Appendix E Preliminary Water Quality Management Plan

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County of Orange/Santa Ana Region Priority Project Preliminary Water Quality Management Plan (P-WQMP)

Project Name:

Coyote Canyon Landfill Project

20662 Newport Coast Drive

Newport Beach, CA 92657

Plan Check No. _____

Prepared for:

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3rd Submittal: June 24, 2024

Project Owner's Certification

Permit/Application No.		Grading Permit No.	
Tract/Parcel Map No.		Building Permit No.	
20662 Newport Coast Drive, Newport Beach, CA 92657			

This Preliminary Water Quality Management Plan (P-WQMP) has been prepared for Orange County Waste & Recycling (County of Orange) by BKF Engineers. The Preliminary WQMP is intended to comply with the requirements of the local NPDES Stormwater Program requiring the preparation of the plan.

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

Owner:			
Title			
Company	OC Waste & Recycling (County of Orange)		
Address	601 N. Ross Street, 5th Floor, Santa Ana, CA 92701		
Email			
Telephone #			
Signature		Date	

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Figures

Section I Discretionary Permit(s) and Water Quality Conditions

Provide discretionary permit and water quality information.

Project Infomation			
Permit/Application No.		Tract/Parcel Map No.	
Additional Information/ Comments:	20662 Newport Coast Drive, Newport Beach, CA 92657		
Water Quality Conditions of Approval or Issuance			
Water Quality Conditions (list verbatim)	This project qualifies as a Priority Project per the definition provided in Table 7.II-2 in the Model WQMP. All significant redevelopment projects, where significant redevelopment is defined as the addition or replacement of 5,000 or more square feet of impervious surface on an already developed site. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of the facility, or emergency redevelopment activity required to protect public health and safety. If the redevelopment results in the addition or replacement of less than 50 percent of the impervious area on-site and the existing development was not subject to WQMP requirement, the numeric sizing criteria discussed in Section 7.II-2.0 only applies to the addition or replacement area. If the addition or replacement accounts for 50 percent or more of the impervious area, the Project WQMP requirements apply to the entire development.		
Watershed-Based Plan Conditions			

Provide applicable conditions from watershed - based plans including WIHMPs and TMDLs.	According to the 2018 303(d) list, the impaired water bodies that are downstream to the Project include: • San Diego Creek Reach 1 is listed as impaired for benthic community effects, dichlorodiphenyltrichloroethane (DDT), indicator bacteria, nutrients, sedimentation/siltation, selenium, toxaphene, toxicity, and malathion. • Upper Newport Bay is listed as impaired for chlordane, copper, dichlorodiphenyltrichloroethane (DDT), indicator bacteria, malathion, nutrients, polychlorinated biphenyls (PCBs), sedimentation/siltation, and toxicity. • Lower Newport Bay is listed as impaired for chlordane, copper, dichlorodiphenyltrichloroethane (DDT), indicator bacteria, nutrients, polychlorinated biphenyls (PCBs), and toxicity. In addition to those pollutants, TMDLs have been developed for pesticides, sedimentation/siltation, and selenium. A Water Management Plan (WMP) is currently being developed for the North and Central Orange County area. The WMP includes the Newport Bay Watershed. Several regional projects are identified as part of the OC WMP.

Section II Project Description

II.1 Project Description

Provide a detailed project description including:

- *Project areas;*
- *Land uses;*
- *Land cover;*
- *Design elements;*
- *A general description not broken down by drainage management areas (DMAs).*

Include attributes relevant to determining applicable source controls.

Description of Proposed Project		
Development Category (Verbatim from WQMP):	All significant redevelopment projects, where significant redevelopment is defined as the addition or replacement of 5,000 or more square feet of impervious surface on an already developed site. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of the facility, or emergency redevelopment activity required to protect public health and safety. If the redevelopment results in the addition or replacement of less than 50 percent of the impervious area on-site and the existing development was not subject to WQMP requirement, the numeric sizing criteria discussed in Section 7.II-2.0 only applies to the addition or replacement area. If the addition or replacement accounts for 50 percent or more of the impervious area, the Project WQMP requirements apply to the entire development.	
Project Area (ft^2): 46,606	Number of Dwelling Units: N/A	SIC Code: 4923, 4953
Narrative Project Description:	The 1.07-acre project site is located at the Coyote Canyon Landfill (CCL) in the City of Newport Beach, approximately 4,000 feet southeast of the Newport Coast Drive and State Route 73 Interchange. CCL is owned by the County of Orange and maintained by Orange County Waste & Recycling. The Project involves building a new Renewable Natural Gas (RNG) Plant at the CCL. The RNG Plant converts landfill gas into a pipeline quality natural gas equivalent. The south corner of the site will be leased out to Southern California Gas. Southern California Gas will have facilities to receive the converted landfill gas in order to distribute it to consumers.	

	Project runoff is captured by storm inlets along the northern/eastern perimeter access road and discharge into a subsurface gravel layer. Perforated pipes direct flows to a biofiltration BMP at the northwest corner of the Project site.			
Project Area	Pervious		Impervious	
	Area (acres)	Percentage	Area (acres)	Percentage
Pre-Project Conditions	1.07	100.0%	0.00	0.0%
Post-Project Conditions	0.36	33.6%	0.71	66.4%
Drainage Patterns/Connections	For the pre-project site, runoff overlands northerly to a ditch at the northwest corner of the Project site. These ditch flows discharge to an existing offsite storm drain pipe. These piped flows join a 24-inch lateral RCP owned by the City of Newport Beach. The 24-inch drains to the OC Flood Control District Facility #F04P04 (78-inch) that successively discharges to Bonita Creek, San Diego Creek Reach 1, and Newport Bay. The post-project site will mimic pre-project drainage patterns. Runoff from the project site sheet flows north towards the perimeter access road along the Project's north and east boundaries. Runoff is conveyed by the road's gutter and collected by multiple storm inlets which discharge to a 24-inch deep gravel layer beneath the access road. The gravel layer has a perforated pipe to direct flows to a Modular Wetlands unit. Low-flows are treated via biofiltration by the unit and high-flows overtop the unit's internal bypass weir. Flows exiting the Modular Wetlands unit discharge to an existing offsite storm drain pipe, which connects with the City-owned 24-inch lateral RCP.			

II.2 Potential Stormwater Pollutants

Determine and list expected stormwater pollutants based on land uses and site activities.

Pollutants of Concern			
Pollutant	Circle One: E=Expected to be of concern N=Not Expected to be of concern		Additional Information and Comments
Suspended Solids / Sediment	(E)	N	
Nutrients	E	(N)	
Heavy Metals	(E)	N	
Pathogens (Bacteria/Viruses)	(E)	N	
Pesticides	E	(N)	
Oil and Grease	(E)	N	
Toxic Organic Compounds	(E)	N	
Trash and Debris	(E)	N	

- Suspended Solids / Sediment: consist of soils or other surficial materials that are eroded and then transported or deposited by wind, water, or gravity. Excessive sedimentation can increase turbidity, clog fish gills, reduce spawning habitat, lower young aquatic organisms survival rates, smother bottom dwelling organisms, and suppress aquatic vegetation growth. Sediments in runoff also transport other pollutants that adhere to them, including trace metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and phosphorus. The largest source of suspended solids / sediment is typically erosion from disturbed soils.
- Nutrients: includes the macro-nutrients nitrogen and phosphorus. They commonly exist in the form of mineral salts dissolved or suspended in water and as particulate organic matter transported by storm water. Excessive discharge of nutrients to water bodies and streams can cause eutrophication, including excessive aquatic algae and plant growth, loss of dissolved oxygen, release of toxins in sediment, and significant swings in hydrogen ion concentration (pH). Primary sources of nutrients in urban runoff are fertilizers, trash and

debris, and eroded soils. Urban areas with improperly managed landscapes can be substantial sources.

- Metals: includes certain metals that can be toxic to aquatic life if concentrations become high enough to stress natural processes. Metals of concern include cadmium, chromium, copper, lead, mercury, and zinc. Lead and chromium have been used as corrosion inhibitors in primer coatings and are also raw material components in non-metal products such as fuels, adhesives, paints, and other coatings. Copper and zinc are typically associated with building materials, including galvanized metal and ornamental copper, and automotive products, including tires and brake pads. Humans can be impacted from contaminated groundwater resources, and bioaccumulation of metals in fish and shellfish. Environmental concerns regarding the potential for release of metals to the environment have already led to restricted metal usage in certain applications, for example lead additives in gasoline. The primary source of metals in urban storm water is typically commercially available metal products and automobiles.
- Microbial Pathogens (Bacteria and Viruses): include bacteria and viruses, which are ubiquitous microorganisms that thrive under a range of environmental conditions. Water containing excessive pathogenic bacteria and viruses can create a harmful environment for humans and aquatic life. The source of pathogenic bacteria and viruses is typically the transport of animal or human fecal wastes from the watershed, but pathogenic organisms do occur in the natural environment.
- Oil and Grease: are characterized as high-molecular weight organic compounds. Elevated oil and grease content can decrease the aesthetic value of the water body, as well as the water quality. Introduction of these pollutants to water bodies may occur due to the wide uses and applications of some of these products in municipal, residential, commercial, industrial, and construction areas. Primary sources of oil and grease are petroleum hydrocarbon products, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids.
- Toxic Organic Compounds: include organic compounds (pesticides, solvents, hydrocarbons) which at toxic concentrations constitute a hazard to humans and aquatic organisms. Storm water coming into contact with organic compounds can transport excessive levels organics to receiving waters. Dirt, grease, and grime retained in cleaning fluid or rinse water may also adsorb levels of organic compounds that are harmful or hazardous to aquatic life. Sources of organic compounds include landscape maintenance areas, vehicle maintenance areas, waste handling areas, and potentially most other urban areas.
- Trash and Debris: includes trash, such as paper, plastic, and various waste materials, that can typically be found throughout the urban landscape, and debris which includes waste products of natural origin which are not naturally discharged to water bodies such as landscaping waste, woody debris, etc. The presence of trash and debris may have a significant impact on the recreational value of a water body and upon the health of aquatic habitat.

II.3 Hydrologic Conditions of Concern

Determine if streams located downstream from the project area are determined to be potentially susceptible to hydromodification impacts.

☐ No – Show map

☒ Yes – Describe applicable hydrologic conditions of concern below.

According to "Section 2.2.3.1 Determining HCOCs in North Orange County" of the 2013 North OC TGD, Hydrologic Conditions of Concern (HCOCs) exist if any streams located downstream from the project are determined to be potentially susceptible to hydromodification impacts and either of the following conditions exists:

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

OR

- Time of concentration of post-development runoff for the 2-year, 24-hour storm event exceeds the time of concentration of the pre-development condition for the 2-year, 24-hour storm event by more than 5 percent

Figure XIV.3 of the 2013 North OC TGD, entitled "Susceptibility Analysis Newport Bay-Newport Coastal Streams", identifies the susceptibility of all downstream reaches of the Project to hydromodification. The table below summarizes the findings of the susceptibility mapping.

Susceptibility Mapping Summary

Stream Name	Bed and Banks Composition	Susceptibility to Hydromodification
City 24" RCP	RCP	No
OCFCD #F04P04 (78" RCP)	RCP	No
City 66" RCP	RCP	No
City 72" RCP	RCP	Yes
Bonita Creek	Earthen - 1 non-engineered, unstable segment	Yes
San Diego Creek Reach 1	Earthen - 1 non-engineered, unstable segment	Yes
Newport Bay	N/A	N/A
Pacific Ocean	N/A	N/A

Calculation methods for determination of HCOCs in the North Orange County permit area are provided in Appendix IV.1 of the 2013 North OC TGD. If these conditions do not exist or streams are not potentially susceptible to hydromodification impacts, HCOCs do not exist and hydromodification does not need to be considered further.

Computations of the Project's time of concentration and runoff volume for the 2-year 24-hour storm were performed using the Orange County Hydrology Manual and Advanced Engineering Software (AES) software.

Computations are provided in Attachment B, and a summary of the results is provided in the table below.

2-Year 24-Hour Storm Computations Summary

Condition	Area (ac)	Imper (%)	Flowrate (cfs)	Volume (ac-ft)	T_c (min)
Pre-Project	1.07	0.0%	1.2	0.05	10.9
Post-Project	1.07	66.4%	1.7	0.12	7.1
Delta Δ	----	----	0.5	0.06	-3.8
Δ (%)	----	----	42%	120%	-35%

The post-project runoff volume of 0.12 acre-feet represents a 140 percent difference with respect to the pre-project runoff volume of 0.05 acre-feet.

Therefore, HCOCs do exist for the Project. The 2-year 24-hour runoff volume of 0.07 acre-feet (3,050 cubic feet), delta between post-project and pre-project, needs to be stored onsite. The site design proposes constructing a gravel layer beneath the access road to store the 2-year 24-hour runoff volume. Refer to Section IV.3.5.

II.4 Post Development Drainage Characteristics

Describe post development drainage characteristics.

Project site runoff overlands towards the northern/eastern perimeter access road. Flows concentrate in the road's gutter and are intercepted by a series of storm inlets which drain into a 24-inch deep gravel layer beneath the road. A perforated pipe embedded in the gravel later routes flows to a Modular Wetlands unit at the northwest corner of the Project site. Larger storm flows spill over the unit's internal bypass weir and smaller storm flows enter the unit's wetland media bed for treatment. Outflows from the Modular Wetlands unit drain to an existing offsite storm drain pipe, which flows to the City-owned 24-inch lateral RCP. The 24-inch drains to the OC Flood Control District Facility #F04P04 (78-inch) that successively discharges to Bonita Creek, San Diego Creek Reach 1, and Newport Bay.

II.5 Property Ownership/Management

Describe property ownership/management.

The RNG Plant Project is being built on property owned by the County of Orange. Orange County Waste & Recycling is responsible for the ongoing property ownership, management, and maintenance of the structures and adjacent areas. The operation and maintenance of the BMPs and onsite storm drain facilities within the lease boundary are the responsibility of Archaea Energy unless designated otherwise.

It is Archaea Energy's responsibility for all operation and maintenance related activities including a funding mechanism. A copy of the WQMP and BMP maintenance records will be kept by the owner, Orange County Waste & Recycling, and by Archaea Energy at all times and made available upon request.

Section III Site Description

III.1 Physical Setting

Fill out table with relevant information.

Planning Area/ Community Name	Coyote Canyon Landfill (CCL)
Location/Address	20662 Newport Coast Drive, Newport Beach, CA 92657
Land Use	Industrial
Zoning	City of Newport Beach: *OS – Open Space* per City Zoning Map
Acreage	1.07 acres
Predominant Soil Type	A preliminary geotechnical investigation is summarized in a report entitled "Infiltration Testing for Proposed Infiltration System – Proposed RNG Plant Equipment Area Coyote Canyon Landfill", and was prepared by LOR Geotechnical Group, dated April 14, 2023 (refer to Attachment E). The preliminary geotechnical report include an exploratory boring, which indicated the following shallow subsurface soils: silty sand with gravel, sandy siltone, and clayey siltstone. Figure XVI-2a of the 2013 North OC TGD, entitled "NRCS Hydrologic Soil Groups", shows the Project being in an area classified as Hydrologic Soil Groups C and D.

III.2 Site Characteristics

Fill out table with relevant information and include information regarding BMP sizing, suitability, and feasibility, as applicable.

Precipitation Zone	The Project site is located in the 0.75-inch design capture storm depth rainfall zone, based on Figure XVI-1 of the 2013 North OC TGD.
Topography	The development is located in the City of Newport Beach. The Project site is relatively flat with slopes less than 5%.
Drainage Patterns/Connections	The Project is located in the San Diego Creek Watershed. In the pre-project condition runoff originating within the Project site is collected and conveyed through a City-owned 24-inch RCP to the OC Flood Control District Facility #F04P04 (78-inch). The post-project site will mimic pre-project drainage patterns.
Soil Type, Geology, and Infiltration Properties	The preliminary geotechnical report by LOR Geotechnical Group included two borehole percolation tests at depths of 10 feet below the surface. The report stated the subsurface materials encountered at the site "*consisted predominantly of clayey siltstone with much lesser sandstone*". The results of the infiltration testing showed rates of 0.01 inches/hour and 0.00 inches/hour for the two test locations.

Site Characteristics (continued)	
Hydrogeologic (Groundwater) Conditions	Figure XVI-2d of the 2013 North OC TGD, entitled "North Orange County Mapped Depth to First Groundwater", shows the nearest groundwater contour is at least 30 feet below existing ground. Also the preliminary geotechnical report by LOR Geotechnical Group, stated the exploratory boring showed no groundwater at depth of 21+ feet. The USGS National Water Information System reveals that the closest well to the site with water depth information is located near the outlet of Bonita Canyon with San Diego Creek. Given that the site is a former landfill, it is expected that groundwater is deep.

Geotechnical Conditions (relevant to infiltration)	Research of the California Geological Survey (CGS) seismic hazard zones map (Tustin 7.5-minute Quadrangle) shows that the subject site is located within a zone of potential landslide, seismically-induced slope instability. Infiltration is not feasible for the Project site due to the following: • Site is within Hydrologic Soil Groups C and D based on Figure XVI-2a. This results in an infiltration rate below the required 0.3 inch/hour minimum rate accepted by the 2013 North OC TGD. • Percolation tests by LOR Geotechnical Group showed extremely low, negligible infiltration rates between 0.00 and 0.01 inches/hour. Furthermore, the preliminary geotechnical report by LOR Geotechnical Group states the following: "*The results of our field investigation and percolation test data indicates the site earth materials at the depth and locations tested are not conducive to acceptable infiltration. Therefore, consideration should be given to alternative methods and water quality storm water systems should not incorporate on-site infiltration when determining storm water treatment capacity.*"
Off-Site Drainage	There is no offsite runoff discharging through the Project site. Onsite runoff, leaving the site, discharges offsite through a City-owned 24-inch RCP to the OC Flood Control District Facility #F04P04 (78-inch).
Utility and Infrastructure Information	Existing onsite storm drains and other utilities including water, sanitary sewer, communication, and electrical, are owned and maintained by the County of Orange. Proposed BMPs and onsite storm drain facilities will be maintained by the County of Orange. Upon completion of the project, the County of Orange will be required to maintain and inspect all storm drains.

III.3 Watershed Description

Fill out table with relevant information and include information regarding BMP sizing, suitability, and feasibility, as applicable.

Receiving Waters	The project is located in the San Diego Creek Watershed. The receiving waters include: Bonita Creek, San Diego Creek Reach 1, Upper Newport Bay and Lower Newport Bay
303(d) Listed Impairments	According to the 2018 303(d) list, the impaired water bodies that are downstream to the Project include: • San Diego Creek Reach 1 is listed as impaired for benthic community effects, dichlorodiphenyltrichloroethane (DDT), indicator bacteria, nutrients, sedimentation/siltation, selenium, toxaphene, toxicity, and malathion. • Upper Newport Bay is listed as impaired for chlordane, copper, dichlorodiphenyltrichloroethane (DDT), indicator bacteria, malathion, nutrients, polychlorinated biphenyls (PCBs), sedimentation/siltation, and toxicity. • Lower Newport Bay is listed as impaired for chlordane, copper, dichlorodiphenyltrichloroethane (DDT), indicator bacteria, nutrients, polychlorinated biphenyls (PCBs), and toxicity.
Applicable TMDLs	TMDLs: • San Diego Creek Reach 1 – Metals, Nutrients, Pesticides, Siltation • Upper Newport Bay – Metals, Nutrients, Pathogens, Pesticides, Siltation • Lower Newport Bay – Metals, Nutrients, Pathogens, Pesticides, Priority Organics, Siltation
Pollutants of Concern for the Project	Suspended Solids / Sediment, Nutrients, Metals, Pathogens (Bacteria/Viruses), Pesticides, Oil and Grease, Toxic Organic Compounds, Trash and Debris
Environmentally Sensitive and Special Biological Significant Areas	The project is not located within 200 feet or adjacent to an Environmentally Sensitive Area (ESA). Also, there is no Area of Special Biological Significance (ASBS) in the City of Newport Beach.

Figure 1. 303(d) Impaired Water Bodies

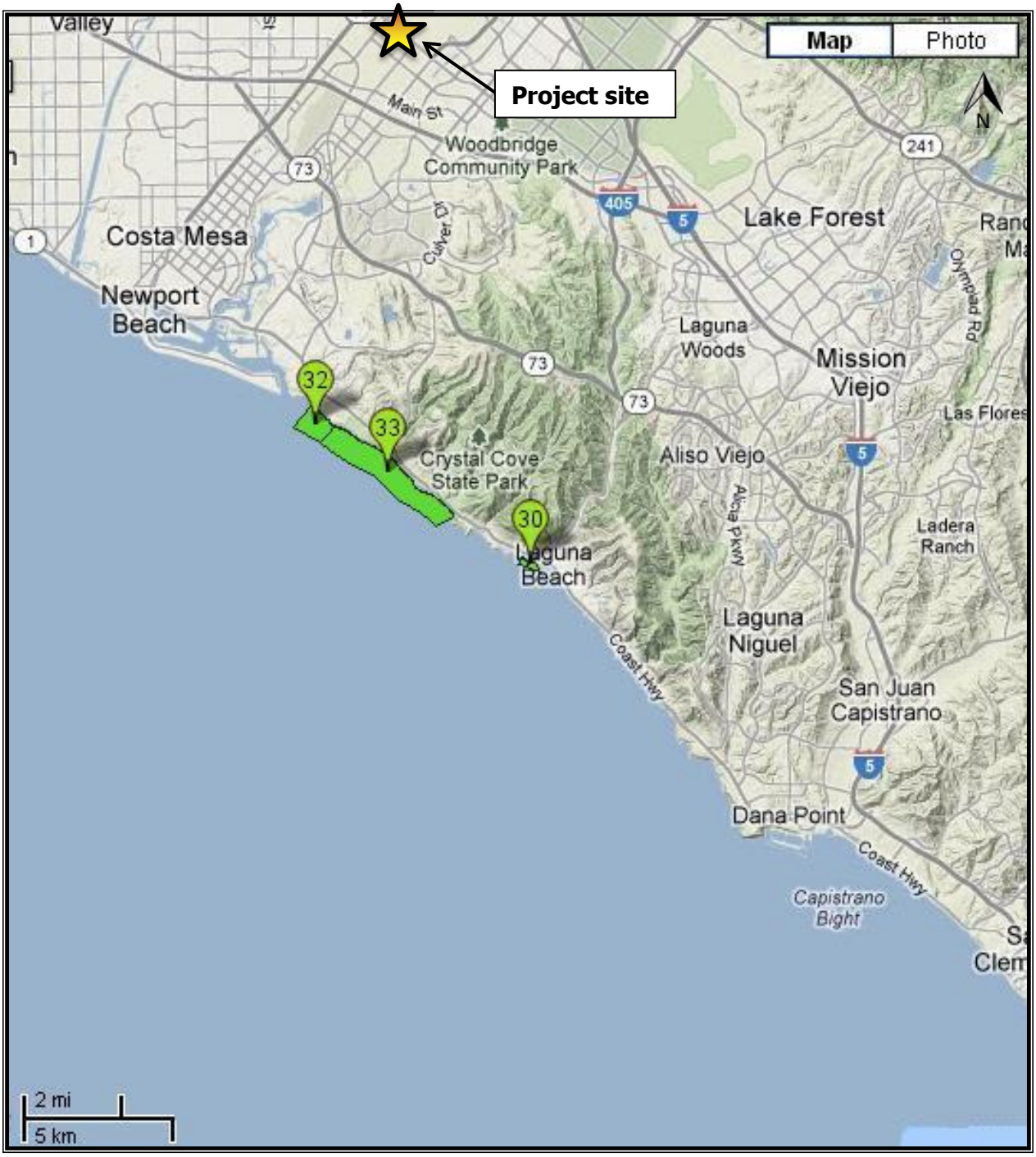


Figure 2. Areas of Special Biological Significance Near the CCL Project

Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

Describe project performance criteria. Several steps must be followed in order to determine what performance criteria will apply to a project. These steps include:

- *If the project has an approved WIHMP or equivalent, then any watershed specific criteria must be used and the project can evaluate participation in the approved regional or sub-regional opportunities. The local Permittee planning or NPDES staff should be consulted regarding the existence of an approved WIHMP or equivalent.*
- *Determine applicable hydromodification control performance criteria.*
- *Determine applicable LID performance criteria.*
- *Determine applicable treatment control BMP performance criteria.*
- *Calculate the LID design storm capture volume for the project.*

(NOC Permit Area only) Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implementing LID on regional or sub-regional basis?	YES ☐	NO ☒
If yes, describe WIHMP feasibility criteria or regional/sub-regional LID opportunities.	N/A	

Project Performance Criteria (continued)	
If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)	Following the North OC Model WQMP, assessment of potential impacts is based on: • Increases in runoff volume • Decreases in infiltration • Changes in time of concentration • Potential for increases in post-development downstream erosion • Potential for adverse downstream impacts on physical structure, aquatic, and riparian habitat A project does not have an HCOC if either of the following conditions is met: • The volumes and time of concentration of stormwater runoff for the post-development condition do not significantly exceed those of the pre-development condition for a two-year frequency storm event (a difference of five percent or less is considered insignificant). • The site infiltrates at least the runoff from a two-year storm event. For the Project site, Hydrologic Conditions of Concern (HCOC) do exist. The Project's post-development condition runoff volume for the 2-year, 24-hour storm exceeds the pre-development condition by more than 5%. Refer to Section IV.3.5.
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	Based on the North OC Model WQMP, LID BMPs must be designed to: • Retain, on-site, (infiltrate, harvest and use, or evapotranspire) stormwater runoff as feasible up to the Design Capture Volume, and • Recover (i.e., draw down) the storage volume as soon as possible after a storm event, and, if necessary • Biotreat, on-site, additional runoff, as feasible, up to 80 percent average annual capture efficiency (cumulative, retention plus biotreatment), and, if necessary • NOC Permit Area only – retain or biotreat, in a regional facility, the remaining runoff up to 80 percent average annual capture efficiency (cumulative, retention plus biotreatment, on-site plus off-site), and, if necessary

<table>
<tr><td></td><td>
Fulfill alternative compliance obligations for runoff volume not retained or biotreated up to 80 percent average annual capture efficiency using treatment controls or other alternative approaches
The Project will treat the 85th percentile, 24-hour storm event with onsite flow-based biofiltration systems. An onsite retention system was not implemented due to infiltration infeasibility and insufficient water demand for potential harvest-and-use alternatives.

Refer to Attachment B for calculations.
</td></tr>
<tr><td>List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)</td><td>
Not applicable.

Per the North OC Model WQMP Section 7.II-3.2.2, it is noted that the satisfaction of LID performance criteria also fully satisfies treatment control performance criteria, therefore the implementation of the treatment control BMPs is not required.
</td></tr>
<tr><td>Calculate LID design storm capture volume for Project.</td><td>
The water quality design flowrate (Q) was calculated using the "Simple Method Runoff Coefficient for Flow-Based BMP Sizing", Appendix III.1.2 of the 2013 North OC TGD. See Attachment B for calculations.

Design Flowrate (Q):

Q = C × i × A

C = runoff coefficient = (0.75 × impervious + 0.15)

i = rainfall intensity (in/hr) = 0.26 in/hr (Tc ≈ 5 minutes)

A = tributary area (acres)
<table>
<tr><th>DMA</th><th>Area (ac)</th><th>Imp (%)</th><th>C</th><th>i (in/hr)</th><th>Q (cfs)</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>1</td><td>1.07</td><td>66.4%</td><td>0.648</td><td>0.26</td><td>0.180</td></tr>
</table>
Refer to BMP Map included in Exhibits section herein.
</td></tr>
</table>

IV.2. SITE DESIGN AND DRAINAGE PLAN

Describe site design and drainage plan including

- *A narrative of site design practices utilized or rationale for not using practices;*
- *A narrative of how site is designed to allow BMPs to be incorporated to the MEP*
- *A table of DMA characteristics and list of LID BMPs proposed in each DMA.*
- *Reference to the WQMP plot plan.*
- *Calculation of Design Capture Volume (DCV) for each drainage area.*
- *A listing of GIS coordinates for LID and Treatment Control BMPs (unless not required by local jurisdiction)*

This Project is located in the San Diego Creek Watershed as discussed in Section II.1. This Project is located within the limits of the City of Newport Beach and is bounded by open space and the Coyote Canyon Landfill (CCL) to the east, and Newport Coast Drive to the west.

The Project will involve building a new Renewable Natural Gas (RNG) Plant at the CCL. The drainage of the Project site is identified with the site map in **Attachment B**.

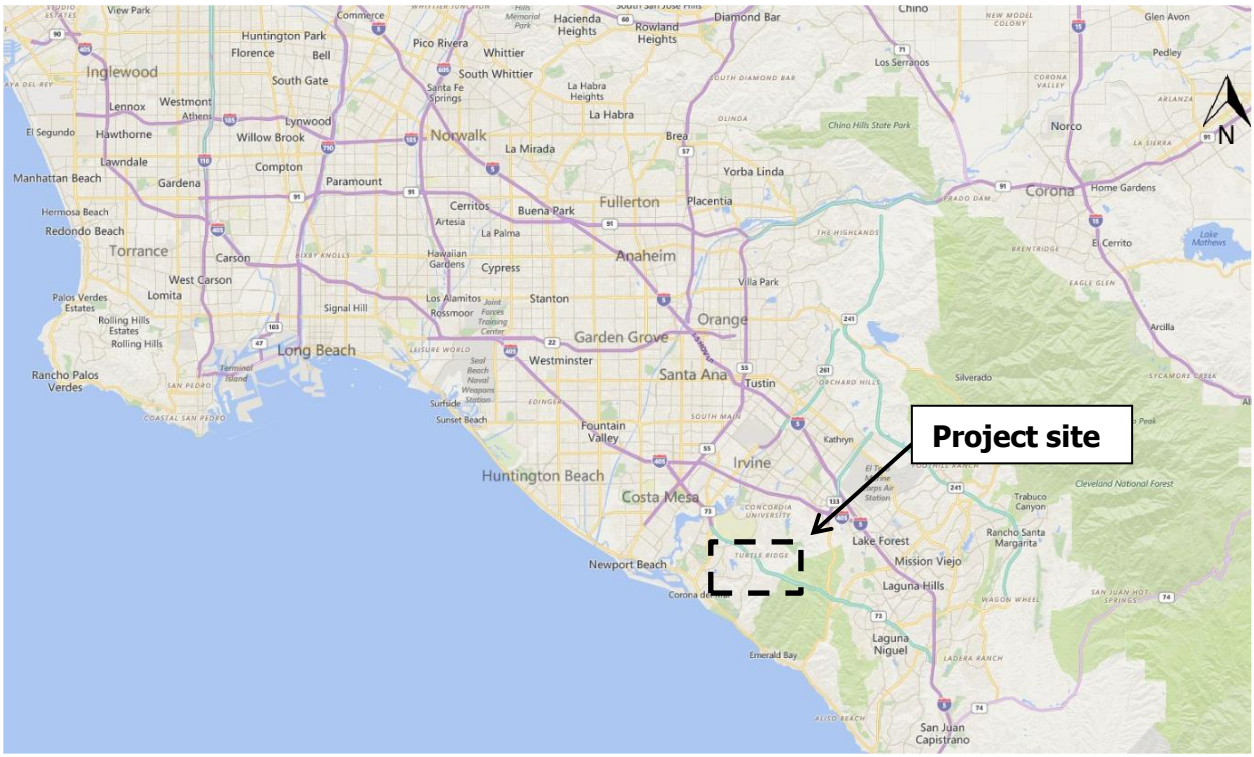


Figure 3. Regional Location of the CCL Project

DMA 1

The 1.07-acre drainage area (DMA 1) composes the entire CCL Project site. The area is 66.4% impervious, which includes the asphalt access road and concrete pads for RNG Plant equipment. The impervious area also includes the Southern California Gas's Facilities which are located at the southern corner of the site. The site runoff is intercepted by storm inlets along the perimeter access road, discharged into a subsurface gravel layer, and piped through perforated pipes to a BMP facility for treatment.

BMP 1

The site proposes to implement a Modular Wetlands unit (BMP 1) to treat the 85th percentile, 24-hour storm event. Modular Wetlands is a pre-engineered biofiltration system with a small footprint and high treatment capacity.

The site's proposed Modular Wetlands will be Contech's 8-ft x 8-ft underground configuration (Model # MWS-L-8-8-V-UG).

IV.3 LID BMP SELECTION AND PROJECT CONFORMANCE ANALYSIS

Each sub-section below documents that the proposed design features conform to the applicable project performance criteria via check boxes, tables, calculations, narratives, and/or references to worksheets.

IV.3.1 Hydrologic Source Controls

If required HSCs are included, fill out applicable check box forms. If the retention criteria are otherwise met with other LID BMPs, include a statement indicating HSCs not required.

Name	Included?
Localized on-lot infiltration	☐
Impervious area dispersion (e.g. roof top disconnection)	☐
Street trees (canopy interception)	☐
Residential rain barrels (not actively managed)	☐
Green roofs/Brown roofs	☐
Blue roofs	☐
Impervious area reduction (e.g. permeable pavers, site design)	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐

Hydrologic Source Controls (HSCs) are not integrated in this Project because flow-based biofiltration systems treat the water quality design flowrate (Q), as required by the 2013 North OC TGD.

IV.3.2 Infiltration BMPs

Identify infiltration BMPs to be used in project. If design volume cannot be met state why BMPs cannot be met

Name	Included?
Bioretention without underdrains	☐
Rain gardens	☐
Porous landscaping	☐
Infiltration planters	☐
Retention swales	☐
Infiltration trenches	☐
Infiltration basins	☐
Drywells	☐
Subsurface infiltration galleries	☐
French drains	☐
Permeable asphalt	☐
Permeable concrete	☐
Permeable concrete pavers	☐
Other:	☐
Other:	☐

Show calculations below to demonstrate if the LID Design Strom Capture Volume can be met with infiltration BMPs. If not document how much can be met with infiltration and document why it is not feasible to meet the full volume with infiltration BMPs.

Figure XVI-2a of the 2013 North OC TGD, entitled "NRCS Hydrologic Soil Groups", shows the Project being in an area classified as Hydrologic Soil Groups C and D. This results in an infiltration rate below the required 0.3 inch/hour minimum rate accepted by the 2013 North OC TGD. Also, percolation tests by LOR Geotechnical Group showed extremely low, negligible infiltration rates between 0.00 and 0.01 inches/hour. Therefore, infiltration is not feasible for the Project site.

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

If the full Design Storm Capture Volume cannot be met with infiltration BMPs, describe any evapotranspiration, rainwater harvesting BMPs.

Name	Included?
All HSCs; *See Section IV.3.1*	☐
Surface-based infiltration BMPs	☐
Biotreatment BMPs	☐
Above-ground cisterns and basins	☐
Underground detention	☐
Other:	☐
Other:	☐
Other:	☐

Show calculations below to demonstrate if the LID Design Strom Capture Volume can be met with evapotranspiration, rainwater harvesting BMPs in combination with infiltration BMPs. If not document how much can be met with either infiltration BMPs, evapotranspiration, rainwater harvesting BMPs, or a combination, and document why it is not feasible to meet the full volume with either of these BMPs categories.

There are no potential demands for rainwater harvesting for the Project.

IV.3.4 Biotreatment BMPs

If the full Design Storm Capture Volume cannot be met with infiltration BMPs, and/or evapotranspiration and rainwater harvesting BMPs, describe biotreatment BMPs. Include sections for selection, suitability, sizing, and infeasibility, as applicable.

Name	Included?
Bioretention with underdrains	☐
Stormwater planter boxes with underdrains	☐
Rain gardens with underdrains	☐
Constructed wetlands	☐
Vegetated swales	☐
Vegetated filter strips	☐
Proprietary vegetated biotreatment systems	☐
Wet extended detention basin	☐
Dry extended detention basins	☐
Other: Modular Wetlands Device	☒
Other:	☐

Show calculations below to demonstrate if the LID Design Strom Capture Volume can be met with infiltration, evapotranspiration, rainwater harvesting and/or biotreatment BMPs. If not document how much can be met with either infiltration BMPs, evapotranspiration, rainwater harvesting BMPs, or a combination, and document why it is not feasible to meet the full volume with either of these BMPs categories.

Infiltration of the Design Capture Volume (DCV) is not feasible based on the Project site's infiltration rates. A flow-based biofiltration device will treat the water quality design flowrate (Q), as required by the 2013 North OC TGD. A single Modular Wetlands system will be incorporated into the site at the northwest corner of the Project site.

A summary of the Modular Wetlands system is shown in the table below. The drainage areas are delineated on the BMP Map included in Exhibits section herein.

LID Biofiltration BMPs – DMA Treatment

DMA	Area (ac)	Q [1] (cfs)	Biofiltration Model #	Treatment Capacity [2] (cfs)	Coordinates
1	1.07	0.180	MWS-L-8-8-V-UG	0.231	N 33.61334°, W 117.82189°

Notes:
[1] The water quality design flowrate (Q) was calculated using the "Simple Method Runoff Coefficient for Flow-Based BMP Sizing", Appendix III.1.2 of the 2013 North OC TGD
[2] Refer to Contech Standard Detail MWS-L-8-8-V-UG (see Attachment B)

IV.3.5 Hydromodification Control BMPs

Describe hydromodification control BMPs. See Section 5 TGD. Include sections for selection, suitability, sizing, and infeasibility, as applicable. Detail compliance with Prior Conditions of Approval.

Hydromodification Control BMPs	
BMP Name	BMP Description
Gravel Storage BMP	24-inch deep gravel layer placed under access road to provide storage of 2-year, 24-hour runoff volume; total proposed volume of gravel is 7,636 cubic feet

As identified in Section II.3, hydromodification control BMPs are required for the Project. For the Project site, Hydrologic Conditions of Concern (HCOC) do exist. The Project's post-development condition runoff volume for the 2-year, 24-hour storm exceeds the pre-development condition by more than 5%. The 2-year, 24-hour storm runoff volume will be stored in a gravel layer beneath the access road. The site's proposed gravel volume is 7,636 cubic feet, which provides an available storage volume of 3,054 cubic feet based on a 40% void ratio.

IV.3.6 Regional/Sub-Regional LID BMPs

Describe regional/sub-regional LID BMPs in which the project will participate.

Regional/Sub-Regional LID BMPs
Project does not require regional/sub-regional LID BMPs, onsite BMPs are adequate for the Project's requirements.

IV.3.7 Treatment Control BMPs

Treatment control BMPs can only be considered if the project conformance analysis indicates that it is not feasible to retain the full design capture volume with LID BMPs. Describe treatment control BMPs including sections for selection, sizing, and infeasibility, as applicable.

Treatment Control BMPs	
BMP Name	BMP Description

Per the North OC Model WQMP Section 7.II-3.2.2, it is noted that the satisfaction of LID performance criteria also fully satisfies treatment control performance criteria, therefore the implementation of the treatment control BMPs is not required.

IV.3.8 Non-structural Source Control BMPs

Fill out non-structural source control check box forms or provide a brief narrative explaining if non-structural source controls were not used.

Non-Structural Source Control BMPs				
Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
N1	Education for Property Owners, Tenants and Occupants	☒	☐	
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☐	☒	No proposed landscaping on site.
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	No hazardous waste activities on site.
N6	Local Industrial Permit Compliance	☐	☒	No fuel dispensing / industrial waste areas on site.
N7	Spill Contingency Plan	☒	☐	
N8	Underground Storage Tank Compliance	☐	☒	No underground tanks on site.
N9	Hazardous Materials Disclosure Compliance	☐	☒	No hazardous waste activities on site.
N10	Uniform Fire Code Implementation	☒	☐	
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☐	☒	No loading docks on site.
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	No retail gas outlets on site.

N1 Education for Property Owners, Tenants and Occupants – Practical information materials will be provided to the County employees and contractors that operate at Coyote Canyon Landfill (CCL). Materials will cover general good housekeeping practices to promote protection of stormwater quality. These materials will be provided by the County of Orange.

N2 Activity Restrictions – Activities must be compliant with the water quality ordinance set forth by the County of Orange. The following activities are not permitted: No hosing down paved surfaces where non-stormwater will discharge to the storm drain. No dumping of waste materials into storm drain inlets.

N4 BMP Maintenance – The Project's WQMP will identify responsibility for implementation of each non-structural BMP and scheduled cleaning and/or maintenance of all structural BMP facilities. Documentation of inspection and maintenance records will be kept on-site.

N7 (SC-11) Spill Contingency Plan – The owner must prepare a "Spill Contingency Plan" which describes how employees that operate at Coyote Canyon Landfill (CCL) will prepare for and respond to spills of materials. An effective spill response and control plan will include spill/leak prevention measures, spill response procedures, spill cleanup procedures, reporting, and training.

N10 Uniform Fire Code Implementation – Compliance with Article 80 of the Uniform Fire Code enforced by fire protection agency.

N11 (SC-60) Common Area Litter Control – The owner is required to implement regularly scheduled maintenance which includes trash patrolling, trash receptacle emptying, trash disposal violation reporting, and "Best Management Practices" implementing.

N12 Employee Training – Education program applicable to future employees of the County of Orange. All employees would be trained and taught proper management techniques. Brochures and education materials provided to employees on an annual basis.

N14 (SC-74) Common Area Catch Basin Inspection – The owner is required to have all storm drain facilities inspected, cleaned, and maintained annually and after rain events. Cleaning should occur in the later summer/early fall prior to the start of the rainy season. Drainage facilities include catch basins (storm drain inlets) detention basins, retention basins, sediment basins, open drainage channels, and lift stations. Records should be kept to document annual maintenance.

N15 (SC-43, SC-70) Street Sweeping Private Streets and Parking Lots – The access road is required to be swept in late summer or early fall, prior to the start of the rainy season or equivalent as required by the governing jurisdiction. Hosing down paved surfaces is not permitted.

IV.3.9 Structural Source Control BMPs

Fill out structural source control check box forms or provide a brief narrative explaining if Structural source controls were not used.

Structural Source Control BMPs				
Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
S1	Provide storm drain system stenciling and signage	☒	☐	
S2	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒	No outdoor storage material areas on site.
S3	Design and construct trash and waste storage areas to reduce pollution introduction	☒	☐	
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☐	☒	No proposed irrigation system on site.
S5	Protect slopes and channels and provide energy dissipation	☐	☒	No steep slopes or channel on site.
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☐	☒	Not applicable.
S6	Dock areas	☐	☒	No dock areas on site.
S7	Maintenance bays	☐	☒	No maintenance bays on site.
S8	Vehicle wash areas	☐	☒	No vehicle wash areas on site.
S9	Outdoor processing areas	☒	☐	
S10	Equipment wash areas	☐	☒	No equipment wash areas on site
S11	Fueling areas	☐	☒	No fueling areas on site.
S12	Hillside landscaping	☐	☒	No hillside landscaping on site.
S13	Wash water control for food preparation areas	☐	☒	No food preparation area on site.
S14	Community car wash racks	☐	☒	No car wash racks on site.

S1 (SD-13) Provide Storm Drain System Stenciling and Signage – Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain catch basins will include highly visible source control messages/graphics which includes prohibitive language (such as: NO DUMPING - DRAINS TO OCEAN) and/or graphical icons to prevent illegal dumping. Maintain legibility of stencils, and preform re-stenciling at a minimum of every 5 years.

S3 (SD-32) Design Trash Enclosures to Reduce Pollution Introduction – The site may include a designated trash enclosure, in which case the trash enclosure will include a solid roof or awning, impermeable paved surface, design not allowing run-on from adjoining areas, and walls to prevent off-site transport of trash. The trash area drain may not connect to the municipal storm drain system.

S9 (SD-36) Outdoor Processing Areas – Outdoor processing areas Outdoor process equipment operations shall adhere to the following requirements:

1. Cover or enclose areas that would be the sources of pollutants; or, slope the area toward a sump that will provide infiltration or evaporation with no discharge; or, if there are no other alternatives, discharge of non-stormwater flow to the sanitary sewer may be considered only allowed by the local sewerage agency through permitted connection.
2. Grade or berm area to prevent run-on from surrounding areas.
3. Installation of storm drains in areas of equipment repair is prohibited.
4. Other features which are comparable or equally effective that prevent unpermitted discharges to the municipal storm drain system.
5. Where wet material processing occurs (e.g. Electroplating), secondary containment structures (not double wall containers) shall be provided to hold spills resulting from accidents, leaking tanks or equipment, or any other unplanned releases (Note: If these are plumbed to the sanitary sewer, the structures and plumbing shall be with the prior approval of the sewer agency).

All non-structural and structural source control BMPs are under the responsibility of Kevin Oxford and the County of Orange. Orange County Waste & Recycling is located on 601 N. Ross Street, Santa Ana, CA 92701 and can be reached by phone at (949) 728-3042.

IV.4 ALTERNATIVE COMPLIANCE PLAN (IF APPLICABLE)

IV.4.1 Water Quality Credits

Determine if water quality credits are applicable for the project.

<table>
<tr><th colspan="5">Description of Proposed Project</th></tr>
<tr><td colspan="5">Project Types that Qualify for Water Quality Credits (Select all that apply):</td></tr>
<tr><td colspan="2">☐Redevelopment projects that reduce the overall impervious footprint of the project site.</td><td colspan="2">☐Brownfield redevelopment, meaning redevelopment, expansion, or reuse of real property which may be complicated by the presence or potential presence of hazardous substances, pollutants or contaminants, and which have the potential to contribute to adverse ground or surface WQ if not redeveloped.</td><td>☐ Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance).</td></tr>
<tr><td colspan="2">☐ Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g. reduced vehicle trip traffic with the potential to reduce sources of water or air pollution).</td><td colspan="2">☐ Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned</td><td>☐ Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping).</td></tr>
<tr><td>☐Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.</td><td>☐ Developments in a city center area.</td><td>☐ Developments in historic districts or historic preservation areas.</td><td>☐ Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria to mixed use development; would not be able to take credit for both categories.</td><td>☐In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.</td></tr>
<tr><td>Calculation of Water Quality Credits
(if applicable)</td><td colspan="4">Not Applicable</td></tr>
</table>

The project is a redevelopment that maintains the overall impervious footprint of the project site. Credits are not considered in the WQMP.

IV.4.2 Alternative Compliance Plan Information

Describe an alternative compliance plan (if applicable). Include alternative compliance obligations (i.e., gallons, pounds) and describe proposed alternative compliance measures.

Alternative Compliance Measures are not required for the Project because flow-based biofiltration BMPs will meet the requirements of the Permit.

Section V Inspection/Maintenance Responsibility for BMPs

Fill out information in table below. Prepare and attach an Operation and Maintenance Plan. Identify the mechanism through which BMPs will be maintained. Inspection and maintenance records must be kept for a minimum of five years for inspection by the regulatory agencies.

BMP Inspection/Maintenance			
BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
Modular Wetlands Systems BMP	Archaea Energy Baffour Ennin (832) 740-1241	Contractor to verify proper installation per manufacturer's specifications and recommendations. Engineer to inspect MSFWS components at place of installation.	After Installation
Modular Wetlands Systems BMP	Archaea Energy Baffour Ennin (832) 740-1241	Qualified person to inspect all MSFWS components and results of inspection to be recorded in an inspection log.	Every 6 to 12 months
Modular Wetlands Systems BMP	Archaea Energy Baffour Ennin (832) 740-1241	Remove sediment and debris from the separation chamber. Description and amount of sediment/debris collected to be documented in maintenance/inspection record.	Every 6 to 12 months
Modular Wetlands Systems BMP	Archaea Energy Baffour Ennin (832) 740-1241	Sediment, debris, trash, and organics captured by MSFWS to be transported and disposed at an approved disposal facility in accordance with local and state regulations.	Every 6 to 12 months
Modular Wetlands Systems BMP	Archaea Energy Baffour Ennin (832) 740-1241	Replace the pretreatment cartridge filter media. Condition of the filter to be documented in maintenance/inspection record.	Every 6 to 12 months

Modular Wetlands Systems BMP	Archaea Energy Baffour Ennin (832) 740-1241	Replace the drain-down filter media and note in maintenance/inspection record.	Every 6 to 12 months
Modular Wetlands Systems BMP	Archaea Energy Baffour Ennin (832) 740-1241	Trim vegetation and prune/remove any dead plant material. Replace dead plants. No chemical herbicides, pesticides, or fertilizers to be used for planting maintenance.	Every 6 to 12 months
Gravel Storage BMP	Archaea Energy Baffour Ennin (832) 740-1241	Inspect storm inlets for structural integrity and clean/sweep area prior to wet season. Check for trash and sediment build-up within inlets.	Annually and After Major Storms
Street Sweeping	Archaea Energy Baffour Ennin (832) 740-1241	Mechanically sweep access road and entrances associated with the site. Avoid wet weather sweeping if feasible.	Monthly
Storm Drain System Stenciling and Signage	Archaea Energy Baffour Ennin (832) 740-1241	Inspect stencilling and signage to ensure message is visible and not damaged. Re-stencil as necessary but at a minimum once every five years.	Once every five years

Section VI Site Plan and Drainage Plan

VI.1 SITE PLAN AND DRAINAGE PLAN

Include a site plan and drainage plan sheet set containing the following minimum information:

- Project location
- Site boundary
- Land uses and land covers, as applicable
- Suitability/feasibility constraints
- Structural BMP locations
- Drainage delineations and flow information
- Drainage connections
- BMP details

Refer to Exhibits section for BMP Map, Attachment B for hydrology, and Attachment D for construction documents.

VI.2 ELECTRONIC DATA SUBMITTAL

The minimum requirement is to provide submittal of PDF exhibits in addition to hard copies. Format must not require specialized software to open.

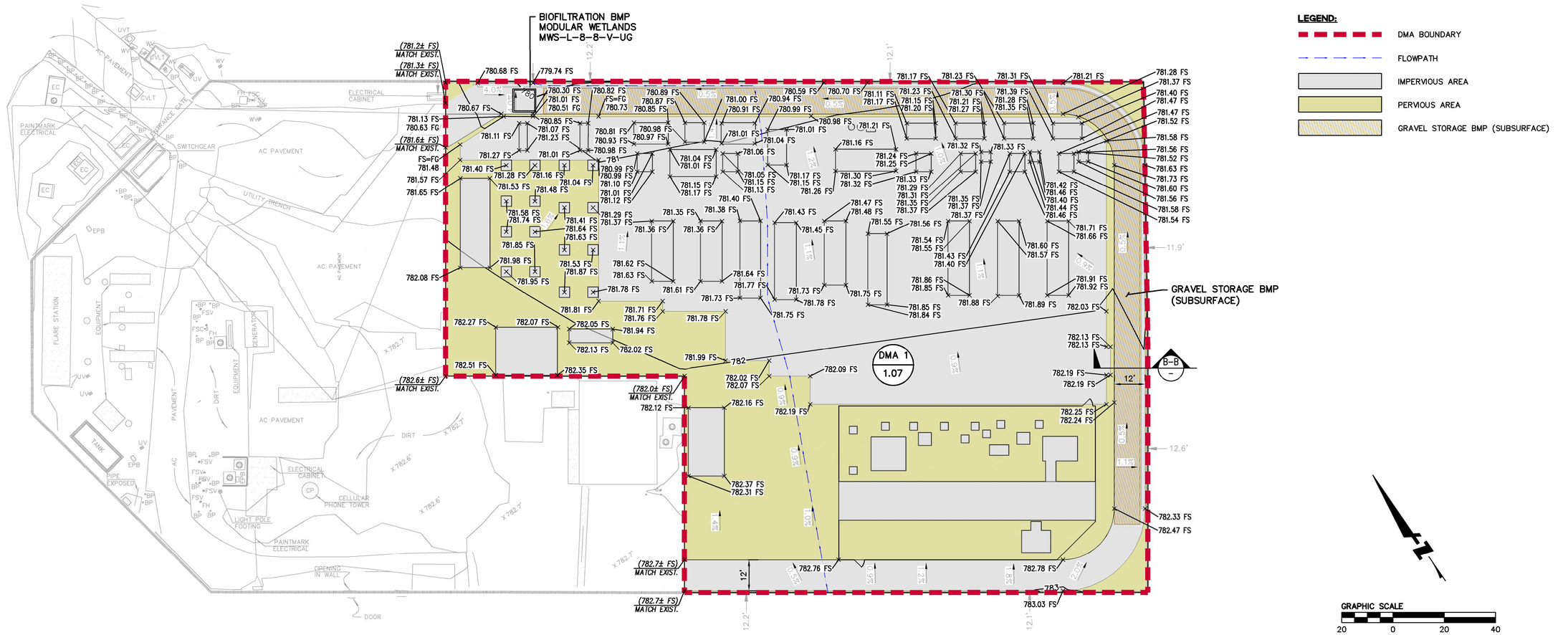
If the local jurisdiction requires specialized electronic document formats (CAD, GIS) to be submitted, this section will be used to describe the contents (e.g., layering, nomenclature, georeferencing, etc.) of these documents so that they may be interpreted efficiently and accurately.

Section VII Educational Materials

Education Materials			
Residential Material (http://www.ocwatersheds.com)	Check If Applicable	Business Material (http://www.ocwatersheds.com)	Check If Applicable
The Ocean Begins at Your Front Door	☒	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☐
Tips for the Home Mechanic	☐	Tips for the Food Service Industry	☐
Homeowners Guide for Sustainable Water Use	☐	Proper Maintenance Practices for Your Business	☒
Household Tips	☐	Other Material	Check If Attached
Proper Disposal of Household Hazardous Waste	☐		
Recycle at Your Local Used Oil Collection Center (North County)	☐	CASQA SC-11 – Spill Prevention, Control & Cleanup	☒
Recycle at Your Local Used Oil Collection Center (Central County)	☐	CASQA SC-43 – Parking Area Maintenance	☒
Recycle at Your Local Used Oil Collection Center (South County)	☐	CASQA SC-60 – Housekeeping Practices	☒
Tips for Maintaining a Septic Tank System	☐	CASQA SC-70 – Road and Street Maintenance	☒
Responsible Pest Control	☐	CASQA SC-74 – Drainage System Maintenance	☒
Sewer Spill	☐	CASQA SD-13 – Storm Drain Signage	☒
Tips for the Home Improvement Projects	☐	CASQA SD-32 – Trash Storage Areas	☒
Tips for Horse Care	☐	CASQA SD-36 – Outdoor Processing Areas	☒
Tips for Landscaping and Gardening	☐		☐
Tips for Pet Care	☐		☐
Tips for Pool Maintenance	☐		☐
Tips for Residential Pool, Landscape and Hardscape Drains	☐		☐
Tips for Projects Using Paint	☐		☐

Refer to Attachment A for education materials.

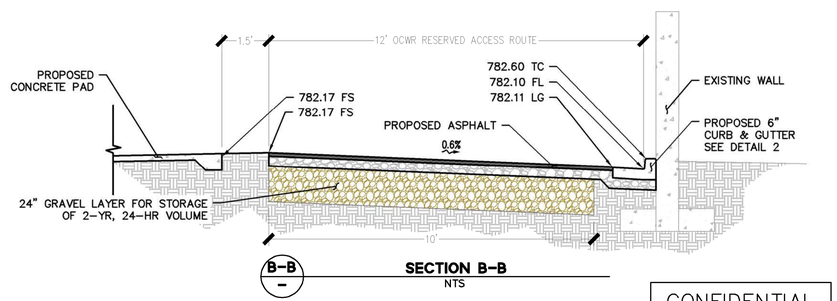
Exhibits



LID Biofiltration BMPs – DMA Treatment

DMA	Area (ac)	Q [1] (cfs)	Biofiltration Model #	Treatment Capacity [2] (cfs)	Coordinates
1	1.07	0.180	MWS-L-8-8-V-UG	0.231	N 33.61334°, W 117.82189°

Notes:
[1] The water quality design flowrate (Q) was calculated using the "Simple Method Runoff Coefficient for Flow-Based BMP Sizing", Appendix III.1.2 of the 2013 North OC TGD
[2] Refer to Contech Standard Detail MWS-L-8-8-V-UG (see Attachment B)



CONFIDENTIAL

NOT FOR CONSTRUCTION

ISSUE FOR BID

REV	DATE	DESCRIPTION	DRN BY	CHK BY	APRV BY
0	11/16/23	ISSUE FOR BID	DMM	VL	RTC

CIVIL ENGINEER:
BKF ENGINEERS
4675 MACARTHUR CT., SUITE 400
NEWPORT BEACH, CA 92660
(949) 526-8640
www.bkf.com

OWNER:
ARCHAEA ENERGY
4444 WESTHEIMER ROAD, SUITE G450
HOUSTON, TX 77027
Ph: (346) 708-8272

ENGINEER:
BIOGAS ENGINEERING
2321 E. 28TH STREET, SUITE 400
SIGNAL HILL, CA 90755, Ph: (562) 726-3565
EMAIL: INFO@BIOGASENG.COM

BMP MAP

COYOTE CANYON LANDFILL
RNG PROJECT
20662 NEWPORT COAST DRIVE
NEWPORT BEACH, CA 92657

SUBJECT TO FURTHER REVISION

LEGEND

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

Rainfall Zones

Design Capture Storm Depth (inches)

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

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

0.65 0.7 0.75 0.8 0.85 0.9 0.95 1 1.05 1.1

PROJECT

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

Pacific Ocean
San Pedro Bay
Long Beach Harbor
San Pedro Channel

0 3 6 12 Kilometers
0 1.8 3.6 7.2 Miles

P:\9526E\16-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-1_RainfallZones_20110215.mxd

TITLE: RAINFALL ZONES

JOB: ORANGE COUNTY TECHNICAL GUIDANCE DOCUMENT — ORANGE CO. CA

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

PACE Advanced Water Engineering

FIGURE XVI-1

SUBJECT TO FURTHER REVISION

LOS ANGELES COUNTY
ORANGE COUNTY

SAN BERNARDINO COUNTY
ORANGE COUNTY

RIVERSIDE COUNTY
ORANGE COUNTY

LOS ANGELES COUNTY
ORANGE COUNTY

PROJECT

LEGEND

City Boundaries

Hydrologic Soil Groups

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

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

0 2.5 5 10 Kilometers

0 1.8 3.6 7.2 Miles

P:\95226E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\95226E_FigureXVI-2a_HydroSoils_20110215.mxd

TITLE
NRCS HYDROLOGIC SOILS GROUPS

JOB
ORANGE COUNTY INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	95226-E

PACE
Advanced Water Engineering

FIGURE
XVI-2a

SUBJECT TO FURTHER REVISION

LOS ANGELES COUNTY
ORANGE COUNTY
SAN BERNARDINO COUNTY
ORANGE COUNTY
RIVERSIDE COUNTY
ORANGE COUNTY
LOS ANGELES COUNTY
ORANGE COUNTY

PROJECT

LEGEND

City Boundaries

Hydrologic Soil Groups

D Soils

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

0 2.5 5 10 Kilometers
0 1.8 3.6 7.2 Miles

Pacific Ocean
San Pedro Channel

TITLE
HYDROLOGIC SOIL GROUP
TYPE D NRCS SOIL SURVEY

JOB
ORANGE CO. INFILTRATION STUDY
ORANGE CO. CA

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

PACE
Advanced Water Engineering

FIGURE
XVI-2b

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2b_D-Soils_20110215.mxd

SUBJECT TO FURTHER REVISION

LOS ANGELES COUNTY
ORANGE COUNTY

SAN BERNARDINO COUNTY
ORANGE COUNTY

RIVERSIDE COUNTY
ORANGE COUNTY

LOS ANGELES COUNTY
ORANGE COUNTY

PROJECT

LEGEND

City Boundaries

Seismic Hazards

Potential Landslide Area

Source:
Seismic Hazard Zone Maps
Division of Mines and Geology, California Geology Survey,
Publication Date: 2005; Data Downloaded 02-09-2011
http://www.conservation.ca.gov/cgs/shzp/Pages/Index.aspx

0 2.5 5 10 Kilometers

0 1.8 3.6 7.2 Miles

San Pedro Channel

Pacific Ocean

TITLE
HYDROLOGIC SOIL GROUP
TYPE D NRCS SOIL SURVEY

JOB
ORANGE COUNTY
INFILTRATION STUDY
CA
ORANGE CO.

SCALE	1" = 1.25 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2c

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2c_Landslides_20110215.mxd

SUBJECT TO FURTHER REVISION

LEGEND

- Depth To First Groundwater Contours
- City Boundaries
- OCWD Groundwater Basin Protection Boundary

Note: Data are not available for South Orange County at this time.

Source:
Sprotte, Fuller and Greenwood, 1980.
California Division of Mines and Geology;
California Geological Survey

LOS ANGELES COUNTY
ORANGE COUNTY

SAN BERNARDINO COUNTY
ORANGE COUNTY

RIVERSIDE COUNTY
ORANGE COUNTY

PROJECT

0 2 4 8 Kilometers

0 1.25 2.5 5 Miles

TITLE
NORTH ORANGE COUNTY
MAPPED DEPTH TO FIRST
GROUNDWATER

JOB
ORANGE COUNTY
INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.25 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2d

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2d_DepthToGroundwaterOverview_20110215.mxd

SUBJECT TO FURTHER REVISION

LEGEND

City Boundaries

OCWD Groundwater Basin Protection Boundary

Depth To Groundwater

<= 5'

5-10'

Note: Data are not available for South Orange County at this time.

Source:
Sprotte, Fuller and Greenwood, 1980.
California Division of Mines and Geology;
California Geological Survey

LOS ANGELES COUNTY
ORANGE COUNTY

SAN BERNARDINO COUNTY
ORANGE COUNTY

RIVERSIDE COUNTY
ORANGE COUNTY

PROJECT

0 2 4 8 Kilometers

0 1.25 2.5 5 Miles

TITLE
NORTH ORANGE COUNTY
MAPPED SHALLOW GROUNDWATER

ORANGE COUNTY
INFILTRATION STUDY

CA

JOB
ORANGE CO.

SCALE	1" = 1.25 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2e

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2e_DepthToGroundwater15ft_20110215.mxd

SUBJECT TO FURTHER REVISION

LEGEND

- City Boundaries
- OCWD Groundwater Basin Protection Boundary

Plume Protection Boundaries

- North Basin Groundwater Protection Project
- South Basin Groundwater Protection Project
- El Toro Marine Base
- Tustin Marine Air Base
- Approximate Selenium Contamination Area

Note: Individual contamination sites are not plotted.
See State Water Resources Control Board Geotracker database (http://geotracker.waterboards.ca.gov), Department of Toxic Substance Control Envirostor database (http://www.envirostor.dtsc.ca.gov) and other applicable sources for current listing of active contaminated sites.

Groundwater basin and plume protection boundaries for South Orange County are not shown on this exhibit at this time

LOS ANGELES COUNTY
ORANGE COUNTY

SAN BERNARDINO COUNTY
ORANGE COUNTY

RIVERSIDE COUNTY
ORANGE COUNTY

PROJECT

0 2 4 8 Kilometers
0 1.25 2.5 5 Miles

TITLE
NORTH ORANGE COUNTY GROUNDWATER PROTECTION AREAS

ORANGE COUNTY INFILTRATION STUDY

JOB ORANGE CO. CA

SCALE	1" = 1.25 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/22/10
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2f

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2f_NorthOCGroundwaterProtectionAreasStreetMap_20110215.mxd

SUBJECT TO FURTHER REVISION

LEGEND

- OCWD Groundwater Basin Protection Boundary
- City Boundaries

Infiltration Constraints

- 1 Constraint
- 2 Overlapping Constraints
- 3 Overlapping Constraints
- 4 Overlapping Constraints

Analysis Layers Included: 1. Hydrologic Soil Group D, 2. Landslide Hazard Zone, 3. Groundwater Protection Areas 4. Approximate Selinium Area, 5. Depth to Groundwater <= 5'

Note: Screening datasets are not exhaustive. The applicant should always conduct a review of available site-specific information relative to infiltration constraints as part of assessing the feasibility of stormwater infiltration.
Source;
Infiltration Constraint Analysis: PACE/Geosyntec

LOS ANGELES COUNTY
ORANGE COUNTY
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY

PROJECT

0 2.5 5 10 Kilometers
0 1.8 3.6 7.2 Miles

P:\95226E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\95226E_FigureXVI-2g_InfiltrationFinal_20110215.mxd

TITLE
INFILTRATION ANALYSIS
OVERLAPPING CONSTRAINT
LOCATIONS

JOB
ORANGE COUNTY
INFILTRATION STUDY
CA
ORANGE CO.

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/22/10
JOB NO.	95226-E

PACE
Advanced Water Engineering

FIGURE
XVI-2g

Susceptibility

Potential Areas of Erosion, Habitat, & Physical Structure Susceptibility

Channel Type

Earth (Unstable)

Earth (Stabilized)

Stabilized

Tidel Influence

<= Mean High Water Line (4.28')

Water Body

Basin

Dam

Lake

Reservoir

Other Lands

Airport/Military

AnaheimBay-HuntingtonHarbor Watershed

Santa Ana River Watershed

Santa Ana River Watershed

South Orange County

El Modena-Irvine Retarding Basin

Lower Peters Canyon Retarding Basin

Eastfoot Retarding Basin

Orchard Estates Retention Basin

Hicks Canyon Retarding Basin

Rattlesnake Reservoir

East Hicks Canyon Retarding Basin

Siphon Reservoir

Bee Canyon Retarding Basin

Round Canyon Retarding Basin

Trabuco Retarding Basin

Marshburn Retarding Basin

Agua Chinon Retarding Basin

North Lake

South Lake

Basin Number 2

Basin Number 1

Sand Canyon Reservoir

Laguna Reservoir

Bonita Canyon Reservoir

San Joaquin Reservoir

Big Canyon Reservoir

Harbor View Dam

Village Pond Park

John Wayne Airport

PROJECT

0 9,000 18,000 Feet

E-52

P:\9526E\16-GIS\Mxds\SuceptabilityMaps_20100505\9526E_NewportBaySusceptibility_20100430.mxd

TITLE: SUSCEPTIBILITY ANALYIS NEWPORT BAY-NEWPORT COASTAL STREAMS

JOB: ORANGE COUNTY WATERSHED MASTER PLANNING ORANGE CO. CA

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

PACE Advanced Water Engineering

FIGURE 4

Attachment A

Educational Materials

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Follow these simple steps to help reduce water pollution:

Household Activities

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

Automotive

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

Pool Maintenance

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

Landscape and Gardening

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

Trash

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

Pet Care

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

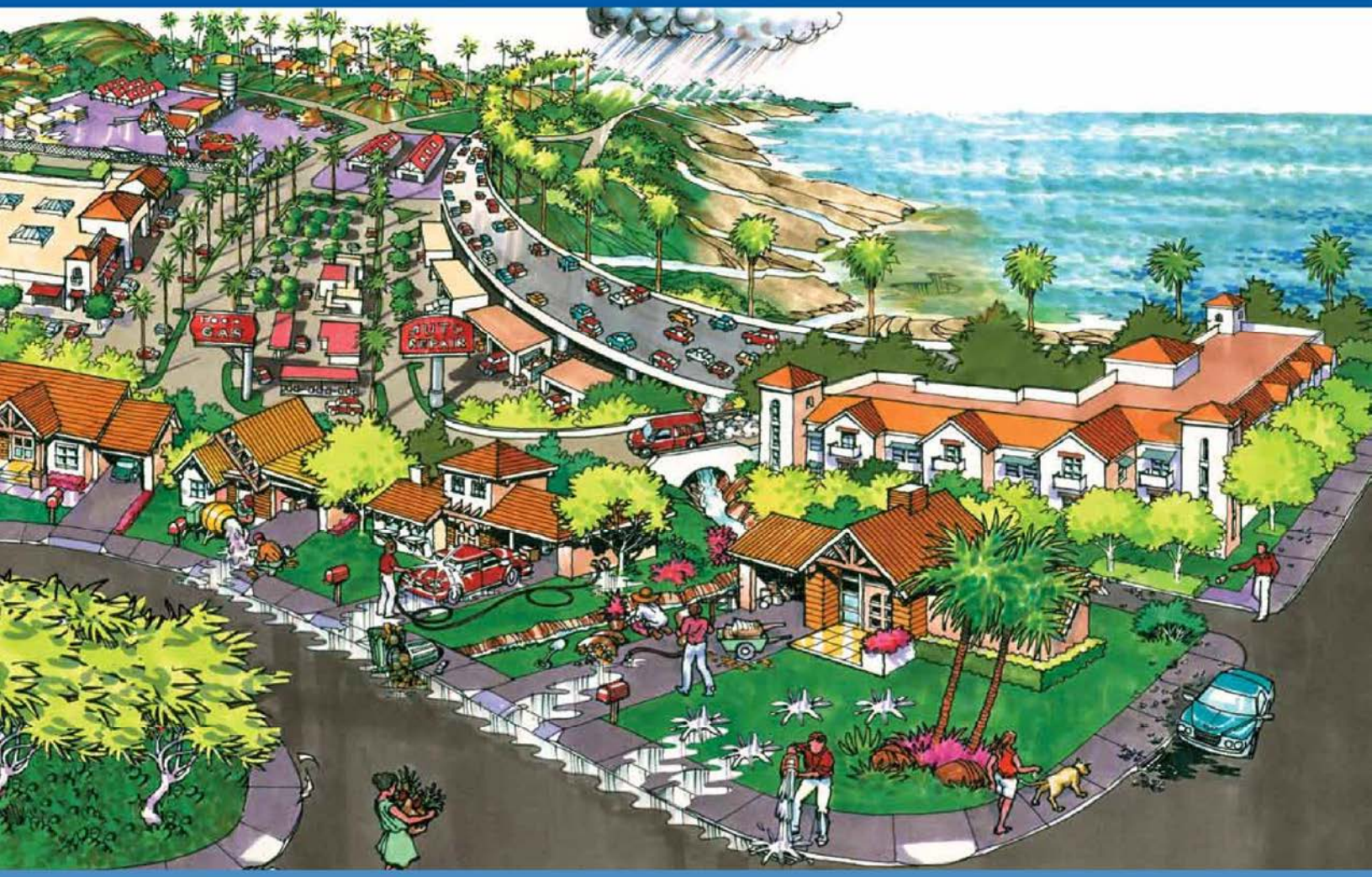
Common Pollutants

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

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

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

The Ocean Begins at Your Front Door



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

Did You Know?

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

Where Does It Go?

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

Sources of Non-Point Source Pollution

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

The Effect on the Ocean

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

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

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

For More Information

Orange County Stormwater Program

California Environmental Protection Agency
www.calepa.ca.gov

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

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

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

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

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

Stormwater Best Management Practice Handbook
Visit www.cabmphandbooks.com

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

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

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

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

On-line Water Pollution Problem Reporting Form

w w w . o c w a t e r s h e d s . c o m

Printed on Recycled Paper

Preventing water pollution at your commercial/industrial site

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many landscape and building maintenance activities can lead to water pollution if you're not careful. Paint, chemicals, plant clippings and other materials can be blown or washed into storm drains that flow to the ocean. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never pour soap or fertilizers into the ocean, so why would you let them enter the storm drains? Follow these easy tips to help prevent water pollution.

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

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

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

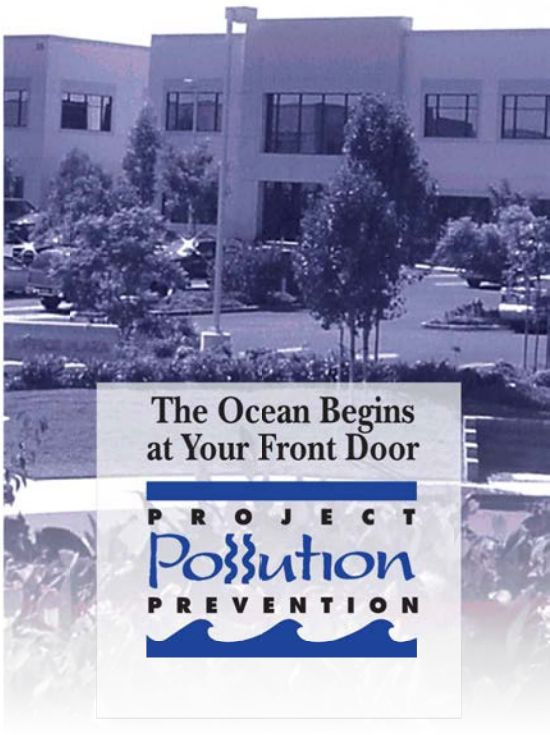
For emergencies, dial 911.

RECYCLE USED OIL

Printed on Recycled Paper

Help Prevent Ocean Pollution:

Proper Maintenance Practices for Your Business



Proper Maintenance Practices for your Business

Landscape Maintenance

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

Building Maintenance

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

NEVER DISPOSE OF ANYTHING IN THE STORM DRAIN.

- Recycle paints, solvents and other materials. For more information about recycling and collection centers, visit **www.oclandfills.com**.
- Store materials indoors or under cover and away from storm drains.
- Use a construction and demolition recycling company to recycle lumber, paper, cardboard, metals, masonry, carpet, plastic, pipes, drywall, rocks, dirt, and green waste. For a listing of construction and demolition recycling locations in your area, visit **www.ciwmb.ca.gov/recycle.**
- Properly label materials. Familiarize employees with Material Safety Data Sheets.

PROJECT Pollution PREVENTION

Spill Prevention, Control & Cleanup SC-11

Objectives

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

Description

Spills and leaks, if not properly controlled, can adversely impact the storm drain system and receiving waters. Due to the type of work or the materials involved, many activities that occur either at a municipal facility or as a part of municipal field programs have the potential for accidental spills and leaks. Proper spill response planning and preparation can enable municipal employees to effectively respond to problems when they occur and minimize the discharge of pollutants to the environment.

Targeted Constituents

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

Approach

- An effective spill response and control plan should include:
  - Spill/leak prevention measures;
  - Spill response procedures;
  - Spill cleanup procedures;
  - Reporting; and
  - Training
- A well thought out and implemented plan can prevent pollutants from entering the storm drainage system and can be used as a tool for training personnel to prevent and control future spills as well.

Pollution Prevention

- Develop and implement a Spill Prevention Control and Response Plan. The plan should include:

CASQA California Stormwater Quality Association

- A description of the facility, the address, activities and materials involved
- Identification of key spill response personnel
- Identification of the potential spill areas or operations prone to spills/leaks
- Identification of which areas should be or are bermed to contain spills/leaks
- Facility map identifying the key locations of areas, activities, materials, structural BMPs, etc.
- Material handling procedures
- Spill response procedures including:
  - Assessment of the site and potential impacts
  - Containment of the material
  - Notification of the proper personnel and evacuation procedures
  - Clean up of the site
  - Disposal of the waste material and
  - Proper record keeping

- Product substitution – use less toxic materials (i.e. use water based paints instead of oil based paints)
- Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of materials that are brought into the facility or into the field.

Suggested Protocols

Spill/Leak Prevention Measures

- If possible, move material handling indoors, under cover, or away from storm drains or sensitive water bodies.
- Properly label all containers so that the contents are easily identifiable.
- Berm storage areas so that if a spill or leak occurs, the material is contained.
- Cover outside storage areas either with a permanent structure or with a seasonal one such as a tarp so that rain can not come into contact with the materials.
- Check containers (and any containment sumps) often for leaks and spills. Replace containers that are leaking, corroded, or otherwise deteriorating with containers in good condition. Collect all spilled liquids and properly dispose of them.

- Store, contain and transfer liquid materials in such a manner that if the container is ruptured or the contents spilled, they will not discharge, flow or be washed into the storm drainage system, surface waters, or groundwater.
- Place drip pans or absorbent materials beneath all mounted taps and at all potential drip and spill locations during the filling and unloading of containers. Any collected liquids or soiled absorbent materials should be reused/recycled or properly disposed of.
- For field programs, only transport the minimum amount of material needed for the daily activities and transfer materials between containers at a municipal yard where leaks and spill are easier to control.
- If paved, sweep and clean storage areas monthly, do not use water to hose down the area unless all of the water will be collected and disposed of properly.
- Install a spill control device (such as a tee section) in any catch basins that collect runoff from any storage areas if the materials stored are oil, gas, or other materials that separate from and float on water. This will allow for easier cleanup if a spill occurs.
- If necessary, protect catch basins while conducting field activities so that if a spill occurs, the material will be contained.

Training

- Educate employees about spill prevention, spill response and cleanup on a routine basis.
- Well-trained employees can reduce human errors that lead to accidental releases or spills:
  - The employees should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.
  - Employees should be familiar with the Spill Prevention Control and Countermeasure Plan if one is available.
- Training of staff from all municipal departments should focus on recognizing and reporting potential or current spills/leaks and who they should contact.
- Employees responsible for aboveground storage tanks and liquid transfers for large bulk containers should be thoroughly familiar with the Spill Prevention Control and Countermeasure Plan and the plan should be readily available.

Spill Response and Prevention

- Identify key spill response personnel and train employees on who they are.
- Store and maintain appropriate spill cleanup materials in a clearly marked location near storage areas; and train employees to ensure familiarity with the site's spill control plan and/or proper spill cleanup procedures.
- Locate spill cleanup materials, such as absorbents, where they will be readily accessible (e.g. near storage and maintenance areas, on field trucks).

SC-11 Spill Prevention, Control & Cleanup

- Follow the Spill Prevention Control and Countermeasure Plan if one is available.
- If a spill occurs, notify the key spill response personnel immediately. If the material is unknown or hazardous, the local fire department may also need to be contacted.
- If safe to do so, attempt to contain the material and block the nearby storm drains so that the area impacted is minimized. If the material is unknown or hazardous wait for properly trained personnel to contain the materials.
- Perform an assessment of the area where the spill occurred and the downstream area that it could impact. Relay this information to the key spill response and clean up personnel.

Spill Cleanup Procedures

- Small non-hazardous spills
  - Use a rag, damp cloth or absorbent materials for general clean up of liquids
  - Use brooms or shovels for the general clean up of dry materials
  - If water is used, it must be collected and properly disposed of. The wash water can not be allowed to enter the storm drain.
  - Dispose of any waste materials properly
  - Clean or dispose of any equipment used to clean up the spill properly
- Large non-hazardous spills
  - Use absorbent materials for general clean up of liquids
  - Use brooms, shovels or street sweepers for the general clean up of dry materials
  - If water is used, it must be collected and properly disposed of. The wash water can not be allowed to enter the storm drain.
  - Dispose of any waste materials properly
  - Clean or dispose of any equipment used to clean up the spill properly
- For hazardous or very large spills, a private cleanup company or Hazmat team may need to be contacted to assess the situation and conduct the cleanup and disposal of the materials.
- Chemical cleanups of material can be achieved with the use of absorbents, gels, and foams. Remove the adsorbent materials promptly and dispose of according to regulations.
- 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.

Reporting

- Report any spills immediately to the identified key municipal spill response personnel.

- Report spills in accordance with applicable reporting laws. Spills that pose an immediate threat to human health or the environment must be reported immediately to the Office of Emergency Service (OES)
- Spills that pose an immediate threat to human health or the environment may also need to be reported within 24 hours 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)
- After the spill has been contained and cleaned up, a detailed report about the incident should be generated and kept on file (see the section on Reporting below). The incident may also be used in briefing staff about proper procedures

Other Considerations

- 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 Plan (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, if permitted to do so, prohibiting any hard connections to the storm drain.

Requirements

Costs

- 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 wastes, contaminated soil and water is very expensive

Maintenance

- 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 response and containment of a spill. A good record keeping system helps the municipality minimize incident recurrence, correctly respond with appropriate containment and cleanup activities, and comply with legal requirements.

SC-11 Spill Prevention, Control & Cleanup

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 drain.

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.

Examples

The City of Palo Alto includes spill prevention and control as a major element of its highly effective program for municipal vehicle maintenance shops.

References and Resources

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

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Parking Area Maintenance SC-43

Description

Parking lots 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 areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

BMPs for other outdoor areas on site (loading/unloading, material storage, and equipment operations) are described in SC-30 through SC-33.

Approach

The goal of this program is to ensure stormwater pollution prevention practices are considered when conducting activities on or around parking 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.

General Pollution Prevention Protocols

- ☐ Encourage advanced designs and maintenance strategies for impervious parking lots. Refer to the treatment control BMP fact sheets in this manual for additional information.
- ☐ Keep accurate maintenance logs to evaluate BMP implementation.

Good Housekeeping

- ☐ Keep all parking areas clean and orderly. Remove debris, litter, and sediments in a timely fashion.
- ☐ Post "No Littering" signs and enforce anti-litter laws.

Objectives
Cover
Contain
Educate
Reduce/Minimize
Product Substitution

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

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- ☐ Provide an adequate number of litter receptacles.
- ☐ Clean out and cover litter receptacles frequently to prevent spillage.

Preventative Maintenance

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.

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.
- ☐ Dispose of parking lot sweeping debris and dirt at a landfill.
- ☐ 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.
- ☐ 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.
  - ✓ Dispose of spilled materials and absorbents appropriately.

Surface Repair

- ☐ Check local ordinance for SUSMP/LID ordinance.
- ☐ 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 during sweeping 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.

Spill Response and Prevention Procedures

- ☐ 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.

Employee Training Program

- ☐ 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.
- ☐ Use a training log or similar method to document training.

Quality Assurance and Record Keeping

- ☐ Keep accurate maintenance logs that document minimum BMP activities performed for parking area maintenance, types and quantities of waste disposed of, and any improvement actions.
- ☐ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- ☐ Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- ☐ Capital investments may be required at some sites to purchase sweeping equipment, train sweeper operators, install oil/water/sand separators, or implement advanced BMPs. These costs can vary significantly depending upon site conditions and the amount of BMPs required.

Maintenance

- Sweep and clean parking lots regularly to minimize pollutant transport into storm drains from stormwater runoff.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Maintain advanced BMPs such as vegetated swales, infiltration trenches, or detention basins as appropriate. Refer to the treatment control fact sheets for more information.

Supplemental Information

Advanced BMPs

Some parking areas may require advanced BMPs to further reduce pollutants in stormwater runoff, and a few examples are listed below. Refer to the Treatment Control Fact Sheets and the New Development and Redevelopment Manual for more information.

- When possible, direct 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.

References and Resources

City of Seattle, Seattle Public Utilities Department of Planning and Development, 2009. *Stormwater Manual Vol. 1 Source Control Technical Requirements Manual.*

California Stormwater Quality Association, 2003. *New Development and Redevelopment Stormwater Best Management Practice Handbook.* Available online at: https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook.

Kennedy/Jenks Consultants, 2007. *The Truckee Meadows Industrial and Commercial Storm Water Best Management Practices Handbook.* Available online at: http://www.cityofsparks.us/sites/default/files/assets/documents/env-control/construction/TM-I-C_BMP_Handbook_2-07-final.pdf.

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities.

Pollution from Surface Cleaning Folder, 1996, 2003. Bay Area Stormwater Management Agencies Association. Available online at: http://basmaa.org/Portals/0/documents/pdf/Pollution%20from%20Surface%20Cleaning.pdf.

Sacramento Stormwater Management Program. *Best Management Practices for Industrial Storm Water Pollution Control.* Available online at: http://www.msa.saccounty.net/sactostormwater/documents/guides/industrial-BMP-manual.pdf.

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

US EPA. *Post-Construction Stormwater Management in New Development and Redevelopment.* BMP Fact Sheets. Available online at: http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=5.

Housekeeping Practices SC-60

Description

Promote efficient and safe housekeeping practices (storage, use, and cleanup) when handling potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals. Related information is provided in BMP fact sheets SC-11 Spill Prevention, Control & Cleanup and SC-34 Waste Handling & Disposal.

Approach

Pollution Prevention

- Purchase only the amount of material that will be needed for foreseeable use. In most cases this will result in cost savings in both purchasing and disposal. See SC-61 Safer Alternative Products for additional information.
- Be aware of new products that may do the same job with less environmental risk and for less or the equivalent cost. Total cost must be used here; this includes purchase price, transportation costs, storage costs, use related costs, clean up costs and disposal costs.

Suggested Protocols

General

- Keep work sites clean and orderly. Remove debris in a timely fashion. Sweep the area.
- Dispose of wash water, sweepings, and sediments, properly.
- Recycle or dispose of fluids properly.
- Establish a daily checklist of office, yard and plant areas to confirm cleanliness and adherence to proper storage and security. Specific employees should be assigned specific inspection responsibilities and given the authority to remedy any problems found.
- Post waste disposal charts in appropriate locations detailing for each waste its hazardous nature (poison, corrosive, flammable), prohibitions on its disposal (dumpster, drain, sewer) and the recommended disposal method (recycle, sewer, burn, storage, landfill).
- Summarize the chosen BMPs applicable to your operation and post them in appropriate conspicuous places.

Objectives

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

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

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- Require a signed checklist from every user of any hazardous material detailing amount taken, amount used, amount returned and disposal of spent material.
- Do a before audit of your site to establish baseline conditions and regular subsequent audits to note any changes and whether conditions are improving or deteriorating.
- Keep records of water, air and solid waste quantities and quality tests and their disposition.
- Maintain a mass balance of incoming, outgoing and on hand materials so you know when there are unknown losses that need to be tracked down and accounted for.
- Use and reward employee suggestions related to BMPs, hazards, pollution reduction, work place safety, cost reduction, alternative materials and procedures, recycling and disposal.
- Have, and review regularly, a contingency plan for spills, leaks, weather extremes etc. Make sure all employees know about it and what their role is so that it comes into force automatically.

Training

- Train all employees, management, office, yard, manufacturing, field and clerical in BMPs and pollution prevention and make them accountable.
- Train municipal employees who handle potentially harmful materials in good housekeeping practices.
- Train personnel who use pesticides in the proper use of the pesticides. The California Department of Pesticide Regulation license pesticide dealers, certify pesticide applicators and conduct onsite inspections.
- Train employees and contractors in proper techniques for spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and Countermeasure (SPCC) plant up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- There are no major limitations to this best management practice.
- There are no regulatory requirements to this BMP. Existing regulations already require municipalities to properly store, use, and dispose of hazardous materials

Requirements

Costs

- Minimal cost associated with this BMP. Implementation of good housekeeping practices may result in cost savings as these procedures may reduce the need for more costly BMPs.

Maintenance

- Ongoing maintenance required to keep a clean site. Level of effort is a function of site size and type of activities.

Supplemental Information

Further Detail of the BMP

- The California Integrated Waste Management Board's Recycling Hotline, 1-800-553-2962, provides information on household hazardous waste collection programs and facilities.

Examples

There are a number of communities with effective programs. The most pro-active include Santa Clara County and the City of Palo Alto, the City and County of San Francisco, and the Municipality of Metropolitan Seattle (Metro).

References and Resources

British Columbia Lake Stewardship Society. Best Management Practices to Protect Water Quality from Non-Point Source Pollution. March 2000.
http://www.nalms.org/bclss/bmphome.html#bmp

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

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities, Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July, 1998, Revised by California Coastal Commission, February 2002.

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Mateo STOPPP - (http://stoppp.tripod.com/bmp.html)

Road and Street Maintenance SC-70

Objectives

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

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Description

Streets, roads, and highways are significant sources of pollutants in stormwater discharges, and operation and maintenance (O&M) practices, if not conducted properly, can contribute to the problem. Stormwater pollution from roadway and bridge maintenance should be addressed on a site-specific basis. Use of the procedures outlined below, that address street sweeping and repair, bridge and structure maintenance, and unpaved roads will reduce pollutants in stormwater.

Approach

Pollution Prevention

- Use the least toxic materials available (e.g. water based paints, gels or sprays for graffiti removal)
- Recycle paint and other materials whenever possible.
- Enlist the help of citizens to keep yard waste, used oil, and other wastes out of the gutter.

Suggested Protocols

Street Sweeping and Cleaning

- Maintain a consistent sweeping schedule. Provide minimum monthly sweeping of curbed streets.
- Perform street cleaning during dry weather if possible.

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- Avoid wet cleaning or flushing of street, and utilize dry methods where possible.
- Consider increasing sweeping frequency based on factors such as traffic volume, land use, field observations of sediment and trash accumulation, proximity to water courses, etc. For example:
  - Increase the sweeping frequency for streets with high pollutant loadings, especially in high traffic and industrial areas.
  - Increase the sweeping frequency just before the wet season to remove sediments accumulated during the summer.
  - Increase the sweeping frequency for streets in special problem areas such as special events, high litter or erosion zones.
- Maintain cleaning equipment in good working condition and purchase replacement equipment as needed. Old sweepers should be replaced with new technologically advanced sweepers (preferably regenerative air sweepers) that maximize pollutant removal.
- Operate sweepers at manufacturer requested optimal speed levels to increase effectiveness.
- To increase sweeping effectiveness consider the following:
  - Institute a parking policy to restrict parking in problematic areas during periods of street sweeping.
  - Post permanent street sweeping signs in problematic areas; use temporary signs if installation of permanent signs is not possible.
  - Develop and distribute flyers notifying residents of street sweeping schedules.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- If available use vacuum or regenerative air sweepers in the high sediment and trash areas (typically industrial/commercial).
- Keep accurate logs of the number of curb-miles swept and the amount of waste collected.
- Dispose of street sweeping debris and dirt at a landfill.
- Do not store swept material along the side of the street or near a storm drain inlet.
- Keep debris storage to a minimum during the wet season or make sure debris piles are contained (e.g. by berming the area) or covered (e.g. with tarps or permanent covers).

Street Repair and Maintenance

Pavement marking

- Schedule pavement marking activities for dry weather.

- Develop paint handling procedures for proper use, storage, and disposal of paints.
- Transfer and load paint and hot thermoplastic away from storm drain inlets.
- Provide drop cloths and drip pans in paint mixing areas.
- Properly maintain application equipment.
- Street sweep thermoplastic grindings. Yellow thermoplastic grindings may require special handling as they may contain lead.
- Paints containing lead or tributyltin are considered a hazardous waste and must be disposed of properly.
- Use water based paints whenever possible. If using water based paints, clean the application equipment in a sink that is connected to the sanitary sewer.
- Properly store leftover paints if they are to be kept for the next job, or dispose of properly.

Concrete installation and repair

- Schedule asphalt and concrete activities for dry weather.
- Take measures to protect any nearby storm drain inlets and adjacent watercourses, prior to breaking up asphalt or concrete (e.g. place san bags around inlets or work areas).
- Limit the amount of fresh concrete or cement mortar mixed, mix only what is needed for the job.
- Store concrete materials under cover, away from drainage areas. Secure bags of cement after they are open. Be sure to keep wind-blown cement powder away from streets, gutters, storm drains, rainfall, and runoff.
- Return leftover materials to the transit mixer. Dispose of small amounts of hardened excess concrete, grout, and mortar in the trash.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile, or dispose in the trash.
- When making saw cuts in pavement, use as little water as possible and perform during dry weather. Cover each storm drain inlet completely with filter fabric or plastic during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the inlets. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site. Alternatively, a small onsite vacuum may be used to pick up the slurry as this will prohibit slurry from reaching storm drain inlets.
- Wash concrete trucks off site or in designated areas on site designed to preclude discharge of wash water to drainage system.

Patching, resurfacing, and surface sealing

- Schedule patching, resurfacing and surface sealing for dry weather.
- Stockpile materials away from streets, gutter areas, storm drain inlets or watercourses. During wet weather, cover stockpiles with plastic tarps or berm around them if necessary to prevent transport of materials in runoff.
- Pre-heat, transfer or load hot bituminous material away from drainage systems or watercourses.
- Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and maintenance holes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from covered maintenance holes and storm drain inlets when the job is complete.
- Prevent excess material from exposed aggregate concrete or similar treatments from entering streets or storm drain inlets. Designate an area for clean up and proper disposal of excess materials.
- Use only as much water as necessary for dust control, to avoid runoff.
- Sweep, never hose down streets to clean up tracked dirt. Use a street sweeper or vacuum truck. Do not dump vacuumed liquid in storm drains.
- 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.

Equipment cleaning maintenance and storage

- Inspect equipment daily and repair any leaks. Place drip pans or absorbent materials under heavy equipment when not in use.
- Perform major equipment repairs at the corporation yard, when practical.
- If refueling or repairing vehicles and equipment must be done onsite, use a location away from storm drain inlets and watercourses.
- Clean equipment including sprayers, sprayer paint supply lines, patch and paving equipment, and mud jacking equipment at the end of each day. Clean in a sink or other area (e.g. vehicle wash area) that is connected to the sanitary sewer.

Bridge and Structure Maintenance

Paint and Paint Removal

- Transport paint and materials to and from job sites in containers with secure lids and tied down to the transport vehicle.
- Do not transfer or load paint near storm drain inlets or watercourses.

- Test and inspect spray equipment prior to starting to paint. Tighten all hoses and connections and do not overfill paint container.
- Plug nearby storm drain inlets prior to starting painting where there is significant risk of a spill reaching storm drains. Remove plugs when job is completed.
- If sand blasting is used to remove paint, cover nearby storm drain inlets prior to starting work.
- Perform work on a maintenance traveler or platform, or use suspended netting or tarps to capture paint, rust, paint removing agents, or other materials, to prevent discharge of materials to surface waters if the bridge crosses a watercourse. If sanding, use a sander with a vacuum filter bag.
- Capture all clean-up water, and dispose of properly.
- Recycle paint when possible (e.g. paint may be used for graffiti removal activities). Dispose of unused paint at an appropriate household hazardous waste facility.

Graffiti Removal

- Schedule graffiti removal activities for dry weather.
- Protect nearby storm drain inlets prior to removing graffiti from walls, signs, sidewalks, or other structures needing graffiti abatement. Clean up afterwards by sweeping or vacuuming thoroughly, and/or by using absorbent and properly disposing of the absorbent.
- When graffiti is removed by painting over, implement the procedures under Painting and Paint Removal above.
- Direct runoff from sand blasting and high pressure washing (with no cleaning agents) into a landscaped or dirt area. If such an area is not available, filter runoff through an appropriate filtering device (e.g. filter fabric) to keep sand, particles, and debris out of storm drains.
- If a graffiti abatement method generates wash water containing a cleaning compound (such as high pressure washing with a cleaning compound), plug nearby storm drains and vacuum/pump wash water to the sanitary sewer.
- Consider using a waterless and non-toxic chemical cleaning method for graffiti removal (e.g. gels or spray compounds).

Repair Work

- Prevent concrete, steel, wood, metal parts, tools, or other work materials from entering storm drains or watercourses.
- Thoroughly clean up the job site when the repair work is completed.
- When cleaning guardrails or fences follow the appropriate surface cleaning methods (depending on the type of surface) outlined in SC-71 Plaza & Sidewalk Cleaning fact sheet.

- If painting is conducted, follow the painting and paint removal procedures above.
- If graffiti removal is conducted, follow the graffiti removal procedures above.
- If construction takes place, see the Construction Activity BMP Handbook.
- Recycle materials whenever possible.

Unpaved Roads and Trails

- Stabilize exposed soil areas to prevent soil from eroding during rain events. This is particularly important on steep slopes.
- For roadside areas with exposed soils, the most cost-effective choice is to vegetate the area, preferably with a mulch or binder that will hold the soils in place while the vegetation is establishing. Native vegetation should be used if possible.
- If vegetation cannot be established immediately, apply temporary erosion control mats/blankets; a comma straw, or gravel as appropriate.
- If sediment is already eroded and mobilized in roadside areas, temporary controls should be installed. These may include: sediment control fences, fabric-covered triangular dikes, gravel-filled burlap bags, biobags, or hay bales staked in place.

Non-Stormwater Discharges

Field crews should be aware of non-stormwater discharges as part of their ongoing street maintenance efforts.

- Refer to SC-10 Non-Stormwater Discharges
- Identify location, time and estimated quantity of discharges.
- Notify appropriate personnel.

Training

- Train employees regarding proper street sweeping operation and street repair and maintenance.
- Instruct employees and subcontractors to ensure that measures to reduce the stormwater impacts of roadway/bridge maintenance are being followed.
- Require engineering staff and/or consulting A/E firms to address stormwater quality in new bridge designs or existing bridge retrofits.
- Use a training log or similar method to document training.
- Train employees on proper spill containment and clean up, and in identifying non-stormwater discharges.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Densely populated areas or heavily used streets may require parking regulations to clear streets for cleaning.
- No currently available conventional sweeper is effective at removing oil and grease. Mechanical sweepers are not effective at removing finer sediments.
- Limitations may arise in the location of new bridges. The availability and cost of land and other economic and political factors may dictate where the placement of a new bridge will occur. Better design of the bridge to control runoff is required if it is being placed near sensitive waters.

Requirements

Costs

- The maintenance of local roads and bridges is already a consideration of most community public works or transportation departments. Therefore, the cost of pollutant reducing management practices will involve the training and equipment required to implement these new practices.
- The largest expenditures for street sweeping programs are in staffing and equipment. The capital cost for a conventional street sweeper is between $60,000 and $120,000. Newer technologies might have prices approaching $180,000. The average useful life of a conventional sweeper is about four years, and programs must budget for equipment replacement. Sweeping frequencies will determine equipment life, so programs that sweep more often should expect to have a higher cost of replacement.
- A street sweeping program may require the following.
  - Sweeper operators, maintenance, supervisory, and administrative personnel are required.
  - Traffic control officers may be required to enforce parking restrictions.
  - Skillful design of cleaning routes is required for program to be productive.
  - Arrangements must be made for disposal of collected wastes.

- If investing in newer technologies, training for operators must be included in operation and maintenance budgets. Costs for public education are small, and mostly deal with the need to obey parking restrictions and litter control. Parking tickets are an effective reminder to obey parking rules, as well as being a source of revenue.

Maintenance

- Not applicable

Supplemental Information

Further Detail of the BMP

Street sweeping

There are advantages and disadvantages to the two common types of sweepers. The best choice depends on your specific conditions. Many communities find it useful to have a compliment of both types in their fleet.

Mechanical Broom Sweepers - More effective at picking up large debris and cleaning wet streets. Less costly to purchase and operate. Create more airborne dust.

Vacuum Sweepers - More effective at removing fine particles and associated heavy metals. Ineffective at cleaning wet streets. Noisier than mechanical broom sweepers which may restrict areas or times of operation. May require an advance vehicle to remove large debris.

Street Flushers - Not affected by biggest interference to cleaning, parked cars. May remove finer sediments, moving them toward the gutter and stormwater inlets. For this reason, flushing fell out of favor and is now used primarily after sweeping. Flushing may be effective for combined sewer systems. Presently street flushing is not allowed under most NPDES permits.

Cross-Media Transfer of Pollutants

The California Air Resources Board (ARB) has established state ambient air quality standards including a standard for respirable particulate matter (less than or equal to 10 microns in diameter, symbolized as PM10). In the effort to sweep up finer sediments to remove attached heavy metals, municipalities should be aware that fine dust, that cannot be captured by the sweeping equipment and becomes airborne, could lead to issues of worker and public safety.

Bridges

Bridges that carry vehicular traffic generate some of the more direct discharges of runoff to surface waters. Bridge scupper drains cause a direct discharge of stormwater into receiving waters and have been shown to carry relatively high concentrations of pollutants. Bridge maintenance also generates wastes that may be either directly deposited to the water below or carried to the receiving water by stormwater. The following steps will help reduce the stormwater impacts of bridge maintenance:

- Site new bridges so that significant adverse impacts to wetlands, sensitive areas, critical habitat, and riparian vegetation are minimized.

- Design new bridges to avoid the use of scupper drains and route runoff to land for treatment control. Existing scupper drains should be cleaned on a regular basis to avoid sediment/debris accumulation.
- Reduce the discharge of pollutants to surface waters during maintenance by using suspended traps, vacuums, or booms in the water to capture paint, rust, and paint removing agents. Many of these wastes may be hazardous. Properly dispose of this waste by referring to CA21 (Hazardous Waste Management) in the Construction Handbook.
- Train employees and subcontractors to reduce the discharge of wastes during bridge maintenance.

De-icing

- Do not over-apply deicing salt and sand, and routinely calibrate spreaders.
- Near reservoirs, restrict the application of deicing salt and redirect any runoff away from reservoirs.
- Consider using alternative deicing agents (less toxic, biodegradable, etc.).

References and Resources

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

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

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

Santa Clara Valley Urban Runoff Pollution Prevention Program. 2001. Fresh Concrete and Mortar Application Best Management Practices for the Construction Industry. June.

Santa Clara Valley Urban Runoff Pollution Prevention Program. 2001. Roadwork and Paving Best Management Practices for the Construction Industry. June.

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Roadway and Bridge Maintenance. On-line
http://www.epa.gov/npdes/menuofbmps/poll_13.htm

Drainage System Maintenance SC-74

Photo Credit: Geoff Brosseau

Objectives

- Contain
- Educate
- Reduce/Minimize

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff that may contain certain pollutants. Maintaining catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis will remove pollutants, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Approach

Suggested Protocols

Catch Basins/Inlet Structures

- Municipal staff should regularly inspect facilities to ensure 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 SC-75 Waste Handling and Disposal).
- Clean catch basins, storm drain inlets, and other conveyance structures in high pollutant load areas just before the wet season to remove sediments and debris accumulated during the summer.

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- 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.
- Record the amount of waste collected.
- 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 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 of. Do not dewater near a storm drain or stream.
- Except for small communities with relatively few catch basins that may be cleaned manually, most municipalities will require mechanical cleaners such as eductors, vacuums, or bucket loaders.

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 flushed effluent and pump to the sanitary sewer for treatment.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge from cleaning a storm drain pump station or other facility to reach the storm drain system.
- Conduct quarterly routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.
- Sample collected sediments to determine if landfill disposal is possible, or illegal discharges in the watershed are occurring.

Open Channel

- Consider modification of storm channel characteristics to improve channel hydraulics, to increase pollutant removals, and to 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

- During routine maintenance of conveyance system and drainage structures field staff should look for evidence of illegal discharges or illicit connections:
  - 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 up gradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
  - Once the origin of flow is established, require illicit discharger to eliminate the discharge.
- Stencil 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

- Regularly inspect and clean up hot spots and other storm drainage areas 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.

- The State Department of Fish and Game has a hotline for reporting violations called Cal TIP (1-800-952-5400). The phone number may be used to report any violation of a Fish and Game code (illegal dumping, poaching, etc.).
- The California Department of Toxic Substances Control's Waste Alert Hotline, 1-800-69TOXIC, can be used to report hazardous waste violations.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Only properly trained individuals are allowed to handle hazardous materials/wastes.
- Train municipal employees from all departments (public works, utilities, street cleaning, parks and recreation, industrial waste inspection, hazardous waste inspection, sewer maintenance) to recognize and report illegal dumping.
- Train municipal employees and educate businesses, contractors, and the general public in proper and consistent methods for disposal.
- Train municipal staff regarding non-stormwater discharges (See SC-10 Non-Stormwater Discharges).

Spill Response and Prevention

- Refer to SC-11, Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Cleanup 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 disposal of flushed effluent to sanitary sewer may be prohibited in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Municipal codes should include sections prohibiting the discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.
- Private property access rights may be needed to track illegal discharges up gradient.

- Requirements of municipal ordinance authority for suspected source verification testing for illicit connections necessary for guaranteed rights of entry.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget. A careful study of cleaning effectiveness should be undertaken before increased cleaning is implemented. Catch basin cleaning costs are less expensive if vacuum street sweepers are available; cleaning catch basins manually can cost approximately twice as much as cleaning the basins with a vacuum attached to a sweeper.

- 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. Encouraging reporting of illicit discharges by employees can offset costs by saving expense on inspectors and directing resources more efficiently. Some programs have used funds available from "environmental fees" or special assessment districts to fund their illicit connection elimination programs.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.

- Identifying illicit discharges requires teams of at least two people (volunteers can be used), plus administrative personnel, depending on the complexity of the storm sewer system.

- Arrangements must be made for proper disposal of collected wastes.

- Requires technical staff to detect and investigate illegal dumping violations, and to coordinate public education.

Supplemental Information

Further Detail of the BMP

Storm Drain flushing

Sanitary sewer flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in sanitary sewer systems. The same principles that make sanitary sewer flushing effective can be used to flush storm drains. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as to an open channel, to another point where flushing will be initiated, or over to the sanitary sewer and on to the treatment facilities, thus preventing re-suspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. The 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, releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce the impacts of stormwater pollution, a second inflatable device, placed well downstream, may be used to re-collect 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 re-collect 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 percent for organics and 55-65 percent 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 drain flushing.

Flow Management

Flow management has been one of the principal motivations for designing urban stream corridors in the past. Such needs may or may not be compatible with the stormwater quality goals in the stream corridor.

Downstream flood peaks can be suppressed by reducing through flow velocity. This can be accomplished by reducing gradient with grade control structures or increasing roughness with boulders, dense vegetation, or complex banks forms. Reducing velocity correspondingly increases flood height, so all such measures have a natural association with floodplain open space. Flood elevations laterally adjacent to the stream can be lowered by increasing through flow velocity.

However, increasing velocity increases flooding downstream and inherently conflicts with channel stability and human safety. Where topography permits, another way to lower flood elevation is to lower the level of the floodway with drop structures into a large but subtly excavated bowl where flood flows we allowed to spread out.

Stream Corridor Planning

Urban streams receive and convey stormwater flows from developed or developing watersheds. Planning of stream corridors thus interacts with urban stormwater management programs. If local programs are intended to control or protect downstream environments by managing flows delivered to the channels, then it is logical that such programs should be supplemented by management of the materials, forms, and uses of the downstream riparian corridor. Any proposal for steam alteration or management should be investigated for its potential flow and stability effects on upstream, downstream, and laterally adjacent areas. The timing and rate of flow from various tributaries can combine in complex ways to alter flood hazards. Each section of channel is unique, influenced by its own distribution of roughness elements, management activities, and stream responses.

Flexibility to adapt to stream features and behaviors as they evolve must be included in stream reclamation planning. The amenity and ecology of streams may be enhanced through the landscape design options of 1) corridor reservation, 2) bank treatment, 3) geomorphic restoration, and 4) grade control.

Corridor reservation - Reserving stream corridors and valleys to accommodate natural stream meandering, aggradation, degradation, and over bank flows allows streams to find their own form and generate less ongoing erosion. In California, open stream corridors in recent urban developments have produced recreational open space, irrigation of streamside plantings, and the aesthetic amenity of flowing water.

Bank treatment - The use of armoring, vegetative cover, and flow deflection may be used to influence a channel's form, stability, and biotic habitat. To prevent bank erosion, armoring can be done with rigid construction materials, such as concrete, masonry, wood planks and logs, riprap, and gabions. Concrete linings have been criticized because of their lack of provision of biotic habitat. In contrast, riprap and gabions make relatively porous and flexible linings. Boulders, placed in the bed reduce velocity and erosive power.

Riparian vegetation can stabilize the banks of streams that are at or near a condition of equilibrium. Binding networks of roots increase bank shear strength. During flood flows, resilient vegetation is forced into erosion-inhibiting mats. The roughness of vegetation leads to lower velocity, further reducing erosive effects. Structural flow deflection can protect banks from erosion or alter fish habitat. By concentrating flow, a deflector causes a pool to be scoured in the bed.

Geomorphic restoration – Restoration refers to alteration of disturbed streams so their form and behavior emulate those of undisturbed streams. Natural meanders are retained, with grading to gentle slopes on the inside of curves to allow point bars and riffle-pool sequences to develop. Trees are retained to provide scenic quality, biotic productivity, and roots for bank stabilization, supplemented by plantings where necessary.

A restorative approach can be successful where the stream is already approaching equilibrium. However, if upstream urbanization continues new flow regimes will be generated that could disrupt the equilibrium of the treated system.

Grade Control - A grade control structure is a level shelf of a permanent material, such as stone, masonry, or concrete, over which stream water flows. A grade control structure is called a sill, weir, or drop structure, depending on the relation of its invert elevation to upstream and downstream channels.

A sill is installed at the preexisting channel bed elevation to prevent upstream migration of nick points. It establishes a firm base level below which the upstream channel can not erode.

A weir or check dam is installed with invert above the preexisting bed elevation. A weir raises the local base level of the stream and causes aggradation upstream. The gradient, velocity, and erosive potential of the stream channel are reduced. A drop structure lowers the downstream invert below its preexisting elevation, reducing downstream gradient and velocity. Weirs and drop structure control erosion by dissipating energy and reducing slope velocity.

When carefully applied, grade control structures can be highly versatile in establishing human and environmental benefits in stabilized channels. To be successful, application of grade control structures should be guided by analysis of the stream system both upstream and downstream from the area to he reclaimed.

Examples

The California Department of Water Resources began the Urban Stream Restoration Program in 1985. The program provides grant funds to municipalities and community groups to implement stream restoration projects. The projects reduce damages from streambank aid watershed instability arid floods while restoring streams' aesthetic, recreational, and fish and wildlife values.

In Buena Vista Park, upper floodway slopes are gentle and grassed to achieve continuity of usable park land across the channel of small boulders at the base of the slopes.

The San Diego River is a large, vegetative lined channel, which was planted in a variety of species to support riparian wildlife while stabilizing the steep banks of the floodway.

References and Resources

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

Los Angeles County Stormwater Quality. Public Agency Activities Model Program. On-line: http://ladpw.org/wmd/npdes/public_TC.cfm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) Municipal Activities Model Program Guidance. 2001. Project Clean Water. November.

United States Environmental Protection Agency (USEPA). 1999. Stormwater Management Fact Sheet Non-stormwater Discharges to Storm Sewers. EPA 832-F-99-022. Office of Water, Washington, D.C. September.

United States Environmental Protection Agency (USEPA). 1999. Stormwater O&M Fact Sheet Catch Basin Cleaning. EPA 832-F-99-011. Office of Water, Washington, D.C. September.

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Illegal Dumping Control. On line: http://www.epa.gov/npdes/menuofbmps/poll_7.htm

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

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

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

– 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.

- 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.

Outdoor Processing Areas SD-36

Description

Outdoor process equipment operations such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, landfills, waste piles, wastewater and solid waste treatment and disposal, and others operations may contribute a variety of toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to the storm conveyance system.

Approach

Outdoor processing areas require a drainage approach different from the typical infiltration/detention strategy. In outdoor process equipment areas, infiltration is discouraged. Containment is encouraged, accompanied by collection and conveyance. Preventative measures include enclosures, secondary containment structures, dead-end sumps, and conveyance to treatment facilities in accordance with conditions established by the applicable sewer agency.

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 commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for outdoor processing areas are governed by Building and Fire codes, and by current local agency ordinances, and zoning requirements.

Designing New Installations

Operations determined to be a potential threat to water quality should consider to the following recommendations:

- Cover or enclose areas that would be the most significant source of pollutants; or slope the area toward a dead-end sump; or, discharge to the sanitary sewer system following appropriate treatment in accordance with conditions established by the applicable sewer agency.
- Grade or berm area to prevent run-on from surrounding areas.
- Do not install storm drains in areas of equipment repair.
- Consider other features that are comparable or equally effective.
- Provide secondary containment structures (not double wall containers) where wet material processing occurs (e.g., electroplating), to hold spills resulting from accidents, leaking tanks, or equipment, or any other unplanned releases (Note: if these are plumbed to the sanitary sewer, they must be with the prior approval of the sewering agency.)

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

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

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.

Attachment B

BMP Design & Calculations

BMP Calculations

Simple Method Runoff Coefficient for Volume-Based BMP Sizing

Design Capture Volume (DCV):

DCV = C × d × A × 43560 ft^2/ac × 1/12 in/ft

C = runoff coefficient = (0.75 × impervious + 0.15)

d = storm depth (inches) = 0.75 in, refer to
North OC TGD, Figure XVI-1 (attached herein)

A = tributary area (acres)

Simple Method Runoff Coefficient for Flow-Based BMP Sizing

Design Flowrate (Q):

Q = C × i × A

C = runoff coefficient = (0.75 × impervious + 0.15)

i = rainfall intensity (inches/hour) = 0.26 in/hr (T_c ≈ 5 minutes), refer to
North OC TGD, Appendix III, Capture Efficiency Figure (attached herein)

A = tributary area (acres)

DMA ID	BMP ID	A (ac)	Imp	C	DCV (ft^3)	Q (cfs)
1	1	1.070	66.4%	0.648	1,888	0.180

SUBJECT TO FURTHER REVISION

LEGEND

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

Rainfall Zones

Design Capture Storm Depth (inches)

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

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

0.7 0.75 0.8 0.85 0.9 0.95 1 1.05 1.1

PROJECT

0 3 6 12 Kilometers
0 1.8 3.6 7.2 Miles

TITLE: RAINFALL ZONES

JOB: ORANGE COUNTY TECHNICAL GUIDANCE DOCUMENT — ORANGE CO. CA

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

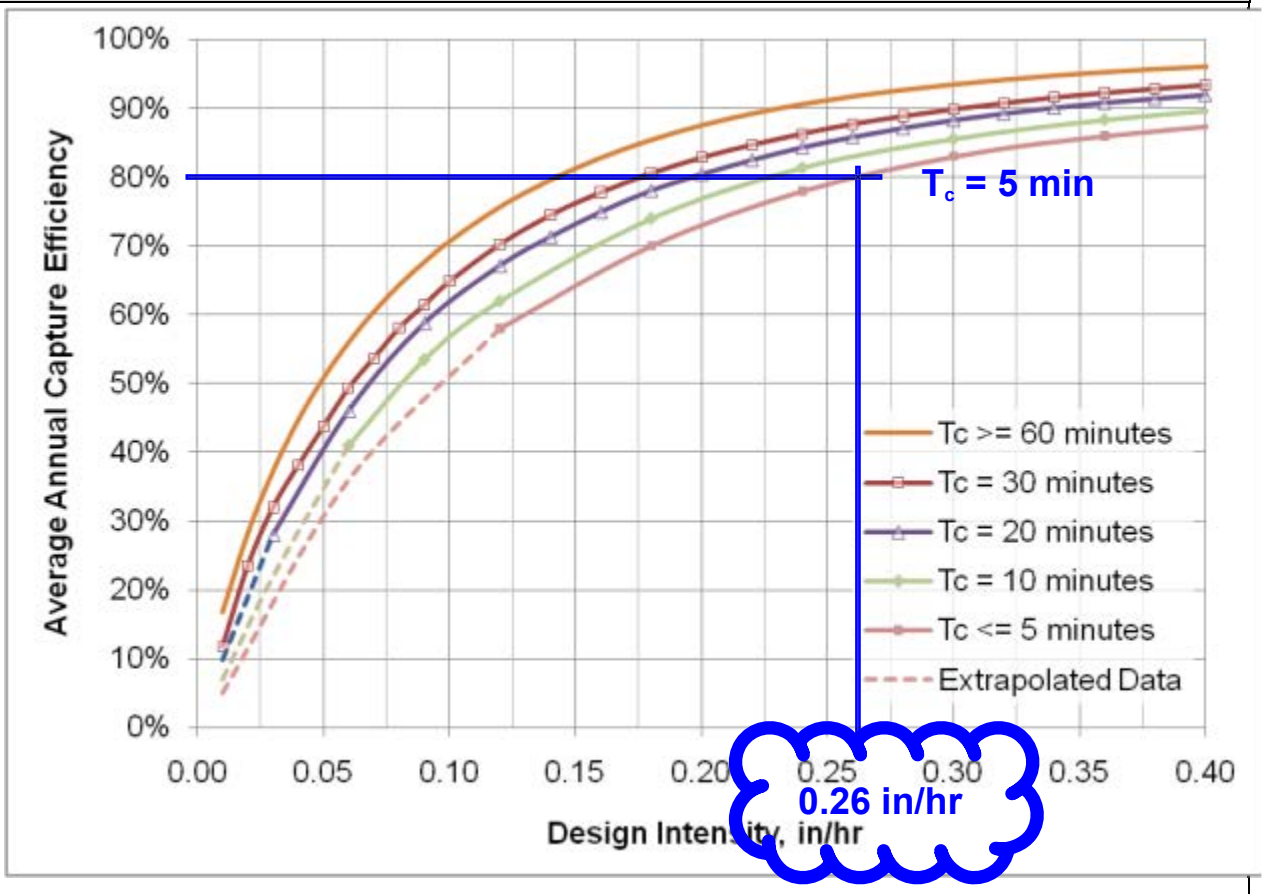
PACE Advanced Water Engineering

FIGURE XVI-1

P:\9526E\16-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-1_RainfallZones_20110215.mxd

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Graphical Operations



Provide supporting graphical operations. See Example III.7.

Gravel Storage BMP Calculations

2-year, 24-hour

Condition	Area (ac)	Impervious	Vol (ac-ft)	Vol (cu ft)
Pre-Proj	1.07	0.0%	0.05	2,178
Post-Proj	1.07	66.4%	0.12	5,227

Refer to Advanced Engineering Software (AES) Small Area Unit Hydrograph (SA UH)
Calculations for 2-year, 24-hour volumes

Required Storage Volume = (Post Proj Vol) – (Pre Proj Vol)
Required Storage Volume = 3,049 cu ft

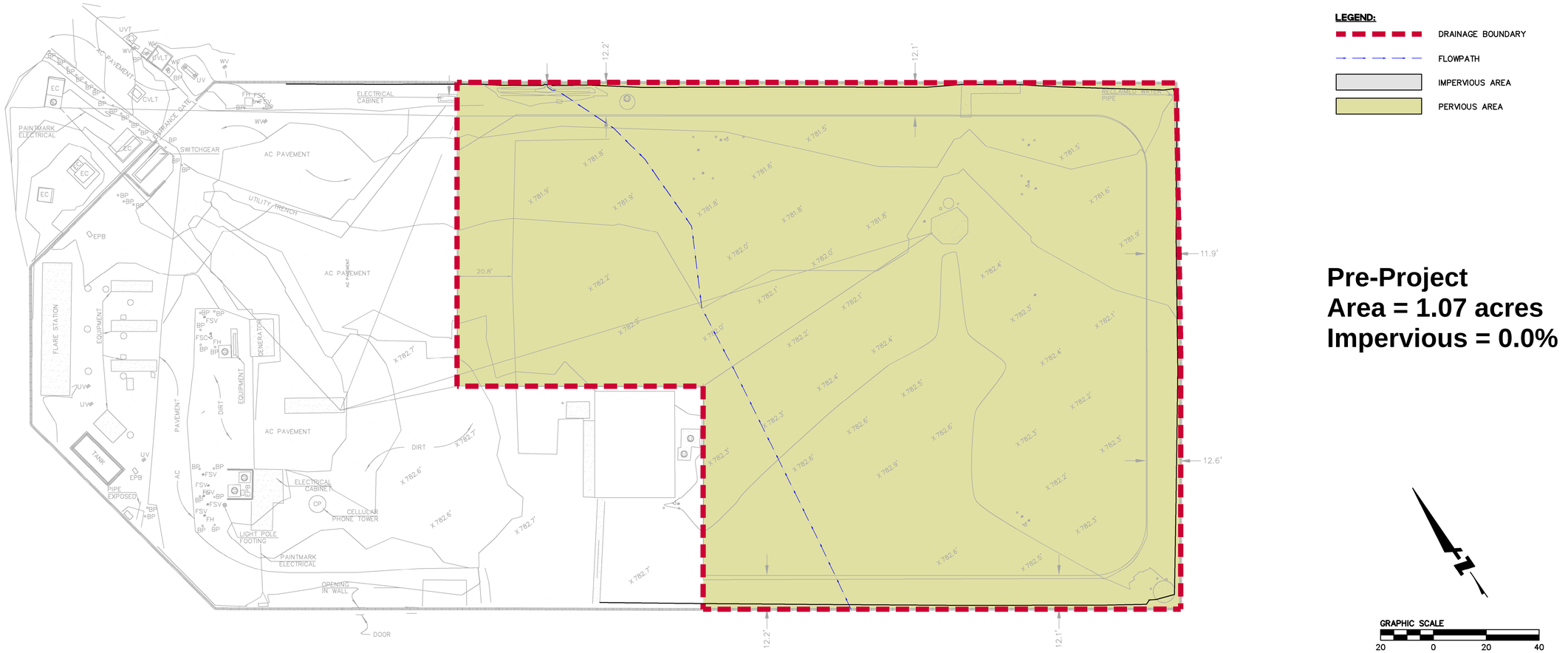
Gravel Void Ratio = 40.0%

Required Gravel Volume = 3049 cu ft / 40%
Required Gravel Volume = 7,623 cu ft

2-Year 24-Hour Storm

Advanced Engineering Software (AES)

Rational Method (RM) Calculations



Pre-Project
Area = 1.07 acres
Impervious = 0.0%

CONFIDENTIAL

NOT FOR CONSTRUCTION

ISSUE FOR BID

REV	DATE	DESCRIPTION	DRN BY	CHK BY	APRV BY
0	11/16/23	ISSUE FOR BID	DMM	VL	RTC

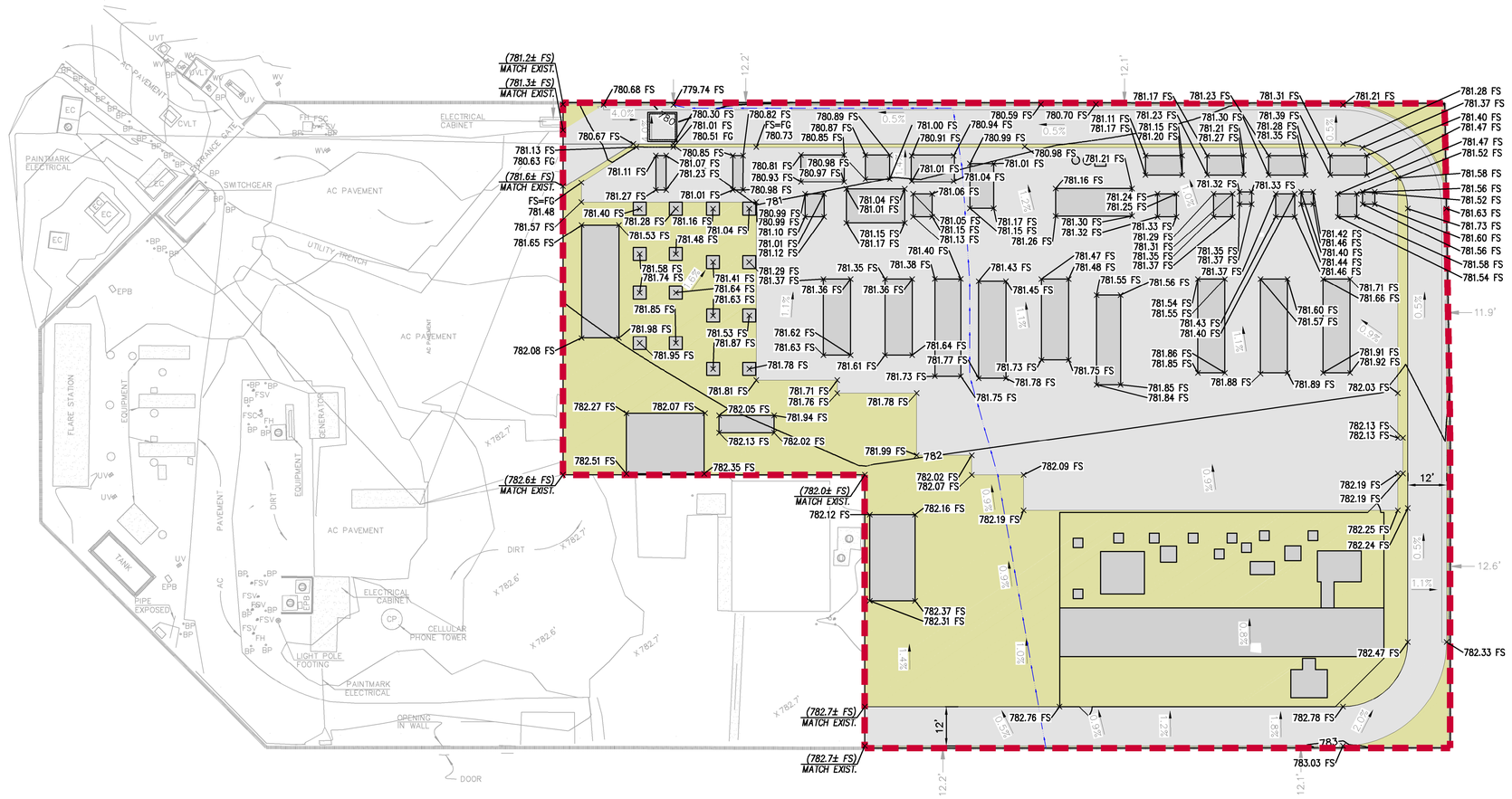
CIVIL ENGINEER:
BKF ENGINEERS
4675 MACARTHUR CT., SUITE 400
NEWPORT BEACH, CA 92660
(949) 526-8640
www.bkf.com

OWNER:
ARCHAEA ENERGY
4444 WESTHEIMER ROAD, SUITE G450
HOUSTON, TX 77027
Ph: (346) 708-8272

ENGINEER:
BIOGAS ENGINEERING
2321 E. 28TH STREET, SUITE 400
SIGNAL HILL, CA 90755, Ph: (562) 726-3565
EMAIL: INFO@BIOGASENG.COM

PRE-PROJECT DRAINAGE AREA

COYOTE CANYON LANDFILL
RNG PROJECT
20662 NEWPORT COAST DRIVE
NEWPORT BEACH, CA 92657



LEGEND:

- DRAINAGE BOUNDARY
- FLOWPATH
- IMPERVIOUS AREA
- PERVIOUS AREA

Post-Project
Area = 1.07 Acres
Impervious = 66.4%

GRAPHIC SCALE
20 0 20 40

CONFIDENTIAL

NOT FOR CONSTRUCTION

ISSUE FOR BID

REV	DATE	DESCRIPTION	DRN BY	CHK BY	APRV BY
0	11/16/23	ISSUE FOR BID	DMM	VL	RTC

CIVIL ENGINEER:
BKF ENGINEERS
4675 MACARTHUR CT., SUITE 400
NEWPORT BEACH, CA 92660
(949) 526-8640
www.bkf.com

OWNER:
ARCHAEA ENERGY
4444 WESTHEIMER ROAD, SUITE G450
HOUSTON, TX 77027
Ph: (346) 708-8272

ENGINEER:
BIOGAS ENGINEERING
2321 E. 28TH STREET, SUITE 400
SIGNAL HILL, CA 90755, Ph: (562) 726-3565
EMAIL: INFO@BIOGASENG.COM

POST-PROJECT DRAINAGE AREA

COYOTE CANYON LANDFILL
RNG PROJECT
20662 NEWPORT COAST DRIVE
NEWPORT BEACH, CA 92657

```
**************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1676

                          Analysis prepared by:




--------------------------------------------------------------------------
  FILE NAME: CCLPRE.DAT
  TIME/DATE OF STUDY: 12:06 12/11/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

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

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

**************************************************************************
  FLOW PROCESS FROM NODE    101.10 TO NODE    101.20 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   230.00
  ELEVATION DATA: UPSTREAM(FEET) =    782.80  DOWNSTREAM(FEET) =    779.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.938
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.444
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  URBAN POOR COVER
  "TURF"                     D        1.07      0.20     1.000    73   10.94
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.20
  TOTAL AREA(ACRES) =      1.07   PEAK FLOW RATE(CFS) =      1.20
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.1  TC(MIN.) =     10.94
  EFFECTIVE AREA(ACRES) =      1.07  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       1.20
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
        (c) Copyright 1983-2016 Advanced Engineering Software (aes)
            Ver. 23.0  Release Date: 07/01/2016  License ID 1676

                        Analysis prepared by:


--------------------------------------------------------------------------
  FILE NAME: CCLPST.DAT
  TIME/DATE OF STUDY: 09:55 06/11/2024
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

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

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

**************************************************************************
  FLOW PROCESS FROM NODE    201.10 TO NODE    201.20 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   280.00
  ELEVATION DATA: UPSTREAM(FEET) =    782.80  DOWNSTREAM(FEET) =    779.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.127
```

```
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.847
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  URBAN POOR COVER
  "TURF"                      D        0.28      0.20     1.000    73   12.31
  COMMERCIAL                  D        0.79      0.20     0.100    57    7.13
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.336
  SUBAREA RUNOFF(CFS) =      1.71
  TOTAL AREA(ACRES) =      1.07   PEAK FLOW RATE(CFS) =      1.71
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.1  TC(MIN.) =      7.13
  EFFECTIVE AREA(ACRES) =      1.07  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.336
  PEAK FLOW RATE(CFS)   =       1.71
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

2-Year 24-Hour Storm

Advanced Engineering Software (AES)

Small Area Unit Hydrograph (SA UH) Calculations

```
================================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

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

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1          1.07      100.00       87.(AMC II)     0.200       0.167

    TOTAL AREA (Acres) =      1.07

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.200

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.833
================================================================================
```

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 1.07
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.200
LOW LOSS FRACTION = 0.833
TIME OF CONCENTRATION(MIN.) = 10.90
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 2
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.19
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.40
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.53
3-HOUR POINT RAINFALL VALUE(INCHES) = 0.89
6-HOUR POINT RAINFALL VALUE(INCHES) = 1.22
24-HOUR POINT RAINFALL VALUE(INCHES) = 2.05

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.05
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.14

****

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.01	0.0000	0.00	Q	.	.	.	.
0.20	0.0000	0.01	Q	.	.	.	.
0.38	0.0001	0.01	Q	.	.	.	.
0.56	0.0002	0.01	Q	.	.	.	.
0.74	0.0003	0.01	Q	.	.	.	.
0.92	0.0004	0.01	Q	.	.	.	.
1.10	0.0004	0.01	Q	.	.	.	.
1.29	0.0005	0.01	Q	.	.	.	.
1.47	0.0006	0.01	Q	.	.	.	.
1.65	0.0007	0.01	Q	.	.	.	.
1.83	0.0008	0.01	Q	.	.	.	.
2.01	0.0008	0.01	Q	.	.	.	.
2.19	0.0009	0.01	Q	.	.	.	.
2.38	0.0010	0.01	Q	.	.	.	.
2.56	0.0011	0.01	Q	.	.	.	.
2.74	0.0012	0.01	Q	.	.	.	.
2.92	0.0013	0.01	Q	.	.	.	.
3.10	0.0014	0.01	Q	.	.	.	.
3.28	0.0014	0.01	Q	.	.	.	.
3.47	0.0015	0.01	Q	.	.	.	.
3.65	0.0016	0.01	Q	.	.	.	.
3.83	0.0017	0.01	Q	.	.	.	.
4.01	0.0018	0.01	Q	.	.	.	.
4.19	0.0019	0.01	Q	.	.	.	.
4.37	0.0020	0.01	Q	.	.	.	.
4.56	0.0021	0.01	Q	.	.	.	.
4.74	0.0022	0.01	Q	.	.	.	.
4.92	0.0023	0.01	Q	.	.	.	.
5.10	0.0024	0.01	Q	.	.	.	.
5.28	0.0025	0.01	Q	.	.	.	.
5.46	0.0026	0.01	Q	.	.	.	.
5.64	0.0027	0.01	Q	.	.	.	.
5.83	0.0028	0.01	Q	.	.	.	.
6.01	0.0029	0.01	Q	.	.	.	.
6.19	0.0030	0.01	Q	.	.	.	.
6.37	0.0031	0.01	Q	.	.	.	.
6.55	0.0032	0.01	Q	.	.	.	.
6.74	0.0033	0.01	Q	.	.	.	.
6.92	0.0034	0.01	Q	.	.	.	.
7.10	0.0035	0.01	Q	.	.	.	.
7.28	0.0036	0.01	Q	.	.	.	.
7.46	0.0037	0.01	Q	.	.	.	.
7.64	0.0038	0.01	Q	.	.	.	.
7.83	0.0040	0.01	Q	.	.	.	.
8.01	0.0041	0.01	Q	.	.	.	.
8.19	0.0042	0.01	Q	.	.	.	.
8.37	0.0043	0.01	Q	.	.	.	.
8.55	0.0044	0.01	Q	.	.	.	.
8.73	0.0046	0.01	Q	.	.	.	.
8.91	0.0047	0.01	Q	.	.	.	.

9.10	0.0048	0.01	Q	.	.	.	.
9.28	0.0049	0.01	Q	.	.	.	.
9.46	0.0051	0.01	Q	.	.	.	.
9.64	0.0052	0.01	Q	.	.	.	.
9.82	0.0053	0.01	Q	.	.	.	.
10.01	0.0055	0.01	Q	.	.	.	.
10.19	0.0056	0.01	Q	.	.	.	.
10.37	0.0058	0.01	Q	.	.	.	.
10.55	0.0059	0.01	Q	.	.	.	.
10.73	0.0061	0.01	Q	.	.	.	.
10.91	0.0062	0.01	Q	.	.	.	.
11.10	0.0064	0.01	Q	.	.	.	.
11.28	0.0065	0.01	Q	.	.	.	.
11.46	0.0067	0.01	Q	.	.	.	.
11.64	0.0069	0.01	Q	.	.	.	.
11.82	0.0070	0.01	Q	.	.	.	.
12.00	0.0072	0.01	Q	.	.	.	.
12.19	0.0074	0.02	Q	.	.	.	.
12.37	0.0077	0.02	Q	.	.	.	.
12.55	0.0079	0.02	Q	.	.	.	.
12.73	0.0081	0.02	Q	.	.	.	.
12.91	0.0084	0.02	Q	.	.	.	.
13.09	0.0086	0.02	Q	.	.	.	.
13.27	0.0089	0.02	Q	.	.	.	.
13.46	0.0092	0.02	Q	.	.	.	.
13.64	0.0094	0.02	Q	.	.	.	.
13.82	0.0097	0.02	Q	.	.	.	.
14.00	0.0100	0.02	Q	.	.	.	.
14.18	0.0104	0.02	Q	.	.	.	.
14.37	0.0107	0.02	Q	.	.	.	.
14.55	0.0111	0.03	Q	.	.	.	.
14.73	0.0115	0.03	Q	.	.	.	.
14.91	0.0119	0.03	Q	.	.	.	.
15.09	0.0124	0.03	Q	.	.	.	.
15.27	0.0129	0.03	Q	.	.	.	.
15.45	0.0134	0.04	Q	.	.	.	.
15.64	0.0140	0.04	Q	.	.	.	.
15.82	0.0154	0.15	Q	.	.	.	.
16.00	0.0185	0.27	.Q	.	.	.	.
16.18	0.0296	1.20	. Q	.	.	.	.
16.36	0.0392	0.08	Q	.	.	.	.
16.55	0.0401	0.04	Q	.	.	.	.
16.73	0.0406	0.03	Q	.	.	.	.
16.91	0.0410	0.03	Q	.	.	.	.
17.09	0.0414	0.02	Q	.	.	.	.
17.27	0.0417	0.02	Q	.	.	.	.
17.45	0.0420	0.02	Q	.	.	.	.
17.64	0.0422	0.02	Q	.	.	.	.
17.82	0.0425	0.02	Q	.	.	.	.
18.00	0.0427	0.02	Q	.	.	.	.
18.18	0.0430	0.01	Q	.	.	.	.
18.36	0.0431	0.01	Q	.	.	.	.
18.54	0.0433	0.01	Q	.	.	.	.
18.73	0.0435	0.01	Q	.	.	.	.
18.91	0.0436	0.01	Q	.	.	.	.
19.09	0.0438	0.01	Q	.	.	.	.
19.27	0.0439	0.01	Q	.	.	.	.
19.45	0.0440	0.01	Q	.	.	.	.
19.63	0.0442	0.01	Q	.	.	.	.
19.82	0.0443	0.01	Q	.	.	.	.
20.00	0.0444	0.01	Q	.	.	.	.
20.18	0.0445	0.01	Q	.	.	.	.
20.36	0.0447	0.01	Q	.	.	.	.
20.54	0.0448	0.01	Q	.	.	.	.
20.72	0.0449	0.01	Q	.	.	.	.
20.91	0.0450	0.01	Q	.	.	.	.
21.09	0.0451	0.01	Q	.	.	.	.
21.27	0.0452	0.01	Q	.	.	.	.
21.45	0.0453	0.01	Q	.	.	.	.
21.63	0.0454	0.01	Q	.	.	.	.
21.81	0.0455	0.01	Q	.	.	.	.
21.99	0.0456	0.01	Q	.	.	.	.
22.18	0.0457	0.01	Q	.	.	.	.
22.36	0.0458	0.01	Q	.	.	.	.
22.54	0.0459	0.01	Q	.	.	.	.
22.72	0.0460	0.01	Q	.	.	.	.
22.90	0.0460	0.01	Q	.	.	.	.

23.08	0.0461	0.01	Q	.	.	.	.
23.27	0.0462	0.01	Q	.	.	.	.
23.45	0.0463	0.01	Q	.	.	.	.
23.63	0.0464	0.01	Q	.	.	.	.
23.81	0.0465	0.01	Q	.	.	.	.
23.99	0.0465	0.01	Q	.	.	.	.
24.17	0.0466	0.01	Q	.	.	.	.
24.36	0.0466	0.00	Q	.	.	.	.

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

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1449.7
10%	32.7
20%	21.8
30%	10.9
40%	10.9
50%	10.9
60%	10.9
70%	10.9
80%	10.9
90%	10.9

```
===============================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

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

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1          0.36      100.00       87.(AMC II)     0.200       0.167
         2          0.71        0.00       98.(AMC II)     0.200       0.890

    TOTAL AREA (Acres) =      1.07

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.067

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.353
===============================================================================
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------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    1.07
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.067
    LOW LOSS FRACTION = 0.353
    TIME OF CONCENTRATION(MIN.) =  7.10
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.12
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.07

************************************************************************
  TIME     VOLUME       Q    0.        2.5       5.0       7.5      10.0
 (HOURS)    (AF)      (CFS)
------------------------------------------------------------------------
  0.03      0.0000      0.00  Q         .         .         .         .
  0.14      0.0001      0.02  Q         .         .         .         .
  0.26      0.0003      0.02  Q         .         .         .         .
  0.38      0.0005      0.02  Q         .         .         .         .
  0.50      0.0007      0.02  Q         .         .         .         .
  0.62      0.0009      0.02  Q         .         .         .         .
  0.74      0.0011      0.02  Q         .         .         .         .
  0.85      0.0013      0.02  Q         .         .         .         .
  0.97      0.0015      0.02  Q         .         .         .         .
  1.09      0.0017      0.02  Q         .         .         .         .
  1.21      0.0019      0.02  Q         .         .         .         .
  1.33      0.0021      0.02  Q         .         .         .         .
  1.45      0.0023      0.02  Q         .         .         .         .
  1.56      0.0025      0.02  Q         .         .         .         .
  1.68      0.0027      0.02  Q         .         .         .         .
  1.80      0.0029      0.02  Q         .         .         .         .
  1.92      0.0031      0.02  Q         .         .         .         .
  2.04      0.0033      0.02  Q         .         .         .         .
  2.16      0.0036      0.02  Q         .         .         .         .
  2.27      0.0038      0.02  Q         .         .         .         .
  2.39      0.0040      0.02  Q         .         .         .         .
  2.51      0.0042      0.02  Q         .         .         .         .
```

2.63	0.0044	0.02	Q	.	.	.	.
2.75	0.0046	0.02	Q	.	.	.	.
2.87	0.0049	0.02	Q	.	.	.	.
2.98	0.0051	0.02	Q	.	.	.	.
3.10	0.0053	0.02	Q	.	.	.	.
3.22	0.0055	0.02	Q	.	.	.	.
3.34	0.0057	0.02	Q	.	.	.	.
3.46	0.0060	0.02	Q	.	.	.	.
3.58	0.0062	0.02	Q	.	.	.	.
3.69	0.0064	0.02	Q	.	.	.	.
3.81	0.0066	0.02	Q	.	.	.	.
3.93	0.0069	0.02	Q	.	.	.	.
4.05	0.0071	0.02	Q	.	.	.	.
4.17	0.0073	0.02	Q	.	.	.	.
4.29	0.0076	0.02	Q	.	.	.	.
4.40	0.0078	0.02	Q	.	.	.	.
4.52	0.0081	0.02	Q	.	.	.	.
4.64	0.0083	0.02	Q	.	.	.	.
4.76	0.0085	0.02	Q	.	.	.	.
4.88	0.0088	0.02	Q	.	.	.	.
5.00	0.0090	0.03	Q	.	.	.	.
5.11	0.0093	0.03	Q	.	.	.	.
5.23	0.0095	0.03	Q	.	.	.	.
5.35	0.0098	0.03	Q	.	.	.	.
5.47	0.0100	0.03	Q	.	.	.	.
5.59	0.0103	0.03	Q	.	.	.	.
5.71	0.0105	0.03	Q	.	.	.	.
5.82	0.0108	0.03	Q	.	.	.	.
5.94	0.0110	0.03	Q	.	.	.	.
6.06	0.0113	0.03	Q	.	.	.	.
6.18	0.0116	0.03	Q	.	.	.	.
6.30	0.0118	0.03	Q	.	.	.	.
6.41	0.0121	0.03	Q	.	.	.	.
6.53	0.0124	0.03	Q	.	.	.	.
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6.77	0.0129	0.03	Q	.	.	.	.
6.89	0.0132	0.03	Q	.	.	.	.
7.01	0.0134	0.03	Q	.	.	.	.
7.12	0.0137	0.03	Q	.	.	.	.
7.24	0.0140	0.03	Q	.	.	.	.
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7.48	0.0146	0.03	Q	.	.	.	.
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7.72	0.0152	0.03	Q	.	.	.	.
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8.31	0.0166	0.03	Q	.	.	.	.
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8.55	0.0173	0.03	Q	.	.	.	.
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9.02	0.0185	0.03	Q	.	.	.	.
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9.61	0.0202	0.03	Q	.	.	.	.
9.73	0.0205	0.04	Q	.	.	.	.
9.85	0.0209	0.04	Q	.	.	.	.
9.97	0.0212	0.04	Q	.	.	.	.
10.08	0.0216	0.04	Q	.	.	.	.
10.20	0.0220	0.04	Q	.	.	.	.
10.32	0.0223	0.04	Q	.	.	.	.
10.44	0.0227	0.04	Q	.	.	.	.
10.56	0.0231	0.04	Q	.	.	.	.
10.68	0.0235	0.04	Q	.	.	.	.
10.79	0.0238	0.04	Q	.	.	.	.
10.91	0.0242	0.04	Q	.	.	.	.
11.03	0.0246	0.04	Q	.	.	.	.
11.15	0.0250	0.04	Q	.	.	.	.
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11.50	0.0263	0.04	Q	.	.	.	.
11.62	0.0267	0.04	Q	.	.	.	.
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12.80	0.0321	0.06	Q	.	.	.	.
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13.04	0.0334	0.07	Q	.	.	.	.
13.16	0.0340	0.07	Q	.	.	.	.
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13.40	0.0354	0.07	Q	.	.	.	.
13.52	0.0361	0.07	Q	.	.	.	.
13.63	0.0368	0.07	Q	.	.	.	.
13.75	0.0376	0.08	Q	.	.	.	.
13.87	0.0383	0.08	Q	.	.	.	.
13.99	0.0391	0.08	Q	.	.	.	.
14.11	0.0399	0.08	Q	.	.	.	.
14.23	0.0408	0.09	Q	.	.	.	.
14.34	0.0417	0.09	Q	.	.	.	.

14.46	0.0426	0.10	Q	.	.	.	.
14.58	0.0436	0.10	Q	.	.	.	.
14.70	0.0446	0.11	Q	.	.	.	.
14.82	0.0457	0.11	Q	.	.	.	.
14.93	0.0468	0.12	Q	.	.	.	.
15.05	0.0479	0.12	Q	.	.	.	.
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15.88	0.0606	0.37	.Q	.	.	.	.
16.00	0.0651	0.53	. Q	.	.	.	.
16.12	0.0761	1.72	. Q	.	.	.	.
16.24	0.0860	0.29	.Q	.	.	.	.
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16.59	0.0914	0.13	Q	.	.	.	.
16.71	0.0926	0.11	Q	.	.	.	.
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16.95	0.0946	0.10	Q	.	.	.	.
17.07	0.0955	0.09	Q	.	.	.	.
17.18	0.0963	0.08	Q	.	.	.	.
17.30	0.0971	0.08	Q	.	.	.	.
17.42	0.0978	0.07	Q	.	.	.	.
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17.66	0.0992	0.07	Q	.	.	.	.
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17.89	0.1004	0.06	Q	.	.	.	.
18.01	0.1010	0.06	Q	.	.	.	.
18.13	0.1015	0.05	Q	.	.	.	.
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18.37	0.1024	0.04	Q	.	.	.	.
18.48	0.1028	0.04	Q	.	.	.	.
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19.19	0.1051	0.04	Q	.	.	.	.
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19.43	0.1058	0.03	Q	.	.	.	.
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21.44	0.1107	0.03	Q	.	.	.	.
21.56	0.1110	0.03	Q	.	.	.	.
21.68	0.1112	0.02	Q	.	.	.	.
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22.03	0.1119	0.02	Q	.	.	.	.
22.15	0.1122	0.02	Q	.	.	.	.
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22.39	0.1126	0.02	Q	.	.	.	.
22.51	0.1128	0.02	Q	.	.	.	.
22.63	0.1131	0.02	Q	.	.	.	.
22.74	0.1133	0.02	Q	.	.	.	.
22.86	0.1135	0.02	Q	.	.	.	.
22.98	0.1137	0.02	Q	.	.	.	.
23.10	0.1139	0.02	Q	.	.	.	.
23.22	0.1141	0.02	Q	.	.	.	.
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23.81	0.1152	0.02	Q	.	.	.	.
23.93	0.1154	0.02	Q	.	.	.	.
24.05	0.1156	0.02	Q	.	.	.	.
24.17	0.1157	0.00	Q	.	.	.	.

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

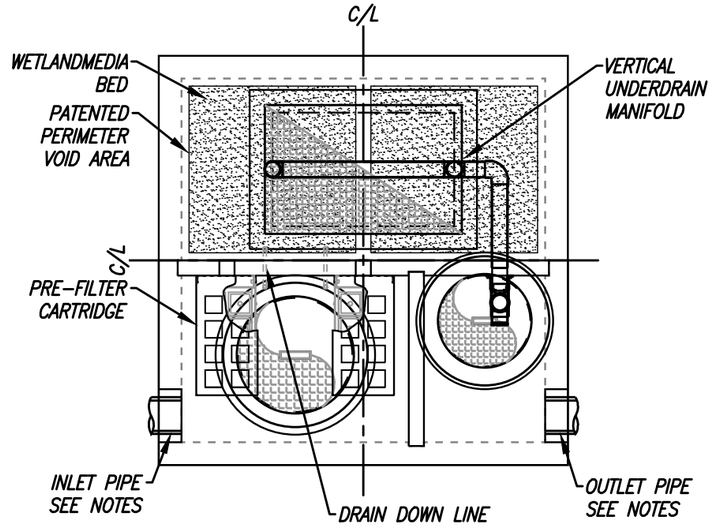
Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1441.3
10%	49.7
20%	21.3
30%	14.2
40%	7.1
50%	7.1
60%	7.1
70%	7.1

80%	7.1
90%	7.1

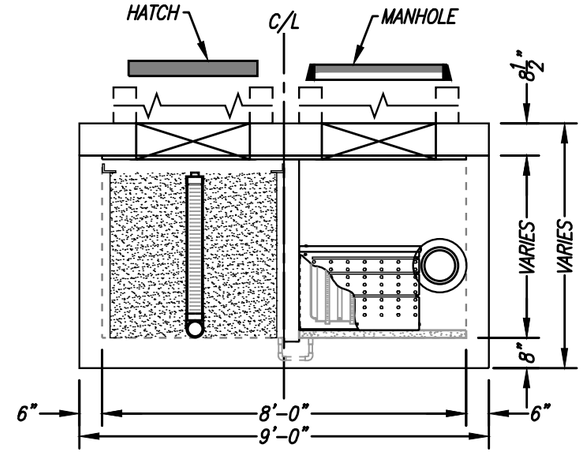
Modular Wetlands

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
FLOW BASED (CFS)			
0.231			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	DIRECT TRAFFIC		
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



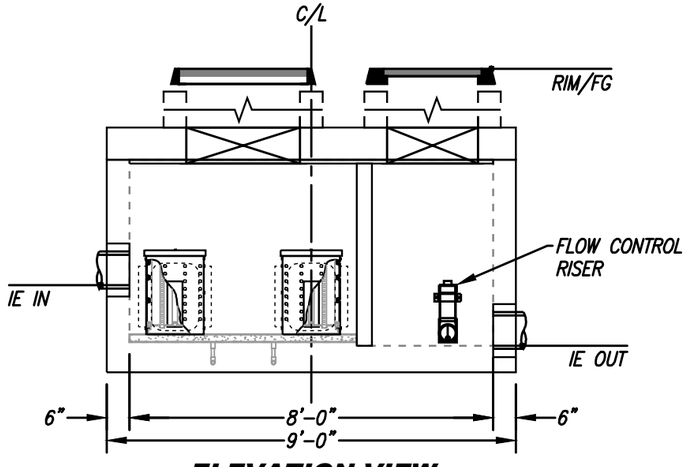
LEFT END VIEW

INSTALLATION NOTES

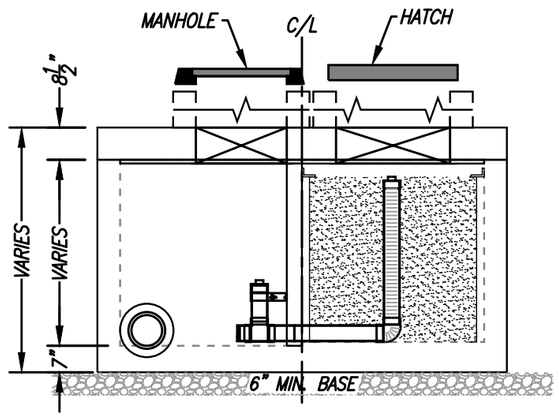
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT CONTECH.



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.231
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS
FOR PATENT INFORMATION, GO TO www.ContechES.com/IP

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com

MWS-L-8-8-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

CONTECH®
ENGINEERED SOLUTIONS

Modular Wetlands® Linear Stormwater Biofiltration

The experts you need to solve your stormwater challenges

Contech is the leader in stormwater solutions, helping engineers, contractors and owners with infrastructure and land development projects throughout North America.

With our responsive team of stormwater experts, local regulatory expertise and flexible solutions, Contech is the trusted partner you can count on for stormwater management solutions.

Your Contech Team

STORMWATER CONSULTANT

It's my job to recommend the best solution to meet permitting requirements.

STORMWATER DESIGN ENGINEER

I work with consultants to design the best approved solution to meet your project's needs.

REGULATORY MANAGER

I understand the local stormwater regulations and what solutions will be approved.

SALES ENGINEER

I make sure our solutions meet the needs of the contractor during construction.

Restoring Nature's Presence in Urban Areas – Modular Wetlands® Linear

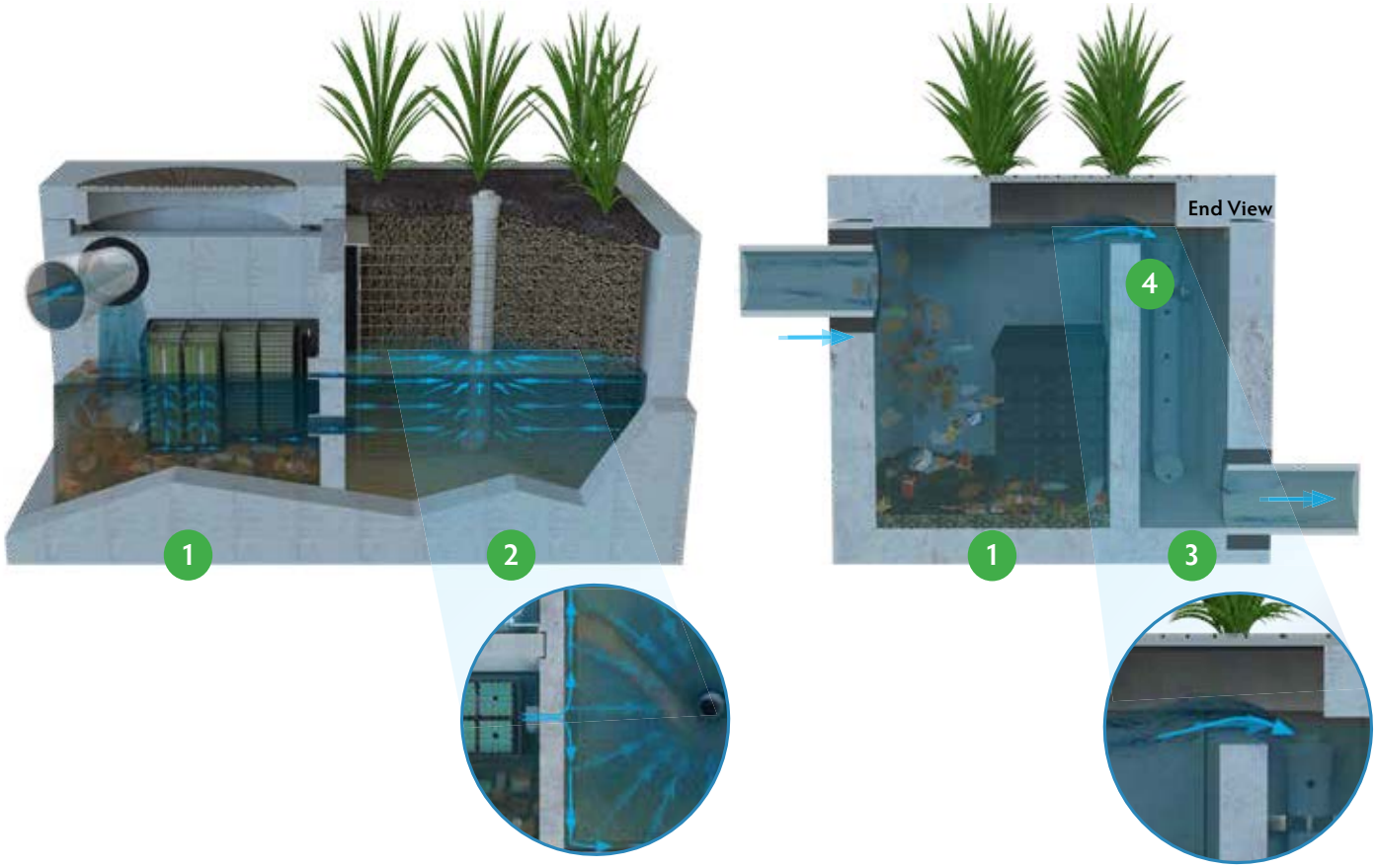
As cities grow, there is less space for natural solutions to treat stormwater. Contech understands this and is committed to providing compact, Low Impact Development (LID) solutions like the Modular Wetlands Linear to protect our nation's waterways.

The Modular Wetlands® Linear is the only biofiltration system to utilize patented horizontal flow, allowing for a small footprint, high treatment capacity, and design versatility. It is also the only biofiltration system that can be routinely installed downstream of storage for additional volume control and treatment.

With numerous regulatory approvals, the system's aesthetic appeal and superior pollutant removal make it the ideal solution for a wide range of stormwater applications, including urban development projects, commercial parking lots, residential streets, mixed-use developments, streetscapes, and more.

MODULAR WETLANDS®

How the Modular Wetlands® Linear Works



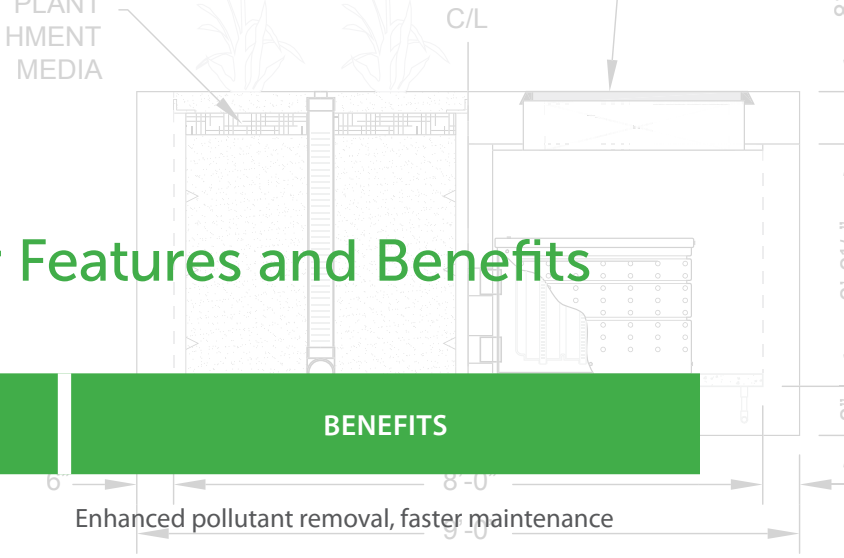
1 **PRETREATMENT** | Stormwater enters the pretreatment chamber where total suspended solids settle, and trash and debris are contained within the chamber. Stormwater then travels through the pretreatment filter boxes that provide additional treatment.

2 **BIOFILTRATION** | As water enters the biofiltration chamber, it fills the void space in the chamber's perimeter. Horizontal forces push the water inward through the biofiltration media, where nutrients and metals are captured. The water then enters the drain pipe to be discharged.

3 **DISCHARGE** | The specially designed vertical drain pipe and orifice control plate control the flow of water through the media to a level lower than the media's capacity, ensuring media effectiveness. The water then enters the horizontal drain pipe to be discharged.

4 **BYPASS** | During peak flows, an internal weir in the side-by-side configuration allows high flows to bypass treatment, eliminating flooding and the need for a separate bypass structure. Bypass is not provided in the end-to end configuration.

Using horizontal flow to improve performance



Modular Wetlands® Linear Features and Benefits

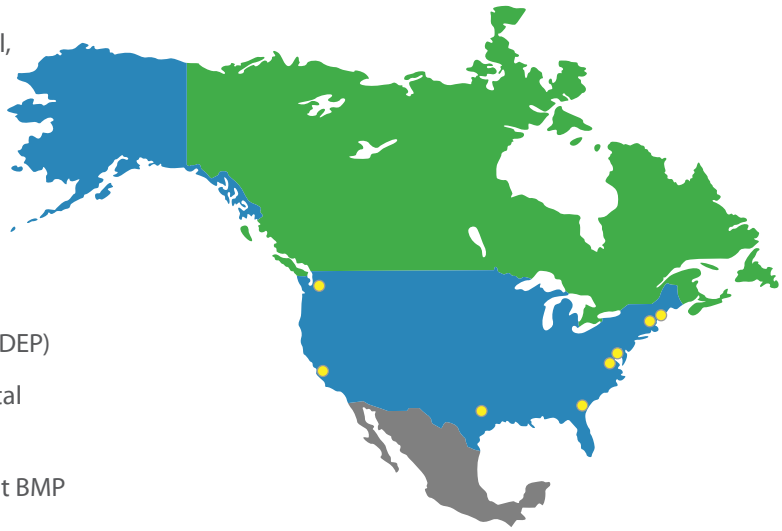
FEATURE	BENEFITS
Pretreatment chamber	Enhanced pollutant removal, faster maintenance
Horizontal flow biofiltration	Greater filter surface area
Performance verified by both the WA DOE and NJ DEP	Superior pollutant capture with confidence
Built-in high flow bypass	Eliminates flooding and the need for a separate bypass structure
Available in multiple configurations and sizes	Flexibility to meet site-specific needs

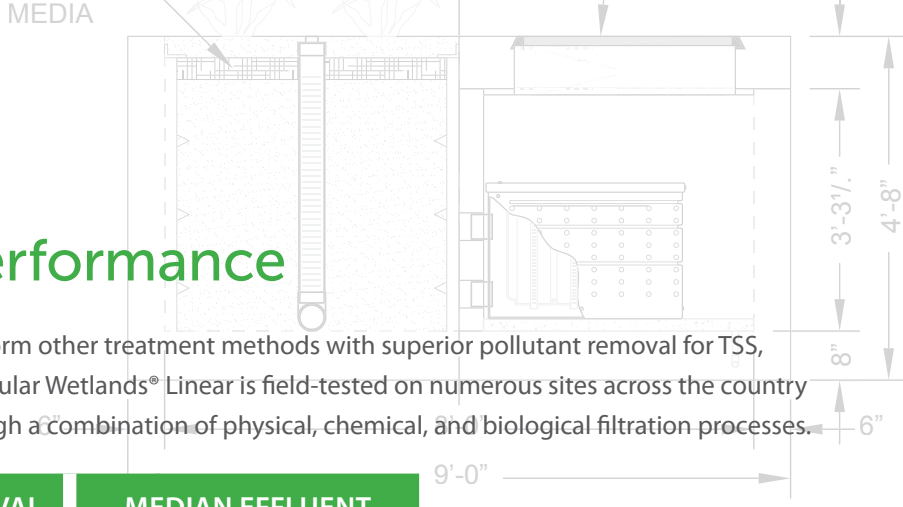
The Modular Wetlands system offers many different configurations.

Select Modular Wetlands® Linear Approvals

Modular Wetlands Linear is approved through numerous local, state and federal programs, including but not limited to:

- Washington State Department of Ecology TAPE
- California Water Resources Control Board, Full Capture Certification
- Virginia Department of Environmental Quality (VA DEQ)
- New Jersey Department of Environmental Protection (NJDEP)
- Maryland Department of the Environment - Environmental Site Design (ESD)
- Rhode Island Department of Environmental Management BMP
- Texas Commission on Environmental Quality (TCEQ)
- Atlanta Regional Commission Certification





Modular Wetlands® Performance

The Modular Wetlands® Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, and hydrocarbons. The Modular Wetlands® Linear is field-tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes.

POLLUTANT OF CONCERN	MEDIAN REMOVAL EFFICIENCY	MEDIAN EFFLUENT CONCENTRATION (MG/L)
Total Suspended Solids (TSS)	89%	12
Total Phosphorus - TAPE (TP)	61%	0.041
Nitrogen (TN)	23%	1
Total Copper (TCu)	50%	0.006
Total Dissolved Copper	37%	0.006
Total Zinc (TZn)	66%	0.019
Dissolved Zinc	60%	0.0148
Motor Oil	79%	0.8

Sources:
TAPE Field Study - 2012
TAPE Field Study - 2013

Note: Some jurisdictions recognize higher removal rates. Contact your Contech Stormwater Consultant for performance expectations.

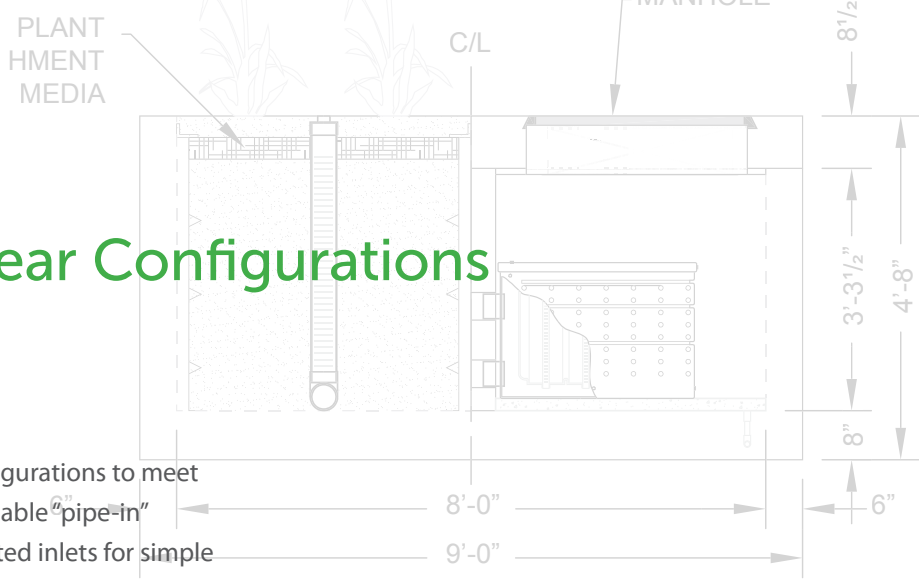
Modular Wetlands® Linear Maintenance

The Modular Wetlands® Linear is a self-contained treatment train. Maintenance requirements for the unit consist of five simple steps that can be completed using a vacuum truck. The system can also be cleaned by hand.

- Remove trash from the screening device
- Remove sediment from the separation chamber
- Periodically replace the pretreatment cartridge filter media
- Replace the drain down filter media
- Trim vegetation

Most Modular Wetland Linear systems can be cleaned in about thirty minutes.

Multiple configurations allow for easy site integration



Modular Wetlands® Linear Configurations

Multiple system configurations integrate with site hydraulic design and layout ...

The Modular Wetlands Linear is offered in multiple configurations to meet site specific needs. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.

Curb Inlet

The Curb Inlet configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions.

Vault

The Vault configuration can be used in end-of-the-line installations. Another benefit of the "pipe-in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements, or for traffic-rated designs (no plants).

Downspout

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

A partner you can rely on

STORMWATER SOLUTIONS

PIPE SOLUTIONS

STRUCTURES SOLUTIONS

Few companies offer the wide range of high-quality stormwater resources you can find with us — state-of-the-art products, decades of expertise, and all the maintenance support you need to operate your system cost-effectively.

THE CONTECH WAY

Contech® Engineered Solutions provides innovative, cost-effective site solutions to engineers, contractors, and developers on projects across North America. Our portfolio includes bridges, drainage, erosion control, retaining wall, sanitary sewer and stormwater management products.

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Attachment C

Operations & Maintenance Plan

CONTECH®
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Modular Wetlands® Linear
Operation & Maintenance Manual

MODULAR WETLANDS®

MODULAR WETLANDS® LINEAR
OPERATION & MAINTENANCE MANUAL

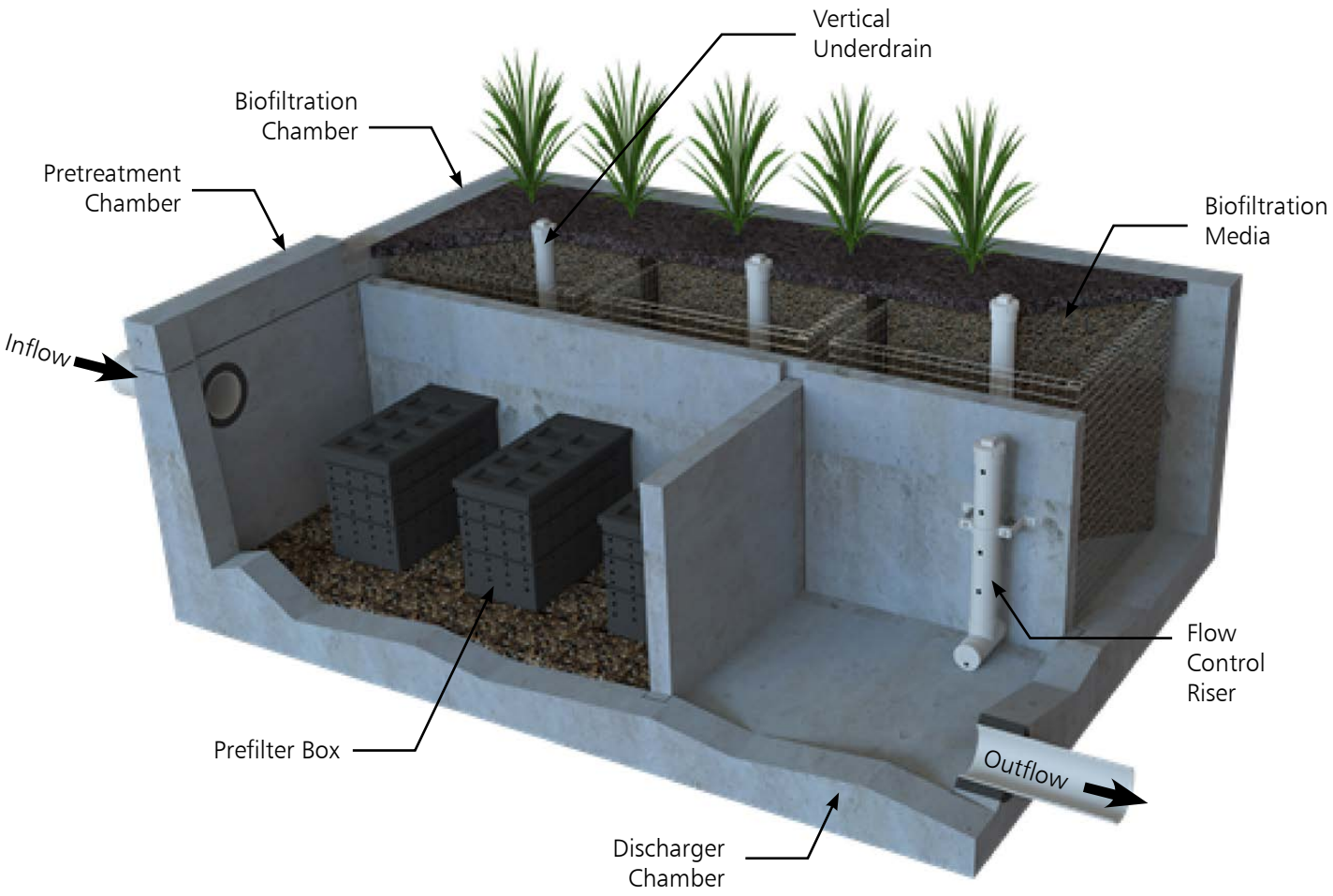
TABLE OF CONTENTS

OVERVIEW

The Modular Wetlands® Linear Biofilter is designed to remove high levels of trash, debris, sediments, nutrients, metals, and hydrocarbons. Its simple design allows for quick and easy installation. The system is housed in a standard precast structure and can be installed at various depths to meet site-specific conditions.

INTRODUCTION

This is the Modular Wetlands Linear Biofilter operation and maintenance manual. Before starting, read the instructions and equipment lists closely. It is important to follow all necessary safety procedures associated with state and local regulations. Some steps required confined space entry. Please contact Contech for more information on pre-authorized third party contractors who can provide installation services in your area. For a list of service providers in your area please visit: www.conteches.com/maintenance.



INSTRUCTIONS

INSPECTION SUMMARY

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 the site specific loading conditions. The first year of inspections can be used to set inspection and maintenance intervals for subsequent years to ensure appropriate maintenance is provided.

- Inspect pre-treatment, biofiltration, and discharge chambers an average of once every six to twelve months. Varies based on site specific and local conditions.
- Average inspection time is approximately 15 minutes. Always ensure appropriate safety protocol and procedures are followed.

The following is a list of equipment required to allow for simple and effective inspection of the Modular Wetlands Linear:

- Modular Wetlands Linear Inspection Form
- Flashlight
- Manhole hook or appropriate tools to remove access hatches and covers
- Appropriate traffic control signage and procedures
- Measuring pole and/or tape measure
- Protective clothing and eye protection
- 7/16" open or closed ended wrench
- Large permanent black marker (initial inspections only - first year)

Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections of the system

INSPECTION AND MAINTENANCE NOTES

1. Following maintenance and/or inspection, it is recommended that 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 not require irrigation after initial establishment.

INSPECTION PROCESS

1. Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other information (see inspection form).
2. Observe the inside of the system through the access covers. If minimal light is available and vision into the unit is impaired, utilize a flashlight to see inside the system and all of its chambers.
3. Look for any out of the ordinary obstructions in the inflow pipe, pre-treatment chamber, biofiltration chamber, discharge chamber or outflow pipe. Write down any observations on the inspection form.
4. Through observation and/or digital photographs, estimate the amount of trash, debris accumulated in the pre-treatment chamber. Utilizing a tape measure or measuring stick, estimate the amount of sediment in this chamber. Record this depth on the inspection form.
5. Through visual observation, inspect the condition of the pre-filter cartridges. Look for excessive build-up of sediment on the cartridges, any build-up on the tops of the cartridges, or clogging of the holes. Record this information on the inspection form. The prefilter cartridges can be further inspected by removing the cartridge tops and assessing the color of the BioMediaGREEN filter cubes (requires entry into pre-treatment chamber - see notes previous notes regarding confined space entry). Record the color of the material. New material is a light green color. As the media becomes clogged, it will turn darker in color, eventually becoming dark brown or black. The closer to black the media is the higher percentage that the media is exhausted and is in need of replacement.

6. The biofiltration chamber is generally maintenance-free due to the system's advanced pre-treatment chamber. For units which have open planters with vegetation, it is recommended that the vegetation be inspected. Look for any plants that are dead or showing signs of disease or other negative stressors. Record the general health of the plants on the inspection form and indicate through visual observation or digital photographs if trimming of the vegetation is required.
7. The discharge chamber houses the orifice control structure, drain down filter (only in California - older models), and is connected to the outflow pipe. It is important to check to ensure the orifice is in proper operating conditions and free of any obstructions. It is also important to assess the condition of the drain down filter media which utilizes a block form of the BioMediaGREEN. Assess in the same manner as the cubes in the pre-filter cartridge as mentioned above. Generally, the discharge chamber will be clean and free of debris. Inspect the water marks on the side walls. If possible, inspect the discharge chamber during a rain event to assess the amount of flow leaving the system while it is at 100% capacity (pre-treatment chamber water level at peak HGL - top of bypass weir). The water level of the flowing water should be compared to the watermark level on the side walls, which is an indicator of the highest discharge rate the system achieved when initially installed. Record on the form if there is any difference in level from the watermark in inches.

NOTE: During the first few storms, the water level in the outflow chamber should be observed and a 6" long horizontal watermark line drawn (using a large permanent marker) at the water level in the discharge chamber while the system is operating at 100% capacity. The diagram below illustrates where the line should be drawn. This line is a reference point for future inspections of the system.

Water level in the discharge chamber is a function of flow rate and pipe size. Observation of the water level during the first few months of operation can be used as a benchmark level for future inspections. The initial mark and all future observations shall be made when the system is at 100% capacity (water level at maximum level in the pre-treatment chamber). If future water levels are below this mark when the system is at 100% capacity, this is an indicator that maintenance to the pre-filter cartridges may be needed.

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

MAINTENANCE INDICATORS

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

- Missing or damaged internal components or cartridges
- Obstructions in the system or its inlet and/or outlet pipes
- Excessive accumulation of floatables in the pretreatment chamber in which the length and width of the chamber is fully impacted more than 18". See photo below.
- Excessive accumulation of sediment in the pretreatment chamber of more than 6" in depth.
- Excessive accumulation of sediment on the BioMediaGREEN media housed within the pretreatment cartridges. The following chart shows photos of the condition of the BioMediaGREEN contained within the pre-filter cartridges. When media is more than 85% clogged, replacement is required.
- Excessive accumulation of sediment on the BioMediaGREEN media housed within the pretreatment cartridges. When media is more than 85% clogged, replacement is required. The darker the BioMediaGREEN, the more clogged it is and in need of replacement.

INSPECTION PROCESS

- Excessive accumulation of sediment on the BioMediaGREEN media housed within the drain down filter (California only - older models). The following photos show the condition of the BioMediaGREEN contained within the drain down filter. When media is more than 85% clogged, replacement is required.

- Overgrown vegetation.

- Water level in the discharge chamber during 100% operating capacity (pretreatment chamber water level at max height) is lower than the water mark by 20%.

MAINTENANCE SUMMARY

The time has come to maintain your Modular Wetlands® Linear. All necessary pre-maintenance steps must be carried out before maintenance occurs. Once traffic control has been set up per local and state regulations and access covers have been safely opened, the maintenance process can begin. It should be noted that some maintenance activities require confined space entry. All confined space requirements must be strictly followed before entry into the system. In addition, the following is recommended:

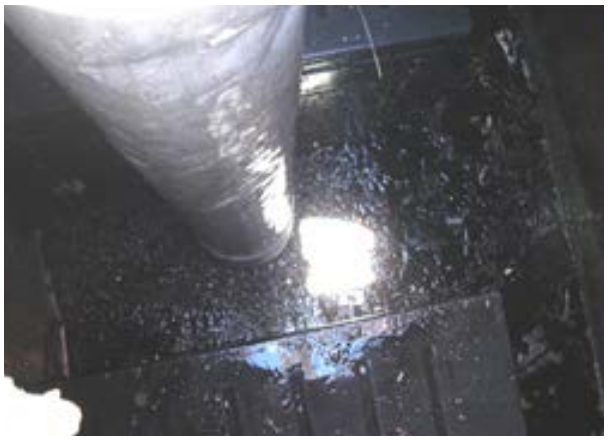
- Prepare the maintenance form by writing in the necessary information including project name, location, date & time, unit number and other info (see maintenance form).
- Set up all appropriate safety and cleaning equipment.
- Ensure traffic control is set up and properly positioned.
- Prepared pre-checks (OSHA, safety, confined space entry) are performed.

The following is a list of equipment to required for maintenance of the Modular Wetlands® Linear:

- Modular Wetlands Linear Maintenance Form
- Manhole hook or appropriate tools to access hatches and covers
- Protective clothing, flashlight, and eye protection
- 7/16" open or closed ended wrench
- Vacuum assisted truck with pressure washer
- Replacement BioMediaGREEN for pre-filter cartridges if required (order from one of Contech's Maintenance Team members at https://www.conteches.com/maintenance).

MAINTENANCE | PRETREATMENT CHAMBER

1. Remove access cover over pre-treatment chamber and position vacuum truck accordingly.
2. With a pressure washer, spray down pollutants accumulated on walls and pre-filter cartridges.
3. Vacuum out pre-treatment chamber and remove all accumulated pollutants including trash, debris, and sediments. Be sure to vacuum the floor until the pervious pavers are visible and clean.
4. If pre-filter cartridges require media replacement, continue to step 5. If not, replace access cover and move to step 11.

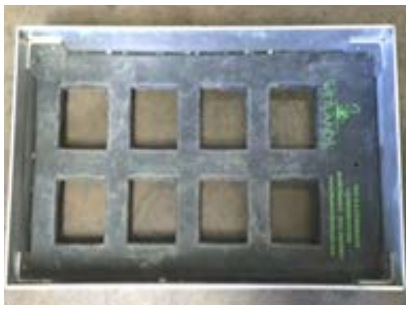


MAINTENANCE | PREFILTER CARTRIDGES

5. After successfully cleaning out the pre-treatment chamber (previous page) enter the pre-treatment chamber.
6. Unscrew the two bolts (circles shown below) holding the lid on each cartridge filter and remove lid.

7. Place the vacuum hose over each individual media filter to suck out filter media.

8. Once filter media has been sucked out, use a pressure washer to spray down the inside of the cartridge and it's media cages. Remove cleaned media cages and place to the side. Once removed, the vacuum hose can be inserted into the cartridge to vacuum out any remaining material near the bottom of the cartridge.
9. Reinstall media cages and fill with new media from the manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase. Utilize the manufacture-provided refilling tray and place on top of the cartridge. Fill the tray with new bulk media and shake down into place. Using your hands, lightly compact the media into each filter cage. Once the cages are full, remove the refilling tray and replace the cartridge top, ensuring bolts are properly tightened.



10. Exit the pre-treatment chamber. Replace access hatch or manhole cover.

MAINTENANCE | BIOFILTRATION CHAMBER

11. In general, the biofiltration chamber is maintenance-free with the exception of maintaining the vegetation. The Modular Wetlands Linear utilizes vegetation similar to surrounding landscape areas, therefore trim vegetation to match surrounding vegetation. If any plants have died, replace them with new ones.

12. Each vertical under drain on the biofiltration chamber has a removable (threaded cap) that can be taken off to check any blockages or root growth. Once removed, a jetting attachment can be used to clean out the under drain and orifice riser.
13. As with all biofilter systems, at some point the biofiltration media (WetlandMedia) will need to be replaced. Either because of physical clogging of sorptive exhaustion of the media ion exchange capacity (to remove dissolved metals and phosphorous). The general life of this media is 10 to 20 years based on site specific conditions and pollutant loading. Utilize the vacuum truck to vacuum out the media by placing the hose into the chamber. Once all the media is removed use the power washer to spray down all the netting on the outer metal cage. Inspect the netting for any damage or holes. If the netting is damaged it can be repaired or replaced with guidance by the manufacturer.
14. Contact one of Contech's Maintenance Team members at https://www.conteches.com/maintenance to order new WetlandMedia. The quantity of media needed can be determined by providing the model number and unit depth. Media will be provided in super sacks for easy installation. Each sack will weigh between 1000 and 2000 lbs. A lifting apparatus (backhoe, boom truck, or other) is recommended to position the super sack over the biofiltration chamber. Fill the media cages up to the same level as the old media. Replant with vegetation.

MAINTENANCE | DISCHARGE CHAMBER

15. Remove access hatch or manhole cover over discharge chamber.
16. Enter chamber to gain access to the drain down filter. Unlock the locking mechanism and lift up drain down filter housing to remove used BioMediaGREEN filter block as shown below. *NOTE: Drain down filter is only found on units installed in California prior to 2023. If no drain down filter is present, skip steps 16 and 17.*

17. Insert a new BioMediaGREEN filter block and lock drain down filter housing back in place.
18. Replace access hatch or manhole cover over discharge chamber.

NOTES

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Inspection Report
Modular Wetlands Linear

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: _____

CONTECH®
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Cleaning and Maintenance Report
Modular Wetlands Linear

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

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

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

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

Weather Condition _____ Additional Notes _____

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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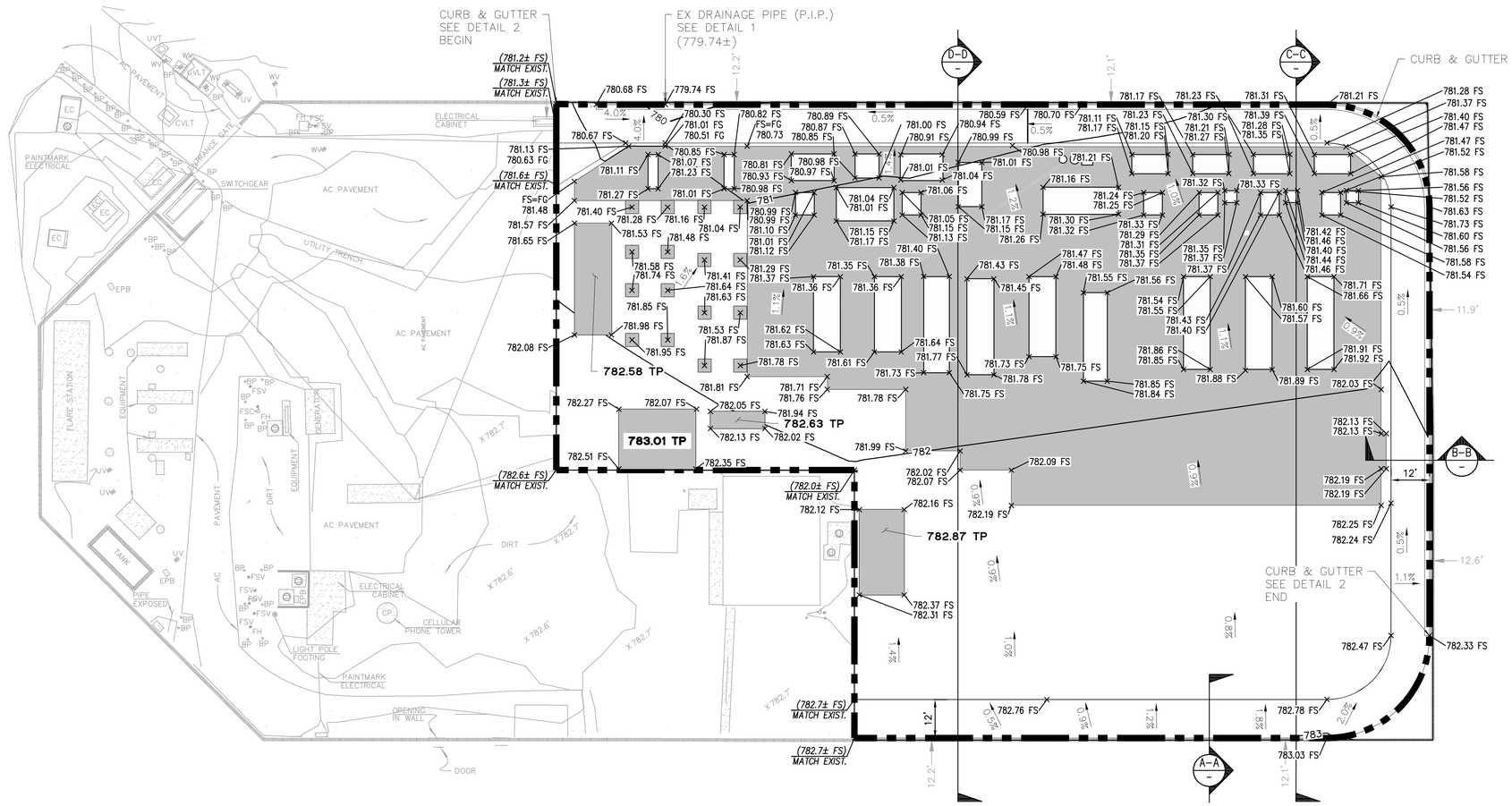
SUPPORT

DRAWINGS AND SPECIFICATIONS ARE AVAILABLE AT WWW.CONTECHES.COM

Attachment D

Construction Documents



LEGEND:

- BKF LIMIT OF WORK
- EXISTING CONTOUR LINE
- XXX — PROPOSED CONTOUR LINE
- XXX.XX TC / XXX.XX FS — PROPOSED GRADE ELEVATION
- X.X% — PROPOSED GRADE SLOPE
- PROPOSED CONCRETE PAD

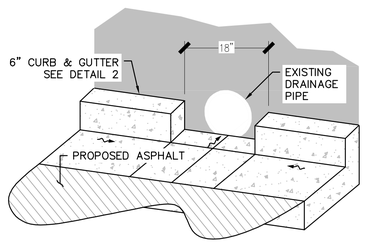
ABBREVIATIONS:

AC	ASPHALT CONCRETE
EX, EXIST	EXISTING
FL	FLOW LINE
FG	FINISH GROUND
FS	FINISH SURFACE
NPB	NEWPORT BEACH
P.I.P.	PROTECT IN PLACE
STD	STANDARD
TC	TOP OF CURB
TP	TOP OF PAVEMENT

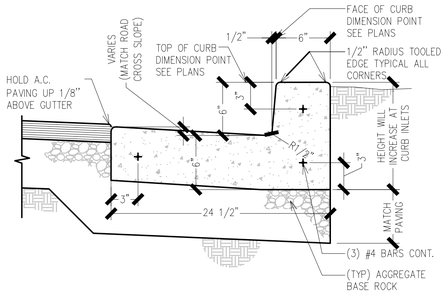
NOTES:

1. ALL DESIGN ELEVATIONS SHOWN ON THE GRADING SHEETS ARE TO FINISHED GRADE, UNLESS OTHERWISE NOTED.
2. ALL EXISTING UTILITY STRUCTURES WITHIN GRADING LIMITS SHALL BE ADJUSTED TO NEW PROPOSED GRADES.
3. GRADING SHALL NOT EXCEED A 2:1 MAXIMUM SLOPE.

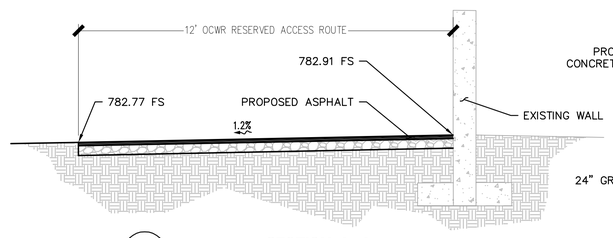
GRAPHIC SCALE
20 0 20 40



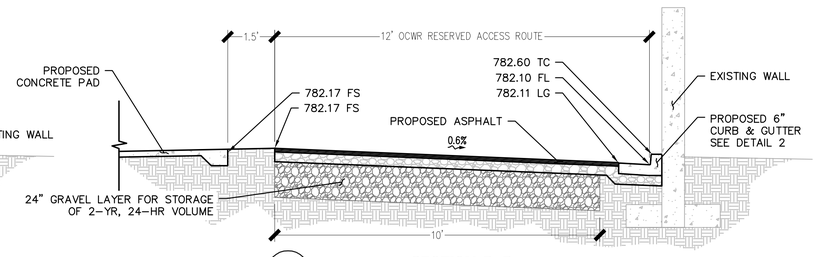
1 — CURB OPENING DETAIL
NTS



2 — CURB & GUTTER
NTS



A-A — SECTION A-A
NTS



B-B — SECTION B-B
NTS

TOPOGRAPHY NOTE:
BASED ON TOPO FURNISHED BY D.WOOLLEY & ASSOCIATES
DATE: 07-28-2022.

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CONFIDENTIAL

ISSUE FOR BID

REV	DATE	DESCRIPTION	DRN BY	CHK BY	APRV BY
0	11/16/23	ISSUE FOR BID	DMM	VL	RTC

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www.bkf.com

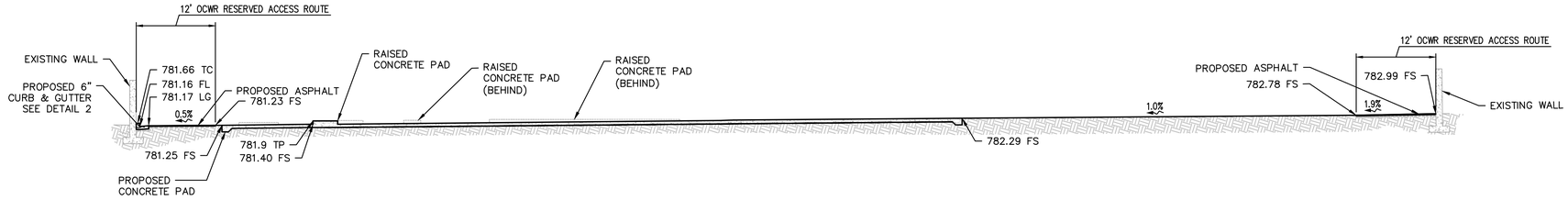
OWNER:
ARCHAEA ENERGY
4444 WESTHEIMER ROAD, SUITE G450
HOUSTON, TX 77027
Ph: (346) 708-8272

ENGINEER:
BIOGAS ENGINEERING
2321 E. 28TH STREET, SUITE 400
SIGNAL HILL, CA 90755, Ph: (562) 726-3565
EMAIL: INFO@BIOGASENG.COM

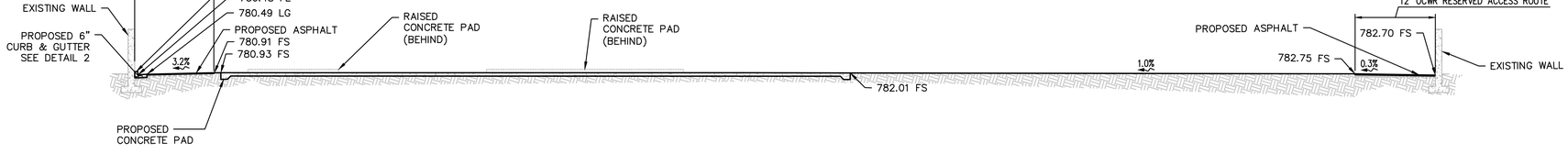
GRADING & DRAINAGE PLAN

COYOTE CANYON LANDFILL
RNG PROJECT
20662 NEWPORT COAST DRIVE
NEWPORT BEACH, CA 92657

DRAWING NO.
C1.0



C-C — **SECTION C-C**
NTS



D-D — **SECTION D-D**
NTS

ABBREVIATIONS:

AC	ASPHALT CONCRETE
EX, EXIST	EXISTING
FL	FLOW LINE
FG	FINISH GROUND
FS	FINISH SURFACE
NPB	NEWPORT BEACH
P.I.P.	PROTECT IN PLACE
STD	STANDARD
TC	TOP OF CURB
TP	TOP OF PAVEMENT

TOPOGRAPHY NOTE:
BASED ON TOPO FURNISHED BY D.WOOLLEY & ASSOCIATES
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0	11/16/23	ISSUE FOR BID	DMM	VL	RTC

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ENGINEER:
BIOGAS ENGINEERING
2321 E. 28TH STREET, SUITE 400
SIGNAL HILL, CA 90755, Ph: (562) 726-3565
EMAIL: INFO@BIOGASENG.COM

SECTIONS

COYOTE CANYON LANDFILL
RNG PROJECT
20662 NEWPORT COAST DRIVE
NEWPORT BEACH, CA 92657

DRAWING NO.
C1.1

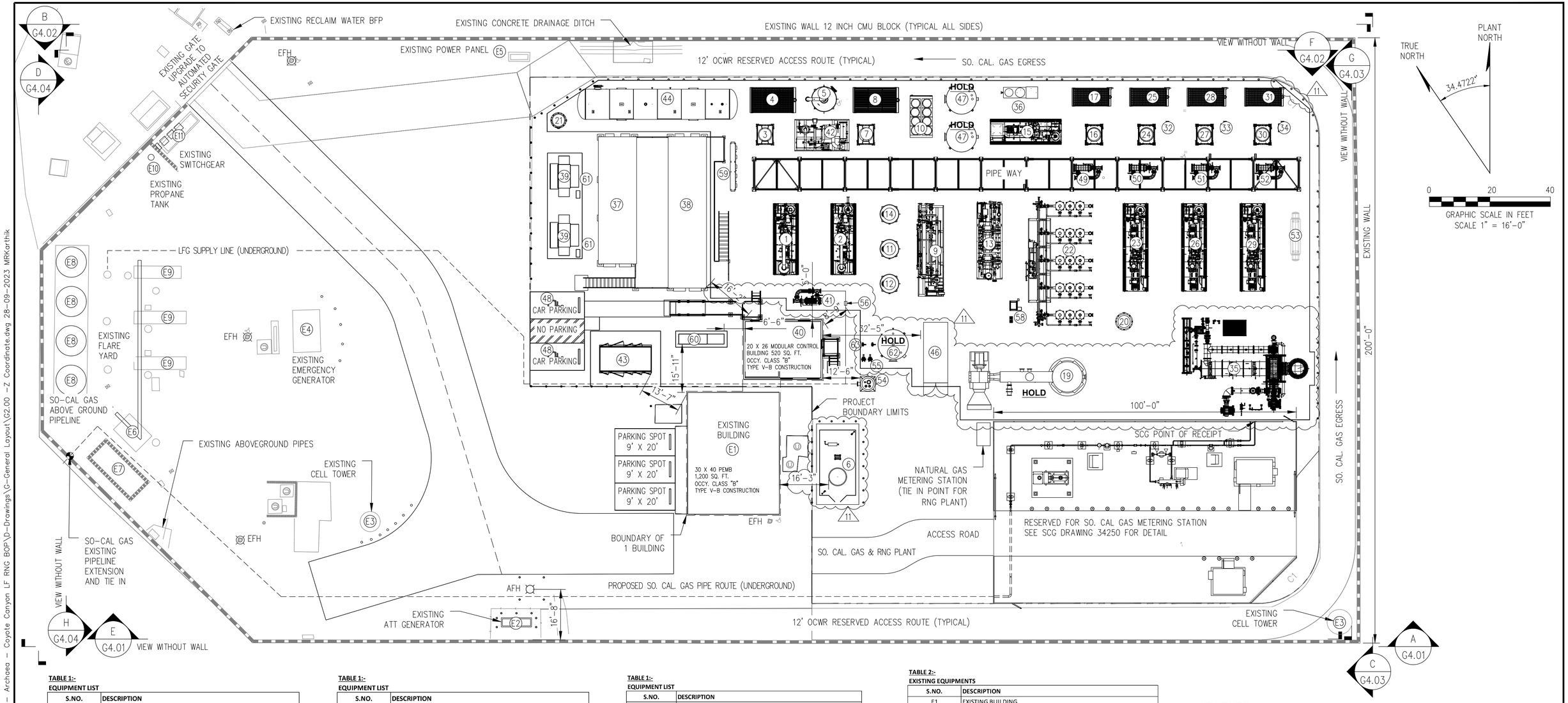


TABLE 1:-
EQUIPMENT LIST

S.NO.	DESCRIPTION
1	TYPE #1 FEED COMPRESSOR
2	TYPE #2 FEED COMPRESSOR
3	TYPE #1 COMPRESSOR FEED OIL COOLER
4	TYPE #1 COMPRESSOR FEED AFTERCOOLER
5	H2S REMOVAL VESSEL
6	LN2 PAD
7	TYPE #2 FEED COMPRESSOR OIL COOLER
8	TYPE #2 FEED COMPRESSOR AFTERCOOLER
9	TSA PRE-TREATMENT SKID
10	CHILLER
11	TSA ADSORBER VESSEL A (6' DIA.)
12	TSA ADSORBER VESSEL B (6' DIA.)
13	MEMBRANE SKID
14	VOC POLISHING VESSEL
15	TYPE #1 RECYCLE COMPRESSOR
16	TYPE #1 RECYCLE COMPRESSOR OIL COOLER
17	TYPE #1 RECYCLE COMPRESSOR AFTERCOOLER
~~18A~~	~~DEOXO SKID~~
~~18B~~	~~DEOXO DRYER~~
~~18C~~	~~DEOXO AFTERCOOLER~~
19	OFF-SPECIFICATION GAS FLARE

TABLE 1:-
EQUIPMENT LIST

S.NO.	DESCRIPTION
20	NRU BUFFER VESSEL
21	COMPRESSED AIR RECEIVER
22	NRU W/ADSORBERS
23	#1 NRU VAC. RINSE SKID
24	#1 NRU VAC. RINSE OIL COOLER
25	#1 NRU VAC. RINSE AFTERCOOLER
26	#2 NRU VAC. RINSE SKID
27	#2 NRU VAC RINSE OIL COOLER
28	#2 NRU VAC. RINSE AFTERCOOLER
29	#3 NRU VAC. RINSE SKID
30	#3 NRU VAC. RINSE OIL COOLER
31	#3 NRU VAC. RINSE AFTERCOOLER
32	#1 NRU DRYER VESSEL
33	#2 NRU DRYER VESSEL
34	#3 NRU DRYER VESSEL
35	THERMAL OXIDIZER
36	OILY WATER SEPARATOR
37	POWER DISTRIBUTION E-HOUSE
38	POWER DISTRIBUTION E-HOUSE BOP
39	TRANSFORMERS
11 40	OPERATOR/CONTROL SHELTER

TABLE 1:-
EQUIPMENT LIST

S.NO.	DESCRIPTION
41	STAGE #1 INLET PARTICULATE FILTER
42	H2S SKID
43	UTILITY INTERTIE SWITCHGEAR
44	TSA BLOWDOWN TANK 30,000 Gal
~~45~~	~~H2S GUARD BED~~
11 46	20 FEET STORAGE CONTAINER
47	CONDENSATE TANK (A & B)
48	PARKING AREA
49	NRU RINSE COMPRESSOR INLET FILTER A
50	NRU VACUUM COMPRESSOR INLET FILTER A
51	NRU RINSE COMPRESSOR INLET FILTER B
52	NRU VACUUM COMPRESSOR INLET FILTER B
53	HEAT EXHANGER (FUTURE)
54	LFG SUMP
55	SUMP CONDENSATE PUMP
56	FLOW METER
~~57~~	~~CONDENSATE TANK PUMP (A & B)~~
58	GAS CHROMATOGRAPH
59	3rd NRU PANEL
60	EMERGENCY GENERATOR
11 61	NEUTRAL GROUNDING RESISTORS
11 62	UTILITY WATER TANK
63	UTILITY WATER PUMP

TABLE 2:-
EXISTING EQUIPMENTS

S.NO.	DESCRIPTION
E1	EXISTING BUILDING
E2	EXISTING ATT GENERATOR
E3	EXISTING CELL TOWER
E4	EXISTING EMERGENCY GENERATOR
E5	EXISITNG POWER PANEL
E6	EXISITNG PAD
E7	EXISITNG TANK
E8	EXISTING FLARE
E9	EXISTING BLOWERS PAD
E10	EXISTING PROPANE TANK
E11	EXISTING SWITCHGEAR

AREA JUSTIFICATION FOR CONTROL BUILDING

ID #	DESCRIPTION	WIDTH	LENGTH	AREA			TYPE CONSTRUCTION	OCCY CLASS	MAX. ALLOW. AREA
40	NEW MODULAR CONTROL BUILDING	26	20	520	27.7%		V-B	B	9,000
E1	EXISTING PEMB BUILDING	30	40	1,200	63.8%		V-B	B	9,000
	TOTAL			1,880	100%	<----------is less than----------<			9,000

NOTES:
1 TREAT BUILDING 40 & E1 AS ONE BUILDING PER SEC. 503.1.2

11 **HOLD:-** VENDOR DRAWING IS AWAITED.

LEGENDS

EFH–EXISTING FIRE HYDRANT RETAINED	EFH
AFH–ADDED FIRE HYDRANT	AFH
GAS LINES	
PROJECT BOUNDARY LIMITS	
SO. CAL. GAS METERING STATION LIMITS	

TOPOGRAPHY NOTE:
BASED ON TOPO FURNISHED BY D.WOOLLEY & ASSOCIATES
DATE: 07-28-2022.

CONFIDENTIAL

90% DESIGN REVIEW

REV	DATE	DESCRIPTION	DRN BY	CHK BY	APRV BY
8	06/15/2023	ISSUED FOR 60% DESIGN REVIEW (REVISED)	SS	TP	AG
9	07/06/2023	ISSUED FOR 60% DESIGN REVIEW (REVISED)	SS	TP	AG
10	08/16/2023	ISSUED FOR 60% DESIGN REVIEW (REVISED)	SS	TP	AG
11	09/14/2023	ISSUED FOR 90% DESIGN REVIEW	SS	TP	AG

OWNER: ARCHAEA ENERGY
4444 WESTHEIMER ROAD, SUITE G450
HOUSTON, TX 77027
Ph: (346) 708-8272

ENGINEER: BIOGAS ENGINEERING
2321 E. 28TH STREET, SUITE 400
SIGNAL HILL, CA 90755, Ph: (562) 726-3565
EMAIL: INFO@BIOGASENG.COM

SITE PLAN

COYOTE CANYON LANDFILL
RNG PROJECT
20662 NEWPORT COAST DRIVE
NEWPORT BEACH, CA 92657

DRAWING NO.
G2.00

Attachment E

Geotechnical Information

LOR GEOTECHNICAL GROUP, INC.
Soil Engineering ▲ Geology ▲ Environmental

INFILTRATION TESTING FOR PROPOSED INFILTRATION SYSTEM PROPOSED RNG PLANT EQUIPMENT AREA COYOTE CANYON LANDFILL NEWPORT COAST, CALIFORNIA

PROJECT NO. 23775.4
APRIL 14, 2023

Prepared For:

Biofuels Coyote Canyon Biogas, LLC
500 Technology Drive, Upper Floor
Canonsburg, Pennsylvania 15317

Attention: Mr. Nick Bauer

6121 Quail Valley Court ▲ Riverside, CA 92507 ▲ (951) 653-1760 ▲ (951) 653-1741 (Fax) ▲ www.lorgeo.com

April 14, 2023

Biofuels Coyote Canyon Biogas, LLC.
500 Technology Drive, Upper Floor
Canonsburg, Pennsylvania 15317

Project No. 23775.4

Attention: Mr. Nick Bauer

Subject: Infiltration Testing, Proposed Infiltration System, Proposed RNG Plant Equipment Area, Coyote Canyon Landfill, Newport Coast, California.

As requested by you, we recently conducted infiltration tests within the natural earth materials in the area of a proposed infiltration system at the subject site. Included herein are the results of our tests. The test locations were provided for us and are shown on Enclosure 1.

The earth materials encountered and tested at the site, at the proposed infiltration system location and bottom elevations, consisted predominantly of clayey siltstone with much lesser sandstone. This is consistent with the findings of our referenced Preliminary Geotechnical Investigation at the site (LOR, 2021). A log of the closest Boring (B-8) conducted during our previous site investigation is included as Enclosure 2.

Testing and Test Results

Two borehole percolation tests were conducted in general accordance with the Deep Percolation Test procedure as outlined in the Orange County Department of Public Works (2018). As mentioned above, the locations of our tests are illustrated on Enclosure 1 and the tests were conducted at the approximate requested depth of 10 feet below the surface. Subsequent to drilling, a 3-inch diameter, perforated PVC pipe wrapped in filter fabric was placed within each test hole and 3/4-inch gravel was placed between the outside of the pipe and the hole wall. Test holes were pre-soaked the same day as drilling. Testing took place the next day, March 4, 2023, within 26 hours but not before 15 hours, of the pre-soak. The holes were filled using water from a 200 gallon water tank. Test periods consisted of allowing the water to drop in approximately 30-minute intervals. After each reading, the hole was refilled. Testing was terminated after a total of 12 readings were recorded. The percolation test data was converted to an infiltration rate using the Porchet Method as outlined by the Orange County Department of Public Works (2018).

Infiltration test results are summarized in the following table:

Test No.	Depth* (ft)	Infiltration Rate** (in/hr)
P-1	10.0	0.01
P-2	10.0	0.00
* depth measured below existing ground surface ** Porchet Method determined clear water rate		

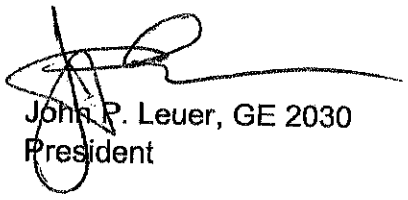
The results of this testing are presented as Enclosures 3 and 4.

Conclusions and Recommendations

The results of our field investigation and percolation test data indicates the site earth materials at the depths and locations tested are not conducive to acceptable infiltration. Therefore, consideration should be given to alternative methods and water quality storm water systems should not incorporate on-site infiltration when determining storm water treatment capacity.

We trust this information is as requested. If you have any questions regarding this letter, please do not hesitate to contact this office at your convenience.

Respectfully submitted,
LOR Geotechnical Group, Inc.



John P. Leuer, GE 2030
President

RMM:JPL:ss

Enclosures Infiltration Map, Boring Log, and Infiltration Test Data

Distribution: Addressee (2) and via email nbauer@archaea.energy

REFERENCES

LOR Geotechnical Group, Inc., 2021, Preliminary Geotechnical Investigation, Proposed RNG Plant Equipment Area, Coyote Canyon Landfill, Newport Coast, California, Project No. 23775.1, dated December 10, 2021.

Orange County Department of Public Works, 2018, Technical Guidance Document (TGD) for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs), Version 1.1 with Minor Update, dated December 21, 2018.

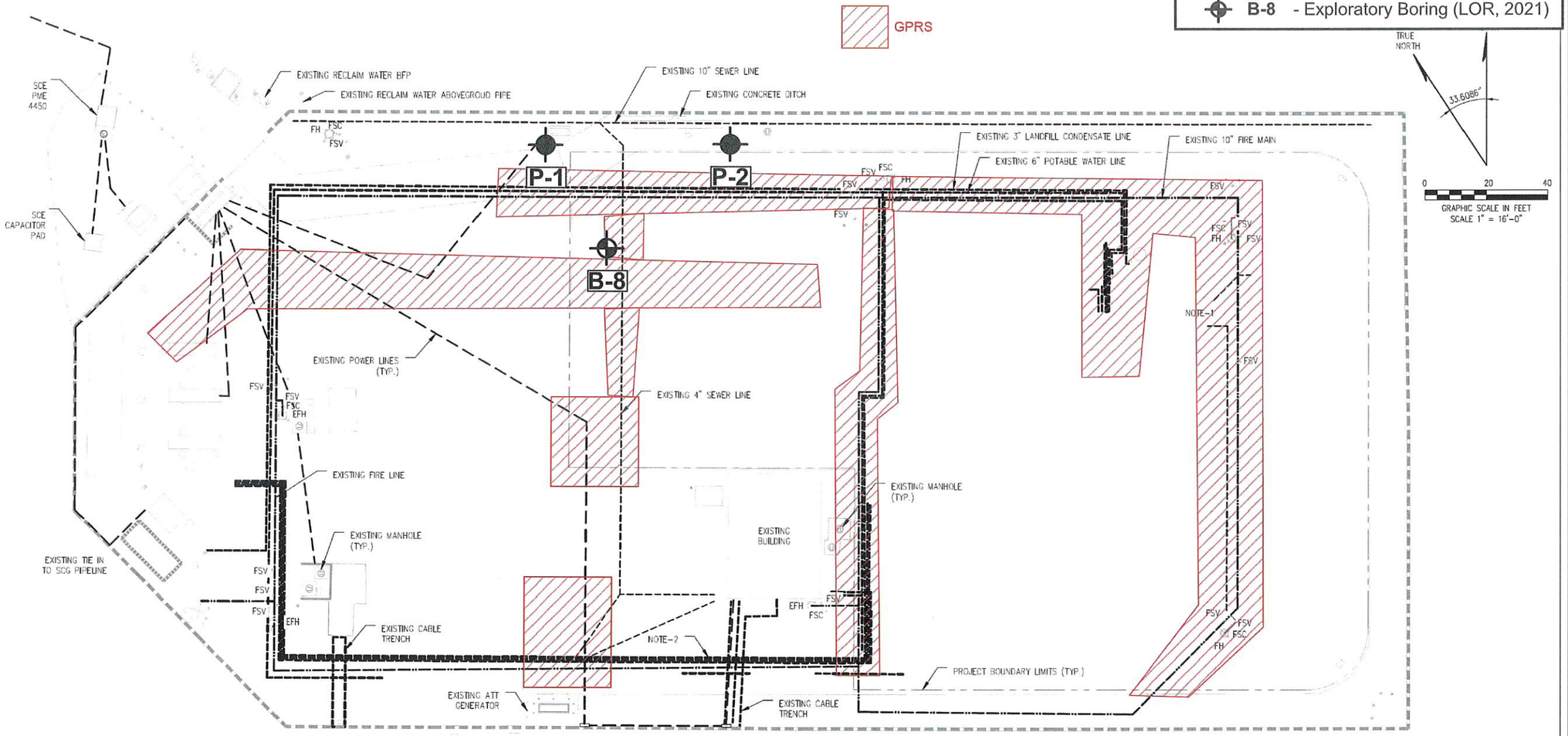
INFILTRATION MAP

Legend

(Locations Approximate)

Map Symbols

- **P-2** - Percolation Test
- **B-8** - Exploratory Boring (LOR, 2021)



LEGENDS

FIRE HYDRANT	FH
AFH-ADDED FIRE HYDRANT	
POWER LINES	
UTILITIES LINE	
FIRE LINE	

LEGENDS

FIRE SERVICE VALVE	FSV
FIRE SERVICE CONNECT	FSC

NOTE:-

1. LOCATE THE DISCARDED BURIED PIPE THAT WAS PART OF PREVIOUS PROJECT.
2. EXISTING UG UTILITIES TO BE FIELD VERIFIED.

TOPOGRAPHY NOTE:
BASED ON TOPO FURNISHED BY D.WOOLLEY & ASSOCIATES
DATE: 07-28-2022.

CONFIDENTIAL

ISSUED FOR CUP

REV	DATE	DESCRIPTION	DRN BY	CHK BY	APRV BY
1.0	08/11/2022	ISSUED FOR CUP	AK	TP	AG

OWNER: ARCHAEA ENERGY
4444 WESTHEIMER ROAD, SUITE G450
HOUSTON, TX 77027
Ph: (346) 708-8272

ENGINEER: BIOGAS ENGINEERING
2321 E. 28TH STREET, SUITE 400
SIGNAL HILL, CA 90755, Ph: (562) 726-3565
EMAIL: INFO@BIOGASENG.COM

EXISTING PIPES & CABLES (FOR UG SERVICES SURVEY)

COYOTE CANYON LANDFILL RNG PROJECT

DRAWING NO. **G6.00**

PROJECT: Proposed RNG Plant Equipment Area

CLIENT: Biofuels Coyote Canyon Biogas, LLC

PROJECT NO.: 23775.4

ENCLOSURE: 1

DATE: April 2023

SCALE: 1" ≈ 36'

LOR GEOTECHNICAL GROUP, INC.

LOG OF BORING B-8

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0	52		11.9	117.6			SM	@ 0 feet, FILL: SILTY SAND with GRAVEL, approximately 15% gravel, 10 % coarse grained sand, 20% medium grained sand, 25% fine grained sand, 20% silty fines, light brown, damp, loose to medium dense.
								@ 2± feet, BEDROCK: SANDY SILTSTONE, approximately 5% medium grained sand, 30% fine grained sand, 65% silty with clay, yellowish-brown to grayish-brown, moist, weakly cemented.
5	53		14.1	115.3				
	76		12.5	118.1				@ 7 feet, slightly sandier.
10	65		14.0	112.0				@ 10 feet, siltier with minor clayey siltstone.
15	36		13.7	108.2				@ 15 feet, includes occasional think (1/8 to 1/4") gypsum stringers.
20	82 for 9"		12.8	104.5				@ 20 feet, sandier.
								END OF BORING @ 21.25'
25								Fill to 2±' No groundwater Bedrock @ 2'

PROJECT:	Proposed RNG Plant Equipment Area	**PROJECT NO.:**	23775.1
CLIENT:	Archaea Energy, LLC	**ELEVATION:**	--
LOR GEOTECHNICAL GROUP, INC.		**DATE DRILLED:**	November 2, 2021
		EQUIPMENT:	Mobile B-61
		HOLE DIA.: 8"	**ENCLOSURE:** B-8

BOREHOLE METHOD PERCOLATION TEST RESULTS

Project:	Coyote Canyon Landfill	Test Date:	April 4, 2023
Project No.:	23755.4	Test Hole No.:	P-1
Soil Classificaiton:	Topanga Formation: Los Trancos member	Effective Hole Dia.*:	4.8 in.
Depth of Test Hole:	10.0 ft.	Date Excavated:	April 3, 2023
Tested By:	A.L.		

READING	TIME START	TIME STOP	TIME INTERVAL		TOTAL TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	INITIAL HOLE DEPTH	FINAL HOLE DEPTH	CHANGE IN WATER LEVEL	AVERAGE WETTED DEPTH	PERCOLATION RATE
			min	hr.	hr.	in.	in.	in.	in.	in.	in.	(min/in)
1	9:23 AM	9:48 AM	25	0.42	0.42	27.25	27.50	120.00	120.00	0.25	92.63	100.0
2	9:48 AM	10:13 AM	25	0.42	0.83	27.50	27.75	120.00	120.00	0.25	92.38	100.0
3	10:13 AM	10:43 AM	30	0.50	1.33	27.75	28.25	120.00	120.00	0.50	92.00	60.0
4	10:43 AM	11:13 AM	30	0.50	1.83	28.25	28.75	120.00	120.00	0.50	91.50	60.0
5	11:13 AM	11:43 AM	30	0.50	2.33	28.75	29.25	120.00	120.00	0.50	91.00	60.0
6	11:43 AM	12:13 PM	30	0.50	2.83	29.25	29.75	120.00	120.00	0.50	90.50	60.0
7	12:13 PM	12:43 PM	30	0.50	3.33	29.75	30.25	120.00	120.00	0.50	90.00	60.0
8	12:43 PM	1:13 PM	30	0.50	3.83	30.25	30.75	120.00	120.00	0.50	89.50	60.0
9	1:13 PM	1:43 PM	30	0.50	4.33	30.75	31.25	120.00	120.00	0.50	89.00	60.0
10	1:43 PM	2:13 PM	30	0.50	4.83	31.25	31.75	120.00	120.00	0.50	88.50	60.0
11	2:13 PM	2:43 PM	30	0.50	5.33	31.75	32.25	120.00	120.00	0.50	88.00	60.0
12	2:43 PM	3:13 PM	30	0.50	5.83	32.25	32.75	120.00	120.00	0.50	87.50	60.0

PERCOLATION RATE CONVERSION (Porchet Method):

H_O	87.75	
H_f	87.25	
ΔH	0.50	
H_{avg}	87.50	
I_t	**0.01**	in/hr (clear water rate)

* diameter adjusted to an effective diameter due to the loss in volume of water because of gravel packing

BOREHOLE METHOD PERCOLATION TEST RESULTS

Project:	Coyote Canyon Landfill	Test Date:	April 4, 2023
Project No.:	23755.4	Test Hole No.:	P-2
Soil Classificaiton:	Topanga Formation: Los Trancos member	Effective Hole Dia.*:	4.8 in.
Depth of Test Hole:	10.0 ft.	Date Excavated:	April 3, 2023
Tested By:	A.L.		

READING	TIME START	TIME STOP	TIME INTERVAL		TOTAL TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	INITIAL HOLE DEPTH	FINAL HOLE DEPTH	CHANGE IN WATER LEVEL	AVERAGE WETTED DEPTH	PERCOLATION RATE
			min	hr.	hr.	in.	in.	in.	in.	in.	in.	(min/in)
1	9:25 AM	9:50 AM	25	0.42	0.42	18.00	18.13	120.00	120.00	0.125	101.94	200.0
2	9:50 AM	10:15 AM	25	0.42	0.83	18.13	18.25	120.00	120.00	0.125	101.81	200.0
3	10:15 AM	10:45 AM	30	0.50	1.33	18.25	18.38	120.00	120.00	0.125	101.69	240.0
4	10:45 AM	11:15 AM	30	0.50	1.83	18.38	18.50	120.00	120.00	0.125	101.56	240.0
5	11:15 AM	11:45 AM	30	0.50	2.33	18.50	18.63	120.00	120.00	0.125	101.44	240.0
6	11:45 AM	12:15 PM	30	0.50	2.83	18.63	18.75	120.00	120.00	0.125	101.31	240.0
7	12:15 PM	12:45 PM	30	0.50	3.33	18.75	18.88	120.00	120.00	0.125	101.19	240.0
8	12:45 PM	1:15 PM	30	0.50	3.83	18.88	19.00	120.00	120.00	0.125	101.06	240.0
9	1:15 PM	1:45 PM	30	0.50	4.33	19.00	19.13	120.00	120.00	0.125	100.94	240.0
10	1:45 PM	2:15 PM	30	0.50	4.83	19.13	19.25	120.00	120.00	0.125	100.81	240.0
11	2:15 PM	2:45 PM	30	0.50	5.33	19.25	19.38	120.00	120.00	0.125	100.69	240.0
12	2:45 PM	3:15 PM	30	0.50	5.83	19.38	19.50	120.00	120.00	0.125	100.56	240.0

PERCOLATION RATE CONVERSION (Porchet Method):

H_O	100.63	
H_f	100.50	
ΔH	0.125	
H_{avg}	100.56	
I_t	**0.00**	in/hr (clear water rate)

* diameter adjusted to an effective diameter due to the loss in volume of water because of gravel packing