumps, and drainage channels that remain at the Site, with the exception of the two USTs. Leggett and Platt were stated to be currently remediating the soil and groundwater under the oversight of the RWQCB. Future Site use should consider the presence of remaining subsurface features and potential residual subsurface impacts; and,

- The Omega property and the TCE Source at Whittier Boulevard TCE plume extends below the Site. The Site has not been identified as a contributor and the use of TCE on the Site was not identified. The proximity and known TCE impacts in ground water below the Site are considered a REC.

Potential environmental condition were identified at the Site by AMEC, they are as follows:

- The Site was in use for agricultural purposes prior to 1950. Herbicide and pesticide use may be potential concerns as the Site has not been used for agriculture for at least 60 years at the time of this report;

- The former railroad and spur was identified to potentially be of concern at the Site due to the possibility of oil application that may have contained PCBs, herbicides, waste oil, and arsenic;

- Potentially asbestos containing materials were identified on the Site due to the age of the buildings. Specific materials identified were piping and boiler insulation; and,

- The upgradient Modine facility was associated with VOC impacted groundwater. Although the investigation at the facility has been closed, residual VOC impact may remain (AMEC 2012)

We generally concur with the AMEC findings and conclusions.

4.2. Discussion

The Site has undergone extensive investigation and remediation in relation to the known hydrocarbon releases at the Site noted to have originated from the USTs that contained motor vehicle fuel and paint thinner solvent. The chemicals have impacted soil and groundwater. Groundwater remediation has been granted No Further Action status from the RWQCB (LARWQCB 2017) though the soil component remains open. TCE has been found below the Site in groundwater. No investigation has been done outside of the northern area where the USTs and the drainage feature in the production area at the Leggett and Platt facility were formerly located. The historical operations at the Site and regionally impacted groundwater poses a potential vapor intrusion condition to the Site.

5. SITE RECONNAISSANCE

Mr. Troy Taylor of HMC conducted a Site and Site vicinity reconnaissance on November 4, 2019. The reconnaissance was conducted in order to identify visible evidence of REC's at the Site and to assess possible conditions off Site that may impact the Site.

The Site was observed with an asphalt driveway leading down toward the former Leggett and Platt facility parking lot. Two industrial buildings were noted to be vacant at the time of our visit. They were noted to be of steel and concrete tilt up construction with concrete foundations. Inside the former production area there was an office to the north. The office area and office build out within the facility was noted to have been built in the 1950's through the 1960's when asbestos use was common in building materials. Suspect ACM was observed and included drywall, acoustic ceilings, and vinyl floor tiles. Outside of the office area in the former production area, floor cuts were seen where maps of the Site noted press machines once occupied that area. A long L-shaped drainage trench was noted to have been removed from the area. The trench was seen to lead toward an indoor clarifier that lead to another clarifier outdoors north of this building near where the former USTs were once located. Wells were also seen near this feature. In the northern area of the production area, a former painting room was noted with concrete bases for machinery. Staining was observed on the concrete surfaces in this area. Oxidizing chemicals containers were also noted in this area including a single 55 gallon drum and a 5 gallon bucket noted to be sealed.

A warehouse was noted to be attached to the former production building to the south. The warehouse was noted to be vacant and no features of concern were noted.

North of the production building was noted to be the area of the former USTs and pump stations. The previously mentioned outdoor clarifier was observed with a concreted trench extending south toward the building. The clarifier lids were opened and a distinct hydrocarbon odor was present and aqueous contents were noted. Further north a yellow metal lid was noted to be a confined space area. Upon opening the entrance hatch, water was noted almost to the top of the subsurface enclosure. Its purpose and contents were unable to be investigated due to it being full of water. Well boxes with vapor probes were seen scattered about this area. Machinery to have been used for the former painting

operations were seen in this outdoor area north of the production area. An AST existed here although its contents, if any, were unable to be ascertained.

Loading docks were observed on the south side of the production building although no features of concern were noted at this location.

Selected photographs illustrating the property and nearby off-site conditions are included in Appendix A. Summaries of the Site and observations are detailed below.

Description and Use of Site:	The Site was noted to be a vacant former manufacturing facility at the time of our inspection.
Underground and Aboveground Storage Tanks:	No USTs were observed during our investigation although two former USTs were historically present, north of the production building. An AST was present north of the production building. Its contents, if any, were unable to be ascertained. Two clarifiers were seen at the Site. One remained within the production building and the other outside north of the production building. The outdoor clarifier was noted with aqueous contents and a hydrocarbon odor.
Hazardous Materials, Hazardous Wastes or Petroleum Products:	Two containers of an oxidizing chemical were noted on the Site.
Drains, Drain lines and Sumps:	An L shaped trench which formerly contained drainage piping leading toward the clarifiers was seen.
Pits, Ponds, Lagoons	No ponds, pits, or lagoons were seen at or near the Site.
Industrial Wastewater:	The facility was non-operational and vacant at the time of our investigation. No wastewater was being generated at the Site.
Stains:	Staining was observed in the former painting room located in the production building.

Wells:	Monitoring wells were observed within the production building and north of the production building.
Transformers:	Several transformers were noted at the Site. No staining was observed in the vicinity of these features.
Other Features:	Floor patches were noted in an area in the production facility where presses have been indicated to have been used.

5.1. Site Vicinity

The Site is located in an area zoned by the City of Whittier for the Whittier Boulevard Specific Plan Workplace District and is bound:

- to the north by Whittier Boulevard and a Public Storage facility;
- on the east by Whittier Boulevard across which are several automotive repair shops;
- to the south by Oceanic Arts, BL Wilcox and Associates, and Tool and Jig Plating Company; and,
- to the west by PIH Whittier Health and a construction site (formerly Nellis School for Boys).

6. REGULATORY AGENCY DATABASE RESEARCH

Regulatory agency database information was obtained from a standard radius Site Assessment (ASTM) report by Environmental Data Resources, Inc. The center of the search was in the approximate center of the Site. Search distances for specific databases were one-quarter to one mile as specified in the ASTM 1527-13 standard. The database search includes over 70 federal, state, local, and proprietary records. A complete copy of this report is included in Appendix B.

6.1. Database Records Concerning the Target Property

The Site was listed on the following databases in the EDR report:

Name	Address	Dist.	Direction	Lists	REC	Rationale
Leggett and Platt Inc.	12352 E. Whittier Blvd.	0'	NA	FINDS, HAZNET, CIWQS CERS, LOS ANGELES CO, HMS,WDS, SLIC REG 4 CERS HAZ WASTE SWEEPS UST,HIST UST,EMI LA CO. SITE MITIGATION RGA LUST, RCRA-SQG LUST REG 4, CPS-SLIC US AIRS MINOR HIST CORTESE ECHO, SSTS	YES	This facility is indicated to have used, stored, and disposed of various chemicals including halogenated organics, unspecified solvent mixtures, and degreasing sludge. Halogenated solvents or chlorinated solvents have been listed as having been disposed of from the Site and therefore used at the Site. Two USTs were operated at the Site that cause naptha and motor vehicle fuel releases to the Site subsurface. According to the RWQCB, this Site has received groundwater closure but has not received any other closure in regard to soil. Impacts to soil still may remain in the Site subsurface. The use of chlorinated solvents and the potential residual contamination to soil caused by the USTs are RECs.
Southern California Edison	12352 E. Whittier Blvd.	0'	NA	HAZNET	NO	This listing is a record of SCE having disposed of PCB waste. The disposal of this chemical does not imply that PCB contamination has affected the Site.
May Trucking	12352 E. Whittier Blvd.	0'	NA	HAZNET	NO	This listing is a record of oil containing waste from the Site. This listing does not imply that contamination exists at the Site.

6.2. Database Records Concerning the Site Vicinity

We reviewed the database report for off-Site potential sources within the relevant search distance. In review of the many entries on the database, we reviewed the following factors that affect the ability of a facility to affect the Site:

- Distance from the Site,
- Location from the Site with regard to the direction of groundwater flow,
- Nature of the release and whether the release has affected soil, groundwater or both,
- Status of the investigation (e.g. open or closed)

Groundwater was noted to flow in a westerly direction below the Site, therefore facilities located adjacent to or to the east were further considered. Only those facilities judged using these factors are discussed below. The following presents a summary of our findings:

Location	Address	Dist.	Direction	Lists	REC	Rationale
Omega Chemical Site PRP Organized Group	12504-12512 E. Whittier Blvd	1,311'	SE	NPL, SEMS CORRACTS RCRA-TSDF RCRA-LQG SITE US INST CONTROL SWEEPS UST HIST UST ROD, RAATS PRP, EMI	YES	This facility is noted to have caused a groundwater plume of TCE and other chlorinated solvents that extends north and effects at least the southeastern portion of the Site
Modine Mfg. Co.	12252 Whittier Blvd.	483'	NNW	SEMS ARCHIVE RCRA-SQG ENVIROSTOR SLIC REG 4 HIST UST, ICIS FINDS, ECHO HAZNET LA CO. SITE MITIGATION, CERS SWEEPS UST LOS ANGELES CO. HMS	NO	This facility is listed as having had a release of chlorinated solvents. Soil contamination has received a Closed status from the RWQCB. Groundwater is ongoing to the best of our knowledge from records available. The Site is located northwest of the Site and groundwater is noted to flow west in the area.
Union Pacific Corp.	12300 Whittier Blvd.	344'	N	LUST LOS ANGELES CO. HMS CERS	NO	This facility is listed as having a small release of hydrocarbons from a UST. The contamination was limited to soil and the tank was removed. The Site

						received closure status in 2018.
Sunrise Properties	12353 and 12363 Whittier Blvd.	222'	NE	ENVIROSTOR	YES	This facility has been referred to as the "TCE Source at Whittier Boulevard" in past reports. This facility is located across Whittier Boulevard from the Site and has a TCE plume that has comingled with the Omega Chemical plume. The release has been documented to have comingled with the Omega plume and has traveled below the Site.
Mar Vista Moulding	7343 Pierce Ave.	510'	ENE	LUST REG 4 NPDES WDS CIWQS CERS	NO	This facility has had a release of gasoline from a leaking UST. The contamination was limited to soil and received a closed status from the RWQCB in 2004.

Orphan Sites

Orphan Sites are those properties that are included on various agency lists, but for which the records do not have sufficient address information for the database program to map the site. No orphan sites identified appear to be in the Site vicinity with the exception of Dryclean Express located 846 feet east of the Site. The dry cleaning facility is noted to use PCE but has not been indicated to have caused contamination from the evidence found in the listing. The facility was not found on GeoTracker or Envirostor.

6.3. Summary of Off-Site Issues

Based on the review of the available regulatory information, the Site is located in an area with a long history of industrial uses. Several facilities were identified to store and use hazardous chemicals and have had releases of petroleum and chlorinated solvent chemicals. The Omega Chemical facility and the Sunrise Properties (TCE Source at Whittier Boulevard) are believed to have had releases of chlorinated solvents that have comingled and migrated below the Site. These former facilities are RECs.

7. LOCAL AGENCY AND OTHER RECORDS REVIEW

7.1. Tribal Records

The Site is not located in a tribal area therefore there were no tribal records to review.

7.2. Oil and Gas Wells

The State of California Department of Conservation, Division of Oil, Gas, and Geothermal Resources online mapping website was reviewed for the location of active, plugged, or abandoned oil and gas wells in the vicinity of the Site. No oil or gas wells were listed as having been drilled on Site.

7.3. State of California

The State of California Geotracker and EnviroStor websites were also reviewed for information on potential on or off-Site facilities that are being remediated under either RWQCB or DTSC oversight. No active cases were listed on these databases that were not listed in the EDR review.

HMC also submitted public records requests to the DTSC and RWQCB. The DTSC found no files are kept for the Site. The RWQCB several files of reports for groundwater and soil vapor extraction activities. According to files found in possession of the RWQCB, groundwater closure only was granted to the Site. Conditions of the closure status stated that the owner must notify the Regional Board immediately if residual contamination is found in groundwater or soil. Closure for soil has not been granted.

In a file found named "Soil Vapor and Soil Confirmation and Sampling Results and Request for "No Further Action and Case Closure", soil vapor reported concentrations of PCE over the current screening levels in the north in the area of the former tanks. At the time of the AMEC report, these PCE concentrations were below 2014 screening levels (AMEC 2014).

A phone message was left to Mr. Joseph Carrasco, the case worker for the Site, on December 5 and 9, 2019 to request further detail into additional Site closure requirements. No response has been received as of the date of this report.

7.4. Los Angeles County Fire Department

A public records request was submitted online to the LACFD. No responsive records were found for Site.

7.5. Los Angeles County Department Public Works Environmental Services

HMC visited LACDPW to perform a file review in the environmental services department. Files were found responsive for both address at the Site.

Documents were found in relation to the noted unauthorized discharge in relation to the releases from the two USTs at the Site. One tank was noted to contain diesel fuel and the other naptha, which was used as a paint solvent. Both tanks were noted to have been of a 20,000 gallon capacity. In letter from the same year to the LAPW, concentrations in soil around the tanks that were taken every five feet indicated TPH to have ranged from 1,060 to 21,300 milligrams per kilogram for Total Petroleum, Hydrocarbons. BTEX analysis indicated that ethylbenzene was found between 6.98 and 64.4 mg/kg in soil around theses tanks.

In 1987, LADPW recommended that the Leggett and Platt facility redesign their painting system. This stemmed from a fire that occurred and the fire suppression system caused the paint and solvent tanks to overflow and discharge in a storm drain. Subsequent violations and correspondence to comply with LADPW demands were included in the file in regard to this occurrence.

7.6. South Coast Air Quality Management District

A review of the SCAQMD Facility Information Detail website indicates that several records exist for permits to operate various equipment at the Site, including ovens, flow coaters, and storage tanks. The painting operations and storage tanks have been noted with releases at the Site. The operation of this equipment does not generally indicate an REC, but in conjunction with the noted releases at the Site, the use of this equipment is an REC.

A violation was found for exceeding the facilities allowed coating usage. The case was closed and does not present a REC.

7.7. City Clerk City of Whittier

A public records request was submitted to the City and several files were return for HMC's review. Records review provided information regarding general construction activities. Two building permits contained information of an environmental nature. The paint room

at the Site was noted to have receive a building permit in 1960 and the installation of a gasoline storage tank received a permit in 1953.

8. VAPOR INTRUSION, ASBESTOS AND OTHER CONCERNS

8.1. Vapor Intrusion

Given the findings of this Phase I ESA, there is evidence that a soil vapor intrusion condition exists at the Site. According to very limited soil vapor investigation conducted to date, PCE was reported at concentrations around the former USTs and was stated to have originated from the off Site chlorinated solvent sources previously discussed in this report. At the time of the report, soil gas screening levels were higher than today's standards. The concentrations of VOCs reported at the Site exceed the current soil gas screening levels. The reported concentrations of PCE below the Site as well as the off Site chlorinated solvent sources are considered RECs.

8.2. Asbestos

The building was reported to have been built in the late 1950's during a time when asbestos was commonly found in construction materials. Suspect asbestos containing materials were observed at the Site including drywall, joint compound, ceiling tiles, vinyl floor tile, acoustic ceilings, ducting/pipe wrap, and mastic. A thorough asbestos sampling event should take place at the Site if these building materials are to be disturbed.

8.3. Radon

The Site is listed as being located in Zone 2 with regards to radon indicating that radon maybe present at concentrations less than 4 pico curies / liter.

8.4. Mold

No evidence of mold or water damage was observed at the Site.

9. SUMMARY OF FINDINGS

Key findings of this Phase I ESA are as follows:

- The Site and Site vicinity was observed to have historically been used for agriculture since at least 1928 until the 1953 aerial photograph when the Site

was first seen to be developed with the original single industrial structure. While pesticides or fertilizers may be present in the shallow soil, given the length of time that has occurred since agricultural activity has taken place and fact that the Site was developed and will be redeveloped for commercial use, there were no RECs found from the former agricultural usage of the Site.

- The Site was noted to have been developed in the mid 1950s and used for industrial operations for approximately 70 year.

- The Site is noted to be occupied by three vacant, attached structures that comprised the former Leggett and Platt facility. The Site is approximately 13-acres and was noted to be paved with asphalt and concrete. The on-Site buildings were noted to be of steel construction and measure approximately 213,000 square feet. The Site is relatively flat with an elevation of approximately 220 feet above mean sea level (msl) with a regional slope to the southwest. The Site is located in the City of Whittier and zoned for the Whittier Boulevard Specific Plan Workplace District.

- The past manufacturing operations utilized chemicals and features including USTs, clarifiers, sumps, and drainage channels that remain at the Site. As noted, the two USTs have been removed. Equipment from the former painting line, including an AST, clarifiers, and an unidentified confined space still remain at the Site. The Site was noted in the EDR report to have disposed of halogenated solvents in the HAZNET database indicating chlorinated solvent use has taken place at the Site.

- No subsurface investigation has been done outside of the northern area where the USTs and the drainage feature in the production area were formerly located.

- The long history of industrial use of the Site is considered an REC.

- The Site has undergone focused investigation and remediation in relation to the known hydrocarbon releases at the Site noted to have originated from the USTs

that contained motor vehicle fuel and paint thinner solvent. The chemicals have impacted soil and groundwater. Remedial efforts were undertaken including soil vapor extraction (SVE) to address soil issues and free product removal from the groundwater. Due to chlorinated solvents showing up in the influent stream to the SVE and fears over pulling impacts from the Omega Chemical Plume onto the Site, SVE activities were terminated though soil remediation was not completed. The groundwater was remediated until only a sheen of petroleum remained on the groundwater and has been granted No Further Action status from the RWQCB (LARWQCB 2017) though the Site remains an open case as soil remediation was not completed.

- Given the presence of residual VOCs in soil and groundwater beneath the Site, a potential soil vapor intrusion condition is present at the Site in our opinion.

- Based on the review of the available regulatory information, the Site is located in an area with a long history of industrial uses. Several facilities were identified to store and use hazardous chemicals and have had releases of petroleum and chlorinated solvent chemicals. The Omega Chemical facility and the Sunrise Properties (TCE Source at Whittier Boulevard) are believed to have had releases of chlorinated solvents that have comingled and migrated below the Site. These off Site facilities would be considered RECs to the Site.

- The EPA recently sent the Owners of the Site a questionnaire referred to as an "EPA 104" letter inquiring about the Site and its potential to have released chlorinated solvents and impacted the Omega Chemical Plume.

- The buildings were reported to have been built in the 1950's through the 1960's during a time when asbestos was commonly found in construction materials. Suspect asbestos containing materials were observed at the Site including drywall, joint compound, ceiling tiles, vinyl floor tile, acoustic ceilings, and mastic.

10. DATA GAPS

One data gap was found in our investigation. An Owner Questionnaire was not returned for HMC's review.

11. CONCLUSIONS

We have performed a Phase I Environmental Site Assessment in accordance with ASTM E1527-13 Guidelines for the property located at 12352 Whittier Boulevard in Whittier, California. The following RECs were identified during this investigation:

- The Site has an open LUST case with the RWQCB due to releases from former USTs. While groundwater has been closed by the RWQCB, soil remains an open issue.
- The Site has a history of industrial use including the use of chlorinated solvents since the 1950's that have not been investigated to date.
- Evidence exists that the plumes of chlorinated solvents from the Omega Chemical facility and Sunrise Properties extends below the Site;
- There is a significant chance that a vapor intrusion condition may exist due to past releases on Site as well as the impacted groundwater from off Site facilities.

There were no HRECs or CRECs encountered during this assessment.

While not an REC by ASTM standards, the buildings were reported to have been built in the 1950's through the 1960's during a time when asbestos was commonly found in construction materials. Suspect asbestos containing materials were observed at the Site including drywall, joint compound, ceiling tiles, vinyl floor tile, acoustic ceilings, and mastic.

12. RECOMMENDATIONS

Based on the findings of this ESA, we recommend the following:

- A subsurface investigation including soil, soil vapor, and groundwater sampling should be completed across the Site; and,

- An Asbestos Operations & Management (O&M) plan should be prepared to guide building management with asbestos until such time that all asbestos is removed from the Site. If the buildings are to be demolished, an asbestos survey will be necessary prior to any disturbance to ACMs so that such ACMs can be abated prior to demolition.

13. REFERENCES

CDWR 2004 California Department of Water Resources, Bulletin 118 - COASTAL PLAIN OF LOS ANGELES - CENTRAL, February 27, 2004

AMEC 2012 AMEC, Phase I Environmental Site Assessment L&P Property Management Company Facility 12352 East Whittier Boulevard Whittier, CA 90602, September 28, 2012

AMEC 2014 AMEC, Soil Vapor and Soil Confirmation Sampling Results and Request for "No Further Action and Case Closure" Leggett and Platt Facility, June 27, 2017

LARWQCB 2017 Los Angeles Regional Water Quality Control Board, No Further Requirements for Groundwater Only 12352 East Whittier Boulevard Whittier, CA, March 9, 2017

14. QUALIFICATIONS

Mark S. Cousineau, NREP

Mr. Mark S. Cousineau, principal with HMC, has a diverse professional background in environmental management, which includes working as a generator, regulator, consultant, and corporate advisor in hazardous waste and other environmental issues.

Mr. Cousineau's technical background is focused in the area of overseeing large-scale environmental investigations and regulatory compliance management related to site assessments, subsurface investigations, facility surveys, and site remediation. To projects such as these, Mr. Cousineau brings expertise in evaluating complex sites and developing solutions to solve the technical, operational, regulatory, financial and timing issues. In addition, Mr. Cousineau routinely assists clients in developing environmental business plans for single assets and multi-site real estate portfolios and has designed and implemented several tenant audit programs involving the proactive management of environmental risk caused by on-site commercial and industrial tenant activities.

Mr. Cousineau has provided litigation support and has served, as a court-appointed expert on environmental issues, is a Member of the National Registry of Environmental Professionals, holds a M.S. in Environmental Sciences from California State University Fullerton and a B.S. in Chemistry from University California San Diego.

As signatory to this report, I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in § 312.10 of this part. I have the specific qualifications based on education, training, and experience to assess the property of the nature, history, and setting of the subject property. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312."



Mark Cousineau, NREP
Principal

OVERVIEW MAP - 5845210.2S

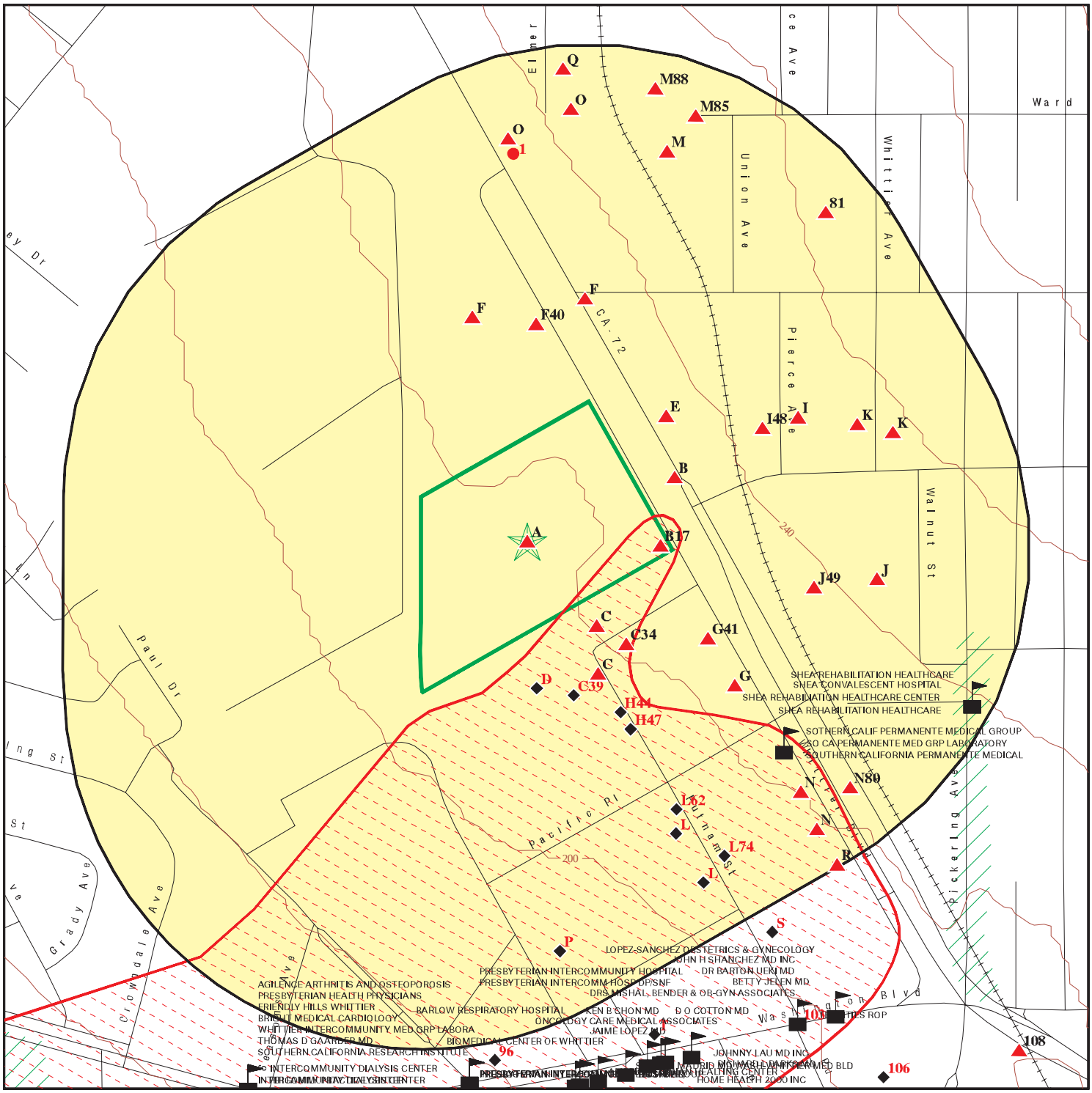


This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Leggett & Platt	CLIENT:	Hazard Management Consulting
ADDRESS:	12352 E Whittier Blvd Whittier CA 90602	CONTACT:	Mark Cousineau
		INQUIRY #:	5845210.2s
LAT/LONG:	33.972939 / 118.047437	DATE:	October 28, 2019 9:10 am

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DETAIL MAP - 5845210.2S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Special Flood Hazard Area (1%)
- 0.2% Annual Chance Flood Hazard
- Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

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