

# Water Quality Management Plan

For:

## Chevron Gas Station

APN 0257-013-12-0-000

Prepared for:

Kareem Oil, LLC

2022 Via Cerritos

Palos Verdes Estates, CA 90275

310-800-4126

Prepared by:

Waber Consultants, Inc.

3711 Long Beach Blvd, Suite 1008

Long Beach, CA 90807

562-426-8283

Submittal Date: November 16, 2016

Revision Date: January 17, 2018

Approval Date: \_\_\_\_\_

Preliminary WQMP Approved.  
Address comments upon  
submittal of Final WQMP.

**REVIEWED**

*By Xochitl Lozano at 2:19 pm, Feb 01, 2018*

**APPROVED**



### Project Owner's Certification

This Water Quality Management Plan (WQMP) has been prepared for Kareem Oil, LLC by Waber Consultants, Inc. The WQMP is intended to comply with the requirements of the San Bernardino County and the NPDES Areawide Stormwater Program requiring the preparation of a WQMP. 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 San Bernardino County's Municipal Storm Water Management Program and the intent of the NPDES Permit for San Bernardino County and the incorporated cities of San Bernardino County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors in interest and the city/county shall be notified of the transfer. The new owner will be informed of its responsibility under this WQMP. A copy of the approved WQMP shall be available on the subject site in perpetuity.

"I certify under a penalty of law that the provisions (implementation, operation, maintenance, and funding) of the WQMP have been accepted and that the plan will be transferred to future successors."

Project Data			
Permit/Application Number(s):	P201600613	Grading Permit Number(s):	
Tract/Parcel Map Number(s):		Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			APN 0257-013-12-0-000
Owner's Signature			
<b>Owner Name:</b> Issam Ghreiwati			
Title	President		
Company	Kareem Oil, LLC		
Address	2022 Via Cerritos, Palos Verdes Estates, CA 90275		
Email	<a href="mailto:issamghreiwati@hotmail.com">issamghreiwati@hotmail.com</a>		
Telephone #	310-800-4126		
Signature		Date	

Required

### Preparer's Certification

Project Data			
Permit/Application Number(s):	P201600613	Grading Permit Number(s):	
Tract/Parcel Map Number(s):	APN 0257-013-12-0-000	Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			APN 0257-013-12-0-000

“The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan were prepared under my oversight and meet the requirements of Regional Water Quality Control Board Order No. R8-2010-0036.”

<b>Engineer:</b> Mahir Waber, P.E.		PE Stamp Below
Title	Principal	
Company	Waber Consultants, Inc.	
Address	3711 Long Beach Blvd, Suite 1008	
Email	<a href="mailto:mwaber@waberconsultants.com">mwaber@waberconsultants.com</a>	
Telephone #	562-426-8283	
Signature		
Date	01/16/18	

Required

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## Section 1 Discretionary Permit(s)

<b>Form 1-1 Project Information</b>					
Project Name		CHEVRON GAS STATION			
Project Owner Contact Name:		ISSAM GHREIWATI			
Mailing Address:	2022 VIA CERRITOS, PALOS VERDES ESTATES, CA 90275	E-mail Address:	<a href="mailto:issamghreiwati@hotmail.com">issamghreiwati@hotmail.com</a>	Telephone:	310-800-4126
Permit/Application Number(s):	P201600613	Tract/Parcel Map Number(s):	APN 0257-013-12-0-000		
Additional Information/ Comments:					
Description of Project:	<p>The existing site is approximately 1.97 acres in size. The redevelopment portion of the site is approximately 1.97 acres and involves the replacement of impervious surface on an already developed site. There is an existing 1-story house and a 1-story commercial building. The existing site is partially paved. The site is sloped in a generally south direction and is relatively flat.</p> <p>The proposed site includes a Chevron gas station, a convenient store and a parking lot exposed to storm water. The site has one drainage area with a total area of 85,986 SF and 66,801 SF impervious area (please see WQMP Site Plan). The proposed site includes landscaping along the perimeter. It generally drains in a southerly direction and sheet flow is captured by curb inlets. Drainage eventually flows into a proposed underground retention tank.</p>				

**Water Quality Management Plan (WQMP)**

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<p>Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.</p>	<p>N/A</p>
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## Section 2 Project Description

### 2.1 Project Information

This section of the WQMP should provide the information listed below. The information provided for Conceptual/ Preliminary WQMP should give sufficient detail to identify the major proposed site design and LID BMPs and other anticipated water quality features that impact site planning. Final Project WQMP must specifically identify all BMP incorporated into the final site design and provide other detailed information as described herein.

The purpose of this information is to help determine the applicable development category, pollutants of concern, watershed description, and long term maintenance responsibilities for the project, and any applicable water quality credits. This information will be used in conjunction with the information in Section 3, Site Description, to establish the performance criteria and to select the LID BMP or other BMP for the project or other alternative programs that the project will participate in, which are described in Section 4.

<b>Form 2.1-1 Description of Proposed Project</b>					
<b>1</b> Development Category (Select all that apply):					
<input checked="" type="checkbox"/> Significant re-development involving the addition or replacement of 5,000 ft <sup>2</sup> or more of impervious surface on an already developed site	<input type="checkbox"/> New development involving the creation of 10,000 ft <sup>2</sup> or more of impervious surface collectively over entire site	<input type="checkbox"/> Automotive repair shops with standard industrial classification (SIC) codes 5013, 5014, 5541, 7532- 7534, 7536-7539	<input type="checkbox"/> Restaurants (with SIC code 5812) where the land area of development is 5,000 ft <sup>2</sup> or more		
<input type="checkbox"/> Hillside developments of 5,000 ft <sup>2</sup> or more which are located on areas with known erosive soil conditions or where the natural slope is 25 percent or more	<input type="checkbox"/> Developments of 2,500 ft <sup>2</sup> of impervious surface or more adjacent to (within 200 ft) or discharging directly into environmentally sensitive areas or waterbodies listed on the CWA Section 303(d) list of impaired waters.	<input checked="" type="checkbox"/> Parking lots of 5,000 ft <sup>2</sup> or more exposed to storm water	<input checked="" type="checkbox"/> Retail gasoline outlets that are either 5,000 ft <sup>2</sup> or more, or have a projected average daily traffic of 100 or more vehicles per day		
<input type="checkbox"/> Non-Priority / Non-Category Project <i>May require source control LID BMPs and other LIP requirements. Please consult with local jurisdiction on specific requirements.</i>					
<b>2</b> Project Area (ft <sup>2</sup> ):	85,986 SF	<b>3</b> Number of Dwelling Units:	N/A	<b>4</b> SIC Code:	5541
<b>5</b> Is Project going to be phased? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, ensure that the WQMP evaluates each phase as a distinct DA, requiring LID BMPs to address runoff at time of completion.</i>					
<b>6</b> Does Project include roads? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, ensure that applicable requirements for transportation projects are addressed (see Appendix A of TGD for WQMP)</i>					

## 2.2 Property Ownership/Management

Describe the ownership/management of all portions of the project and site. State whether any infrastructure will transfer to public agencies (City, County, Caltrans, etc.) after project completion. State if a homeowners or property owners association will be formed and be responsible for the long-term maintenance of project stormwater facilities. Describe any lot-level stormwater features that will be the responsibility of individual property owners.

### Form 2.2-1 Property Ownership/Management

Describe property ownership/management responsible for long-term maintenance of WQMP stormwater facilities:

Kareem Oil, LLC will be responsible for operation and maintenance of BMPs onsite.

Owner: Issam Ghreiwati

Company: Kareem Oil, LLC

Address: 2022 Via Cerritos, Palos Verdes Estates, CA 90275

Telephone: (310) 800-4126

## 2.3 Potential Stormwater Pollutants

Determine and describe expected stormwater pollutants of concern based on land uses and site activities (refer to Table 3-3 in the TGD for WQMP).

Form 2.3-1 Pollutants of Concern			
Pollutant	Please check: E=Expected, N=Not Expected		Additional Information and Comments
	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Pathogens (Bacterial / Virus)	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Santa Ana River, Reach 4; Santa Ana River, Reach 2;
Nutrients - Phosphorous	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Nutrients - Nitrogen	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Santa Ana River, Reach 3
Noxious Aquatic Plants	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Sediment	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Metals	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Santa Ana River, Reach 3; Santa Ana River, Reach 2
Oil and Grease	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Trash/Debris	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Pesticides / Herbicides	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Organic Compounds	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Santa Ana River, Reach 1
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	

Indicate sources of pollutants for all. See technical guidance document for guidance.

## 2.4 Water Quality Credits

A water quality credit program is applicable for certain types of development projects if it is not feasible to meet the requirements for on-site LID. Proponents for eligible projects, as described below, can apply for water quality credits that would reduce project obligations for selecting and sizing other treatment BMP or participating in other alternative compliance programs. Refer to Section 6.2 in the TGD for WQMP to determine if water quality credits are applicable for the project.

<b>Form 2.4-1 Water Quality Credits</b>			
<b>1</b> Project Types that Qualify for Water Quality Credits: <i>Select all that apply</i>			
<input type="checkbox"/> Redevelopment projects that reduce the overall impervious footprint of the project site. [Credit = % impervious reduced]	Higher density development projects <input type="checkbox"/> Vertical density [20%] <input type="checkbox"/> 7 units/ acre [5%]	<input type="checkbox"/> Mixed use development, (combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that demonstrate environmental benefits not realized through single use projects) [20%]	<input type="checkbox"/> Brownfield redevelopment (redevelop real property complicated by presence or potential of hazardous contaminants) [25%]
<input type="checkbox"/> Redevelopment projects in established historic district, historic preservation area, or similar significant core city center areas [10%]	<input type="checkbox"/> Transit-oriented developments (mixed use residential or commercial area designed to maximize access to public transportation) [20%]	<input type="checkbox"/> In-fill projects (conversion of empty lots & other underused spaces < 5 acres, substantially surrounded by urban land uses, into more beneficially used spaces, such as residential or commercial areas) [10%]	<input type="checkbox"/> Live-Work developments (variety of developments designed to support residential and vocational needs) [20%]
<b>2</b> Total Credit % N/A ( <i>Total all credit percentages up to a maximum allowable credit of 50 percent</i> )			
Description of Water Quality Credit Eligibility (if applicable)	N/A		

## Section 3 Site and Watershed Description

Describe the project site conditions that will facilitate the selection of BMP through an analysis of the physical conditions and limitations of the site and its receiving waters. Identify distinct drainage areas (DA) that collect flow from a portion of the site and describe how runoff from each DA (and sub-watershed DMAs) is conveyed to the site outlet(s). Refer to Section 3.2 in the TGD for WQMP. The form below is provided as an example. Then complete Forms 3.2 and 3.3 for each DA on the project site. ***If the project has more than one drainage area for stormwater management, then complete additional versions of these forms for each DA / outlet.***

Fill out

Form 3-1 Site Location and Hydrologic Features			
Site coordinates take GPS measurement at approximate center of site	Latitude 34°03'46" N	Longitude 117°23'50" W	Thomas Bros Map page
<sup>1</sup> San Bernardino County climatic region: <input checked="" type="checkbox"/> Valley <input type="checkbox"/> Mountain			
<sup>2</sup> Does the site have more than one drainage area (DA): Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If no, proceed to Form 3-2. If yes, then use this form to show a conceptual schematic describing DMAs and hydrologic feature connecting DMAs to the site outlet(s). An example is provided below that can be modified for proposed project or a drawing clearly showing DMA and flow routing may be attached</i>			
<pre>                     graph TD                         DA1_DMA_C[DA1 DMA C] --&gt; BMP_1[BMP 1]                         DA1_DMA_A[DA1 DMA A] --&gt; BMP_1                         DA1_DMA_B[DA1 DMA B] --&gt; BMP_1                     </pre>			
Conveyance	Briefly describe on-site drainage features to convey runoff that is not retained within a DMA		
DMA A to BMP 1	All pavement runoff will eventually flow to underground retention tank at southern point of project site.		
DMA B to BMP 1	All roof runoff will eventually flow to underground retention tank at southern point of project site.		
DMA C to BMP 1	All landscape runoff will eventually flow to underground retention tank at southern point of project site.		

Verify. Sum exceeds project area.

<b>Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1</b>				
For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA A	DMA B	DMA C	
<b>1</b> DMA drainage area (ft <sup>2</sup> )	23,131	6,522	61,193	
<b>2</b> Existing site impervious area (ft <sup>2</sup> )	23,131	6,522	0	
<b>3</b> Antecedent moisture condition <i>For desert areas, use <a href="http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf">http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf</a></i>	AMC III	AMC III	AMC III	
<b>4</b> Hydrologic soil group <i>Refer to Watershed Mapping Tool – <a href="http://permitrack.sbcounty.gov/wap/">http://permitrack.sbcounty.gov/wap/</a></i>	A	A	A	
<b>5</b> Longest flowpath length (ft)	162.81	308.94	308.26	
<b>6</b> Longest flowpath slope (ft/ft)	0.011	0.014	0.017	
<b>7</b> Current land cover type(s) <i>Select from Fig C-3 of Hydrology Manual</i>	Asphalt	Roof	Grass, Annual or Perennial	
<b>8</b> Pre-developed pervious area condition: <i>Based on the extent of wet season vegetated cover good &gt;75%; Fair 50-75%; Poor &lt;50% Attach photos of site to support rating</i>	Poor <50%	Poor <50%	Poor <50%	

<b>Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1 (use only as needed for additional DMA w/in DA 1)</b>				
For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA E	DMA F	DMA G	DMA H
<b>1</b> DMA drainage area (ft <sup>2</sup> )				
<b>2</b> Existing site impervious area (ft <sup>2</sup> )				
<b>3</b> Antecedent moisture condition <i>For desert areas, use <a href="http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf">http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf</a></i>				
<b>4</b> Hydrologic soil group <i>Refer to Watershed Mapping Tool – <a href="http://permitrack.sbcounty.gov/wap/">http://permitrack.sbcounty.gov/wap/</a></i>				
<b>5</b> Longest flowpath length (ft)				
<b>6</b> Longest flowpath slope (ft/ft)				
<b>7</b> Current land cover type(s) <i>Select from Fig C-3 of Hydrology Manual</i>				
<b>8</b> Pre-developed pervious area condition: <i>Based on the extent of wet season vegetated cover good &gt;75%; Fair 50-75%; Poor &lt;50% Attach photos of site to support rating</i>				

<b>Form 3-3 Watershed Description for Drainage Area</b>	
Receiving waters <i>Refer to Watershed Mapping Tool - <a href="http://permitrack.sbcounty.gov/wap/">http://permitrack.sbcounty.gov/wap/</a></i> See "Drainage Facilities" link at this website	Santa Ana River, Reach 4; Santa Ana River, Reach 3; Santa Ana River, Reach 2; Santa Ana River, Reach 1; Pacific Ocean
Applicable TMDLs <i>Refer to Local Implementation Plan</i>	Alachor, Atrazine, Azinphos-methyl, Carbaryl, Chlorpyrifos, Dieldrin, Disulfoton, Methyl Parathion, Simazine, Aluminum, Arsenic, Cadmium, Carbofuran, Molinate, Thiobencard/Bolero, Chemical oxygen demand, Chloride, Chromium, Cobalt, Copper, DDE, Diazinon, Fecal Coliform, Indicator Bacteria, Iron, Lead, Malathion, Mercury, Nickel, Pathogens, pH, Salinity, Selenium, Silver, Sodium, Sulfates, Total Nitrogen, Zinc
303(d) listed impairments <i>Refer to Local Implementation Plan and Watershed Mapping Tool - <a href="http://permitrack.sbcounty.gov/wap/">http://permitrack.sbcounty.gov/wap/</a> and State Water Resources Control Board website - <a href="http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml">http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml</a></i>	Copper, Lead, Pathogens
Environmentally Sensitive Areas (ESA) <i>Refer to Watershed Mapping Tool - <a href="http://permitrack.sbcounty.gov/wap/">http://permitrack.sbcounty.gov/wap/</a></i>	None
Unlined Downstream Water Bodies <i>Refer to Watershed Mapping Tool - <a href="http://permitrack.sbcounty.gov/wap/">http://permitrack.sbcounty.gov/wap/</a></i>	Santa Ana River, Reach 4; Santa Ana River, Reach 3; Santa Ana River, Reach 2
Hydrologic Conditions of Concern	<input type="checkbox"/> Yes Complete Hydrologic Conditions of Concern (HCOC) Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-10 in submittal <input checked="" type="checkbox"/> No
Watershed-based BMP included in a RWQCB approved WAP	<input type="checkbox"/> Yes Attach verification of regional BMP evaluation criteria in WAP <ul style="list-style-type: none"> <li>• More Effective than On-site LID</li> <li>• Remaining Capacity for Project DCV</li> <li>• Upstream of any Water of the US</li> <li>• Operational at Project Completion</li> <li>• Long-Term Maintenance Plan</li> </ul> <input checked="" type="checkbox"/> No

Applicable TMDL's for Santa Ana Reach 4 and 3 do not match what is shown here. Please revise.

## Section 4 Best Management Practices (BMP)

### 4.1 Source Control BMP

#### 4.1.1 Pollution Prevention

Non-structural and structural source control BMP are required to be incorporated into all new development and significant redevelopment projects. Form 4.1-1 and 4.1-2 are used to describe specific source control BMPs used in the WQMP or to explain why a certain BMP is not applicable. Table 7-3 of the TGD for WQMP provides a list of applicable source control BMP for projects with specific types of potential pollutant sources or activities. The source control BMP in this table must be implemented for projects with these specific types of potential pollutant sources or activities.

The preparers of this WQMP have reviewed the source control BMP requirements for new development and significant redevelopment projects. The preparers have also reviewed the specific BMP required for project as specified in Forms 4.1-1 and 4.1-2. All applicable non-structural and structural source control BMP shall be implemented in the project.

**Water Quality Management Plan (WQMP)**

<b>Form 4.1-1 Non-Structural Source Control BMPs</b>				
Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N1	Education of Property Owners, Tenants and Occupants on Stormwater BMPs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	An awareness program will be established by Kareem Oil, LLC to inform all employees of the impacts of dumping oil, antifreeze, paints, solvents or other potential harmful chemicals into storm drain; the impacts of littering and improper water disposal
N2	Activity Restrictions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC will provide restrictions to all employees, contractors, etc. on dumping and discharges conducted on this property that would contribute to stormwater pollution. Each employee must be trained and aware of activity restrictions.
N3	Landscape Management BMPs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Landscape will be designed by a landscape architect and maintained by Kareem Oil, LLC through its landscape contractor.
N4	BMP Maintenance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC, through its site and landscape maintenance contractors will be responsible for inspection and maintenance activities in landscape areas and inspect non-structural and structural BMPs.
N5	Title 22 CCR Compliance (How development will comply)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC shall comply with the applicable hazardous waste management section(s) of Title 22 for the proposed development.
N6	Local Water Quality Ordinances	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC shall comply with any applicable local water quality ordinances from the local jurisdiction to ensure clean stormwater discharges from fuel dispensing areas.
N7	Spill Contingency Plan	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC shall provide the Spill Contingency Plan guided by CASQA BMP Handbook SC-11 that mandates stockpiling of cleanup materials, notification of responsible agencies, disposal of cleanup materials, documentation, etc.
N8	Underground Storage Tank Compliance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC shall comply with State regulations dealing with underground storage tanks, enforced by County Environmental Health Services on behalf of the state.
N9	Hazardous Materials Disclosure Compliance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC shall comply with local ordinances and local fire protection agencies for the management of hazardous materials.

<b>Form 4.1-1 Non-Structural Source Control BMPs</b>				
Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N10	Uniform Fire Code Implementation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC shall be responsible to comply with the local Fire Code enforced by fire protection agency.
N11	Litter/Debris Control Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC through site maintenance contractor shall implement litter control procedures and management in the landscape and parking lot areas in order to prevent and reduce pollution of storm water runoff on a weekly basis.
N12	Employee Training	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC shall conduct an employee training program and shall inform and train employees engaged in maintenance activities regarding the impacts of dumping oil, antifreeze, paints, solvents or other potentially harmful chemicals.
N13	Housekeeping of Loading Docks	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Site does not have a loading dock.
N14	Catch Basin Inspection Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC shall perform common area catch basin inspections bi-annually and before the start of wet season.
N15	Vacuum Sweeping of Private Streets and Parking Lots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC shall provide vacuum sweeping of parking lots on a weekly basis. The sweeping program will be intensified prior to the start of the rainy season to minimize water pollution during the "first flush" storm.
N16	Other Non-structural Measures for Public Agency Projects	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Project is a private development.
N17	Comply with all other applicable NPDES permits	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC shall comply with other NPDES permits to include BMPs that are required as part of a SWPPP.

<b>Form 4.1-2 Structural Source Control BMPs</b>				
Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S1	Provide storm drain system stenciling and signage (CASQA New Development BMP Handbook SD-13)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC shall provide stenciling or labeling of all storm drain inlets and catch basins to discourage illegal dumping. Stenciling per CASQA Standards SD-13.
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does not apply to site.
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC shall make sure the trash storage areas meet the proper requirements. Trash enclosure areas shall have permanent roofing to prevent the introduction of debris to site runoff.
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control (Statewide Model Landscape Ordinance; CASQA New Development BMP Handbook SD-12)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Kareem Oil, LLC shall consult with landscape architects to ensure the reduction of excessive irrigation. Site shall be designed to minimize runoff of excess irrigation water into the stormwater system.
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	All landscape shall be finish-graded at a minimum of 1-2 inches below top of curb or sidewalk for increased retention/infiltration of stormwater and irrigation water.
S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does not apply to site.
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does not apply to site.
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does not apply to site.
S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does not apply to site.
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does not apply to site.

Car wash in gas station applies as S9 not S15. Show on site plan



**Form 4.1-2 Structural Source Control BMPs**

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S11	Equipment wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does not apply to site.
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Fueling areas on the site shall be paved with PCC, have appropriate slope to prevent ponding, and extend a minimum of 6.5 ft from the corner of each fuel dispenser. The canopy's minimum dimensions must be equal to or greater than the area within the grade break.
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does not apply to site.
S14	Wash water control for food preparation areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does not apply to site.
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wash waters from this site shall be directed to the sanitary sewer. Approved connection to the sewer will be provided.

See comment on S9

### 4.1.2 Preventative LID Site Design Practices

Site design practices associated with new LID requirements in the MS4 Permit should be considered in the earliest phases of a project. Preventative site design practices can result in smaller DCV for LID BMP and hydromodification control BMP by reducing runoff generation. 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 plan incorporates preventive site design practices
- Include an attached Site Plan layout which shows how preventative site design practices are included in WQMP

Refer to Section 5.2 of the TGD for WQMP for more details.

<b>Form 4.1-3 Preventative LID Site Design Practices Checklist</b>	
Site Design Practices <i>If yes, explain how preventative site design practice is addressed in project site plan. If no, other LID BMPs must be selected to meet targets</i>	
Minimize impervious areas: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Explanation suggests a "yes"
Explanation: Design of the site has been done with the minimizing of impervious areas in mind.	
Maximize natural infiltration capacity: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Explanation: Underground retention tank for site runoff provided.	
Preserve existing drainage patterns and time of concentration: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Explanation: Proposed site drains in the generally same direction on existing site.	
Disconnect impervious areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Explanation: Roof drains toward adjacent landscape areas.	
Protect existing vegetation and sensitive areas: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Explanation: No sensitive areas or existing vegetation need to be protected.	
Re-vegetate disturbed areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Explanation: Additional landscaping will be added throughout the perimeter of the site.	
Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Explanation: Retention basin has been sized by manufacturer according to site conditions. Proper oversight is needed during construction to ensure that the bottoms of infiltration facility are not overly compacted.	
Utilize vegetated drainage swales in place of underground piping or imperviously lined swales: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Explanation: Underground piping will be utilized. Vegetated swales are not to be used due to the high concentration of pollutants in this area.	
Stake off areas that will be used for landscaping to minimize compaction during construction: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Explanation: Retention basin area will be staked off to minimize compaction.	

Explanation suggests a "yes"

## 4.2 Project Performance Criteria

The purpose of this section of the Project WQMP is to establish targets for post-development hydrology based on performance criteria specified in the MS4 Permit. These targets include runoff volume for water quality control (referred to as LID design capture volume), and runoff volume, time of concentration, and peak runoff for protection of any downstream waterbody segments with a HCOC. ***If the project has more than one outlet for stormwater runoff, then complete additional versions of these forms for each DA / outlet.***

Methods applied in the following forms include:

- For LID BMP Design Capture Volume (DCV), the San Bernardino County Stormwater Program requires use of the P<sub>6</sub> method (MS4 Permit Section XI.D.6a.ii) – Form 4.2-1
- For HCOC pre- and post-development hydrologic calculation, the San Bernardino County Stormwater Program requires the use of the Rational Method (San Bernardino County Hydrology Manual Section D). Forms 4.2-2 through Form 4.2-5 calculate hydrologic variables including runoff volume, time of concentration, and peak runoff from the project site pre- and post-development using the Hydrology Manual Rational Method approach. For projects greater than 640 acres (1.0 mi<sup>2</sup>), the Rational Method and these forms should not be used. For such projects, the Unit Hydrograph Method (San Bernardino County Hydrology Manual Section E) shall be applied for hydrologic calculations for HCOC performance criteria.

Refer to Section 4 in the TGD for WQMP for detailed guidance and instructions.

Ensure imperviousness is consistent with areas provided on site plan.

<b>Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA 1)</b>		
<b>1</b> Project area DA 1 (ft <sup>2</sup> ): 85,986	<b>2</b> Imperviousness after applying preventative site design practices (Imp%): 80.9	<b>3</b> Runoff Coefficient (Rc): <u>0.611</u> $R_c = 0.858(Imp\%)^{0.3} - 0.78(Imp\%)^{0.2} + 0.774(Imp\%) + 0.04$
<b>4</b> Determine 1-hour rainfall depth for a 2-year return period P <sub>2yr-1hr</sub> (in): 0.530 <a href="http://hdsc.nws.noaa.gov/hdsc/pfds/so/sca_pfds.html">http://hdsc.nws.noaa.gov/hdsc/pfds/so/sca_pfds.html</a>		
<b>5</b> Compute P <sub>6</sub> , Mean 6-hr Precipitation (inches): 0.785 <i>P<sub>6</sub> = Item 4 * C<sub>1</sub>, where C<sub>1</sub> is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)</i>		
<b>6</b> Drawdown Rate <i>Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.</i>		24-hrs <input type="checkbox"/> 48-hrs <input checked="" type="checkbox"/>
<b>7</b> Compute design capture volume, DCV (ft <sup>3</sup> ): 6,466.5; Proposed Retention Tank: 6,987 ft <sup>3</sup> <i>DCV = 1/12 * [Item 1 * Item 3 * Item 5 * C<sub>2</sub>], where C<sub>2</sub> is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963)</i> <i>Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2</i>		

Verify calculations. Based on numbers above, a higher DCV is calculated.

## Form 4.2-2 Summary of HCOC Assessment (DA 1)

Does project have the potential to cause or contribute to an HCOC in a downstream channel: Yes  No

Go to: <http://permitrack.sbcounty.gov/wap/>

If "Yes", then complete HCOC assessment of site hydrology for 2yr storm event using Forms 4.2-3 through 4.2-5 and insert results below  
(Forms 4.2-3 through 4.2-5 may be replaced by computer software analysis based on the San Bernardino County Hydrology Manual)

If "No," then proceed to Section 4.3 Project Conformance Analysis

Condition	Runoff Volume (ft <sup>3</sup> )	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	<b>1</b> <i>Form 4.2-3 Item 12</i>	<b>2</b> <i>Form 4.2-4 Item 13</i>	<b>3</b> <i>Form 4.2-5 Item 10</i>
Post-developed	<b>4</b> <i>Form 4.2-3 Item 13</i>	<b>5</b> <i>Form 4.2-4 Item 14</i>	<b>6</b> <i>Form 4.2-5 Item 14</i>
Difference	<b>7</b> <i>Item 4 – Item 1</i>	<b>8</b> <i>Item 2 – Item 5</i>	<b>9</b> <i>Item 6 – Item 3</i>
Difference (as % of pre-developed)	<b>10</b> % <i>Item 7 / Item 1</i>	<b>11</b> % <i>Item 8 / Item 2</i>	<b>12</b> % <i>Item 9 / Item 3</i>

**Form 4.2-3 HCOC Assessment for Runoff Volume (DA 1)**

Form 4.2-3 HCOC Assessment for Runoff Volume (DA 1)								
Weighted Curve Number Determination for: Pre-developed DA	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1a Land Cover type								
2a Hydrologic Soil Group (HSG)								
3a DMA Area, ft <sup>2</sup> sum of areas of DMA should equal area of DA								
4a Curve Number (CN) use Items 1 and 2 to select the appropriate CN from Appendix C-2 of the TGD for WQMP								
Weighted Curve Number Determination for: Post-developed DA	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1b Land Cover type								
2b Hydrologic Soil Group (HSG)								
3b DMA Area, ft <sup>2</sup> sum of areas of DMA should equal area of DA								
4b Curve Number (CN) use Items 5 and 6 to select the appropriate CN from Appendix C-2 of the TGD for WQMP								
5 Pre-Developed area-weighted CN:	7 Pre-developed soil storage capacity, S (in): $S = (1000 / \text{Item 5}) - 10$				9 Initial abstraction, I <sub>a</sub> (in): $I_a = 0.2 * \text{Item 7}$			
6 Post-Developed area-weighted CN:	8 Post-developed soil storage capacity, S (in): $S = (1000 / \text{Item 6}) - 10$				10 Initial abstraction, I <sub>a</sub> (in): $I_a = 0.2 * \text{Item 8}$			
11 Precipitation for 2 yr, 24 hr storm (in): Go to: <a href="http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html">http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html</a>								
12 Pre-developed Volume (ft <sup>3</sup> ): $V_{pre} = (1 / 12) * (\text{Item sum of Item 3}) * [(\text{Item 11} - \text{Item 9})^2 / ((\text{Item 11} - \text{Item 9} + \text{Item 7}))]$								
13 Post-developed Volume (ft <sup>3</sup> ): $V_{pre} = (1 / 12) * (\text{Item sum of Item 3}) * [(\text{Item 11} - \text{Item 10})^2 / ((\text{Item 11} - \text{Item 10} + \text{Item 8}))]$								
14 Volume Reduction needed to meet HCOC Requirement, (ft <sup>3</sup> ): $V_{HCOC} = (\text{Item 13} * 0.95) - \text{Item 12}$								

## Form 4.2-4 HCOC Assessment for Time of Concentration (DA 1)

Compute time of concentration for pre and post developed conditions for each DA (For projects using the Hydrology Manual complete the form below)

Variables	Pre-developed DA1 <i>Use additional forms if there are more than 4 DMA</i>				Post-developed DA1 <i>Use additional forms if there are more than 4 DMA</i>			
	DMA A	DMA B	DMA C	DMA D	DMA A	DMA B	DMA C	DMA D
<b>1</b> Length of flowpath (ft) <i>Use Form 3-2 Item 5 for pre-developed condition</i>								
<b>2</b> Change in elevation (ft)								
<b>3</b> Slope (ft/ft), $S_o = \text{Item 2} / \text{Item 1}$								
<b>4</b> Land cover								
<b>5</b> Initial DMA Time of Concentration (min) <i>Appendix C-1 of the TGD for WQMP</i>								
<b>6</b> Length of conveyance from DMA outlet to project site outlet (ft) <i>May be zero if DMA outlet is at project site outlet</i>								
<b>7</b> Cross-sectional area of channel (ft <sup>2</sup> )								
<b>8</b> Wetted perimeter of channel (ft)								
<b>9</b> Manning's roughness of channel (n)								
<b>10</b> Channel flow velocity (ft/sec) $V_{fps} = (1.49 / \text{Item 9}) * (\text{Item 7}/\text{Item 8})^{0.67} * (\text{Item 3})^{0.5}$								
<b>11</b> Travel time to outlet (min) $T_t = \text{Item 6} / (\text{Item 10} * 60)$								
<b>12</b> Total time of concentration (min) $T_c = \text{Item 5} + \text{Item 11}$								
<b>13</b> Pre-developed time of concentration (min):	<i>Minimum of Item 12 pre-developed DMA</i>							
<b>14</b> Post-developed time of concentration (min):	<i>Minimum of Item 12 post-developed DMA</i>							
<b>15</b> Additional time of concentration needed to meet HCOC requirement (min):	$T_{C-HCOC} = (\text{Item 13} * 0.95) - \text{Item 14}$							

## Form 4.2-5 HCOC Assessment for Peak Runoff (DA 1)

Compute peak runoff for pre- and post-developed conditions

Variables	Pre-developed DA to Project Outlet (Use additional forms if more than 3 DMA)			Post-developed DA to Project Outlet (Use additional forms if more than 3 DMA)			
	DMA A	DMA B	DMA C	DMA A	DMA B	DMA C	DMA D
<b>1</b> Rainfall Intensity for storm duration equal to time of concentration <i><math>I_{peak} = 10^{(LOG Form 4.2-1 Item 4 - 0.6 LOG Form 4.2-4 Item 5 / 60)}</math></i>							
<b>2</b> Drainage Area of each DMA (Acres) <i>For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)</i>							
<b>3</b> Ratio of pervious area to total area <i>For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)</i>							
<b>4</b> Pervious area infiltration rate (in/hr) <i>Use pervious area CN and antecedent moisture condition with Appendix C-3 of the TGD for WQMP</i>							
<b>5</b> Maximum loss rate (in/hr) <i><math>F_m = Item 3 * Item 4</math></i> <i>Use area-weighted <math>F_m</math> from DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include</i>							
<b>6</b> Peak Flow from DMA (cfs) <i><math>Q_p = Item 2 * 0.9 * (Item 1 - Item 5)</math></i>							
<b>7</b> Time of concentration adjustment factor for other DMA to site discharge point <i>Form 4.2-4 Item 12 DMA / Other DMA upstream of site discharge point (If ratio is greater than 1.0, then use maximum value of 1.0)</i>	DMA A	<i>n/a</i>		<i>n/a</i>			
	DMA B		<i>n/a</i>		<i>n/a</i>		
	DMA C		<i>n/a</i>			<i>n/a</i>	
	DMA D						<i>n/a</i>
<b>8</b> Pre-developed $Q_p$ at $T_c$ for DMA A: <i><math>Q_p = Item 6_{DMAA} + [Item 6_{DMAB} * (Item 1_{DMAA} - Item 5_{DMAB}) / (Item 1_{DMAB} - Item 5_{DMAB}) * Item 7_{DMAA/2}] + [Item 6_{DMAC} * (Item 1_{DMAA} - Item 5_{DMAC}) / (Item 1_{DMAC} - Item 5_{DMAC}) * Item 7_{DMAA/3}]</math></i>	<b>9</b> Pre-developed $Q_p$ at $T_c$ for DMA B: <i><math>Q_p = Item 6_{DMAB} + [Item 6_{DMAA} * (Item 1_{DMAB} - Item 5_{DMAA}) / (Item 1_{DMAA} - Item 5_{DMAA}) * Item 7_{DMAB/1}] + [Item 6_{DMAC} * (Item 1_{DMAB} - Item 5_{DMAC}) / (Item 1_{DMAC} - Item 5_{DMAC}) * Item 7_{DMAB/3}]</math></i>			<b>10</b> Pre-developed $Q_p$ at $T_c$ for DMA C: $Q_p =$ <i><math>Item 6_{DMAC} + [Item 6_{DMAA} * (Item 1_{DMAC} - Item 5_{DMAA}) / (Item 1_{DMAA} - Item 5_{DMAA}) * Item 7_{DMAC/1}] + [Item 6_{DMAB} * (Item 1_{DMAC} - Item 5_{DMAB}) / (Item 1_{DMAB} - Item 5_{DMAB}) * Item 7_{DMAC/2}]</math></i>			
<b>10</b> Peak runoff from pre-developed condition confluence analysis (cfs): <i>as needed</i>		<i>Maximum of Item 8, 9, and 10 (including additional forms as needed)</i>					
<b>11</b> Post-developed $Q_p$ at $T_c$ for DMA A: <i>Same as Item 8 for post-developed values</i>	<b>12</b> Post-developed $Q_p$ at $T_c$ for DMA B: <i>Same as Item 9 for post-developed values</i>			<b>13</b> Post-developed $Q_p$ at $T_c$ for DMA C: <i>Same as Item 10 for post-developed values</i>			
<b>14</b> Peak runoff from post-developed condition confluence analysis (cfs): <i>forms as needed</i>		<i>Maximum of Item 11, 12, and 13 (including additional forms as needed)</i>					

Water Quality Management Plan (WQMP)

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	<b>15</b> Peak runoff reduction needed to meet HCOC Requirement (cfs): $Q_{p-HCOC} = (Item\ 14 * 0.95) - Item\ 10$
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## 4.3 Project Conformance Analysis

Complete the following forms for each project site DA to document that the proposed LID BMPs conform to the project DCV developed to meet performance criteria specified in the MS<sub>4</sub> Permit (WQMP Template Section 4.2). For the LID DCV, the forms are ordered according to hierarchy of BMP selection as required by the MS<sub>4</sub> Permit (see Section 5.3.1 in the TGD for WQMP). The forms compute the following for on-site LID BMP:

- Site Design and Hydrologic Source Controls (Form 4.3-2)
- Retention and Infiltration (Form 4.3-3)
- Harvested and Use (Form 4.3-4) or
- Biotreatment (Form 4.3-5).

At the end of each form, additional fields facilitate the determination of the extent of mitigation provided by the specific BMP category, allowing for use of the next category of BMP in the hierarchy, if necessary.

The first step in the analysis, using Section 5.3.2.1 of the TGD for WQMP, is to complete Forms 4.3-1 and 4.3-3) to determine if retention and infiltration BMPs are infeasible for the project. For each feasibility criterion in Form 4.3-1, if the answer is “Yes,” provide all study findings that includes relevant calculations, maps, data sources, etc. used to make the determination of infeasibility.

Next, complete Forms 4.3-2 and 4.3-4 to determine the feasibility of applicable HSC and harvest and use BMPs, and, if their implementation is feasible, the extent of mitigation of the DCV.

If no site constraints exist that would limit the type of BMP to be implemented in a DA, evaluate the use of combinations of LID BMPs, including all applicable HSC BMPs to maximize on-site retention of the DCV. If no combination of BMP can mitigate the entire DCV, implement the single BMP type, or combination of BMP types, that maximizes on-site retention of the DCV within the minimum effective area.

If the combination of LID HSC, retention and infiltration, and harvest and use BMPs are unable to mitigate the entire DCV, then biotreatment BMPs may be implemented by the project proponent. If biotreatment BMPs are used, then they must be sized to provide sufficient capacity for effective treatment of the remainder of the volume-based performance criteria that cannot be achieved with LID BMPs (TGD for WQMP Section 5.4.4.2). **Under no circumstances shall any portion of the DCV be released from the site without effective mitigation and/or treatment.**

<b>Form 4.3-1 Infiltration BMP Feasibility (DA 1)</b>	
Feasibility Criterion – Complete evaluation for each DA on the Project Site	
<p><sup>1</sup> Would infiltration BMP pose significant risk for groundwater related concerns? <i>Refer to Section 5.3.2.1 of the TGD for WQMP</i></p>	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
If Yes, Provide basis: (attach)	
<p><sup>2</sup> Would installation of infiltration BMP significantly increase the risk of geotechnical hazards? (Yes, if the answer to any of the following questions is yes, as established by a geotechnical expert):</p> <ul style="list-style-type: none"> <li>• The location is less than 50 feet away from slopes steeper than 15 percent</li> <li>• The location is less than eight feet from building foundations or an alternative setback.</li> <li>• A study certified by a geotechnical professional or an available watershed study determines that stormwater infiltration would result in significantly increased risks of geotechnical hazards.</li> </ul>	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
If Yes, Provide basis: (attach)	
<p><sup>3</sup> Would infiltration of runoff on a Project site violate downstream water rights?</p>	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
If Yes, Provide basis: (attach)	
<p><sup>4</sup> Is proposed infiltration facility located on hydrologic soil group (HSG) D soils or does the site geotechnical investigation indicate presence of soil characteristics, which support categorization as D soils?</p>	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
If Yes, Provide basis: (attach)	
<p><sup>5</sup> Is the design infiltration rate, after accounting for safety factor of 2.0, below proposed facility less than 0.3 in/hr (accounting for soil amendments)?</p>	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
If Yes, Provide basis: (attach)	
<p><sup>6</sup> Would on-site infiltration or reduction of runoff over pre-developed conditions be partially or fully inconsistent with watershed management strategies as defined in the WAP, or impair beneficial uses? <i>See Section 3.5 of the TGD for WQMP and WAP</i></p>	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
If Yes, Provide basis: (attach)	
<p><sup>7</sup> Any answer from Item 1 through Item 3 is “Yes”: <i>If yes, infiltration of any volume is not feasible onsite. Proceed to Form 4.3-4, Harvest and Use BMP. If no, then proceed to Item 8 below.</i></p>	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
<p><sup>8</sup> Any answer from Item 4 through Item 6 is “Yes”: <i>If yes, infiltration is permissible but is not required to be considered. Proceed to Form 4.3-2, Hydrologic Source Control BMP. If no, then proceed to Item 9, below.</i></p>	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
<p><sup>9</sup> All answers to Item 1 through Item 6 are “No”: <i>Infiltration of the full DCV is potentially feasible, LID infiltration BMP must be designed to infiltrate the full DCV to the MEP. Proceed to Form 4.3-2, Hydrologic Source Control BMP.</i></p>	

### 4.3.1 Site Design Hydrologic Source Control BMP

Section XI.E. of the Permit emphasizes the use of LID preventative measures; and the use of LID HSC BMPs reduces the portion of the DCV that must be addressed in downstream BMPs. Therefore, all applicable HSC shall be provided except where they are mutually exclusive with each other, or with other BMPs. Mutual exclusivity may result from overlapping BMP footprints such that either would be potentially feasible by itself, but both could not be implemented. Please note that while there are no numeric standards regarding the use of HSC, if a project cannot feasibly meet BMP sizing requirements or cannot fully address HCOCs, feasibility of all applicable HSC must be part of demonstrating that the BMP system has been designed to retain the maximum feasible portion of the DCV. Complete Form 4.3-2 to identify and calculate estimated retention volume from implementing site design HSC BMP. Refer to Section 5.4.1 in the TGD for more detailed guidance.

<b>Form 4.3-2 Site Design Hydrologic Source Control BMPs (DA 1)</b>			
<b>1</b> Implementation of Impervious Area Dispersion BMP (i.e. routing runoff from impervious to pervious areas), excluding impervious areas planned for routing to on-lot infiltration BMP: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, complete Items 2-5; If no, proceed to Item 6</i>	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
<b>2</b> Total impervious area draining to pervious area (ft <sup>2</sup> )			
<b>3</b> Ratio of pervious area receiving runoff to impervious area			
<b>4</b> Retention volume achieved from impervious area dispersion (ft <sup>3</sup> ) $V = \text{Item 2} * \text{Item 3} * (0.5/12)$ , assuming retention of 0.5 inches of runoff			
<b>5</b> Sum of retention volume achieved from impervious area dispersion (ft <sup>3</sup> ):		$V_{\text{retention}} = \text{Sum of Item 4 for all BMPs}$	
<b>6</b> Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, complete Items 7-13 for aggregate of all on-lot infiltration BMP in each DA; if no, proceed to Item 14</i>	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
<b>7</b> Ponding surface area (ft <sup>2</sup> )			
<b>8</b> Ponding depth (ft)			
<b>9</b> Surface area of amended soil/gravel (ft <sup>2</sup> )			
<b>10</b> Average depth of amended soil/gravel (ft)			
<b>11</b> Average porosity of amended soil/gravel			
<b>12</b> Retention volume achieved from on-lot infiltration (ft <sup>3</sup> ) $V_{\text{retention}} = (\text{Item 7} * \text{Item 8}) + (\text{Item 9} * \text{Item 10} * \text{Item 11})$			
<b>13</b> Runoff volume retention from on-lot infiltration (ft <sup>3</sup> ):		$V_{\text{retention}} = \text{Sum of Item 12 for all BMPs}$	

<b>Form 4.3-2 cont. Site Design Hydrologic Source Control BMPs (DA 1)</b>			
<b>14</b> Implementation of evapotranspiration BMP (green, brown, or blue roofs): Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, complete Items 15-20. If no, proceed to Item 21</i>	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
<b>15</b> Rooftop area planned for ET BMP (ft <sup>2</sup> )			
<b>16</b> Average wet season ET demand (in/day) <i>Use local values, typical ~ 0.1</i>			
<b>17</b> Daily ET demand (ft <sup>3</sup> /day) <i>Item 15 * (Item 16 / 12)</i>			
<b>18</b> Drawdown time (hrs) <i>Copy Item 6 in Form 4.2-1</i>			
<b>19</b> Retention Volume (ft <sup>3</sup> ) <i>V<sub>retention</sub> = Item 17 * (Item 18 / 24)</i>			
<b>20</b> Runoff volume retention from evapotranspiration BMPs (ft <sup>3</sup> ): <span style="float: right;"><i>V<sub>retention</sub> = Sum of Item 19 for all BMPs</i></span>			
<b>21</b> Implementation of Street Trees: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, complete Items 22-25. If no, proceed to Item 26</i>	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
<b>22</b> Number of Street Trees			
<b>23</b> Average canopy cover over impervious area (ft <sup>2</sup> )			
<b>24</b> Runoff volume retention from street trees (ft <sup>3</sup> ) <i>V<sub>retention</sub> = Item 22 * Item 23 * (0.05/12) assume runoff retention of 0.05 inches</i>			
<b>25</b> Runoff volume retention from street tree BMPs (ft <sup>3</sup> ): <span style="float: right;"><i>V<sub>retention</sub> = Sum of Item 24 for all BMPs</i></span>			
<b>26</b> Implementation of residential rain barrel/cisterns: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, complete Items 27-29; If no, proceed to Item 30</i>	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
<b>27</b> Number of rain barrels/cisterns			
<b>28</b> Runoff volume retention from rain barrels/cisterns (ft <sup>3</sup> ) <i>V<sub>retention</sub> = Item 27 * 3</i>			
<b>29</b> Runoff volume retention from residential rain barrels/Cisterns (ft <sup>3</sup> ): <span style="float: right;"><i>V<sub>retention</sub> = Sum of Item 28 for all BMPs</i></span>			
<b>30</b> Total Retention Volume from Site Design Hydrologic Source Control BMPs:		<i>Sum of Items 5, 13, 20, 25 and 29</i>	

### 4.3.2 Infiltration BMPs

Use Form 4.3-3 to compute on-site retention of runoff from proposed retention and infiltration BMPs. Volume retention estimates are sensitive to the percolation rate used, which determines the amount of runoff that can be infiltrated within the specified drawdown time. The infiltration safety factor reduces field measured percolation to account for potential inaccuracy associated with field measurements, declining BMP performance over time, and compaction during construction. Appendix D of the TGD for WQMP provides guidance on estimating an appropriate safety factor to use in Form 4.3-3.

If site constraints limit the use of BMPs to a single type and implementation of retention and infiltration BMPs mitigate no more than 40% of the DCV, then they are considered infeasible and the Project Proponent may evaluate the effectiveness of BMPs lower in the LID hierarchy of use (Section 5.5.1 of the TGD for WQMP)

If implementation of infiltrations BMPs is feasible as determined using Form 4.3-1, then LID infiltration BMPs shall be implemented to the MEP (section 4.1 of the TGD for WQMP).

### Form 4.3-3 Infiltration LID BMP - including underground BMPs (DA 1)

<b>1</b> Remaining LID DCV not met by site design HSC BMP (ft <sup>3</sup> ): 6,466.5 $V_{unmet} = \text{Form 4.2-1 Item 7} - \text{Form 4.3-2 Item 30}$			
BMP Type Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs	DA 1 DMA A, B BMP Type Underground Retention	DA DMA BMP Type	DA DMA BMP Type (Use additional forms for more BMPs)
<b>2</b> Infiltration rate of underlying soils (in/hr) See Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods	1.92 per Soils Report and Percolation Test provided by Geo Environ		Verify per comment on test locations
<b>3</b> Infiltration safety factor See TGD Section 5.4.2 and Appendix D	2 per Soils Report and Percolation Test provided by Geo Environ		Form supersedes and must be filled out per TGB Appendix D
<b>4</b> Design percolation rate (in/hr) $P_{design} = \text{Item 2} / \text{Item 3}$	0.96 per Soils Report provided by Geo Environ		
<b>5</b> Pondered water drawdown time (hr) Copy Item 6 in Form 4.2-1	48		
<b>6</b> Maximum ponding depth (ft) BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details	4		
<b>7</b> Ponding Depth (ft) $d_{BMP} = \text{Minimum of } (1/12 * \text{Item 4} * \text{Item 5}) \text{ or Item 6}$	3.84		
<b>8</b> Infiltrating surface area, $SA_{BMP}$ (ft <sup>2</sup> ) the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP	3,245.19		
<b>9</b> Amended soil depth, $d_{media}$ (ft) Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details			
<b>10</b> Amended soil porosity			
<b>11</b> Gravel depth, $d_{media}$ (ft) Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details			
<b>12</b> Gravel porosity			
<b>13</b> Duration of storm as basin is filling (hrs) Typical ~ 3hrs	3		
<b>14</b> Above Ground Retention Volume (ft <sup>3</sup> ) $V_{retention} = \text{Item 8} * [\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (\text{Item 13} * (\text{Item 4} / 12))]$			
<b>15</b> Underground Retention Volume (ft <sup>3</sup> ) Volume determined using manufacturer's specifications and calculations	6,987, Volume provided by Contech		

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<b>16</b>	Total Retention Volume from LID Infiltration BMPs: 6,987 (Sum of Items 14 and 15 for all infiltration BMP included in plan)
<b>17</b>	Fraction of DCV achieved with infiltration BMP: 1.09% Retention% = Item 16 / Form 4.2-1 Item 7
<b>18</b>	Is full LID DCV retained onsite with combination of hydrologic source control and LID retention/infiltration BMPs? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <i>If yes, demonstrate conformance using Form 4.3-10; If no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the applicable category of development and repeat all above calculations.</i>

Revise since more than 1.09% is being captured by the proposed BMP

**4.3.3 Harvest and Use BMP**

Harvest and use BMP may be considered if the full LID DCV cannot be met by maximizing infiltration BMPs. Use Form 4.3-4 to compute on-site retention of runoff from proposed harvest and use BMPs.

Volume retention estimates for harvest and use BMPs are sensitive to the on-site demand for captured stormwater. Since irrigation water demand is low in the wet season, when most rainfall events occur in San Bernardino County, the volume of water that can be used within a specified drawdown period is relatively low. The bottom portion of Form 4.3-4 facilitates the necessary computations to show infeasibility if a minimum incremental benefit of 40 percent of the LID DCV would not be achievable with MEP implementation of on-site harvest and use of stormwater (Section 5.5.4 of the TGD for WQMP).

<b>Form 4.3-4 Harvest and Use BMPs (DA 1)</b>			
<b>1</b>	Remaining LID DCV not met by site design HSC or infiltration BMP (ft <sup>3</sup> ): <i>V<sub>unmet</sub> = Form 4.2-1 Item 7 - Form 4.3-2 Item 30 - Form 4.3-3 Item 16</i>		
	BMP Type(s) <i>Compute runoff volume retention from proposed harvest and use BMP (Select BMPs from Table 5-4 of the TGD for WQMP) - Use additional forms for more BMPs</i>	DA DMA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
<b>2</b>	Describe cistern or runoff detention facility		
<b>3</b>	Storage volume for proposed detention type (ft <sup>3</sup> ) <i>Volume of cistern</i>		
<b>4</b>	Landscaped area planned for use of harvested stormwater (ft <sup>2</sup> )		
<b>5</b>	Average wet season daily irrigation demand (in/day) <i>Use local values, typical ~ 0.1 in/day</i>		
<b>6</b>	Daily water demand (ft <sup>3</sup> /day) <i>Item 4 * (Item 5 / 12)</i>		
<b>7</b>	Drawdown time (hrs) <i>Copy Item 6 from Form 4.2-1</i>		
<b>8</b>	Retention Volume (ft <sup>3</sup> ) <i>V<sub>retention</sub> = Minimum of (Item 3) or (Item 6 * (Item 7 / 24))</i>		
<b>9</b>	Total Retention Volume (ft <sup>3</sup> ) from Harvest and Use BMP <i>Sum of Item 8 for all harvest and use BMP included in plan</i>		

## Water Quality Management Plan (WQMP)

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**10** Is the full DCV retained with a combination of LID HSC, retention and infiltration, and harvest & use BMPs? Yes  No

*If yes, demonstrate conformance using Form 4.3-10. If no, then re-evaluate combinations of all LID BMP and optimize their implementation such that the maximum portion of the DCV is retained on-site (using a single BMP type or combination of BMP types). If the full DCV cannot be mitigated after this optimization process, proceed to Section 4.3.4.*

### 4.3.4 Biotreatment BMP

Biotreatment BMPs may be considered if the full LID DCV cannot be met by maximizing retention and infiltration, and harvest and use BMPs. A key consideration when using biotreatment BMP is the effectiveness of the proposed BMP in addressing the pollutants of concern for the project (see Table 5-5 of the TGD for WQMP).

Use Form 4.3-5 to summarize the potential for volume based and/or flow based biotreatment options to biotreat the remaining unmet LID DCV w. Biotreatment computations are included as follows:

- Use Form 4.3-6 to compute biotreatment in small volume based biotreatment BMP (e.g. bioretention w/underdrains);
- Use Form 4.3-7 to compute biotreatment in large volume based biotreatment BMP (e.g. constructed wetlands);
- Use Form 4.3-8 to compute sizing criteria for flow-based biotreatment BMP (e.g. bioswales)

<b>Form 4.3-5 Selection and Evaluation of Biotreatment BMP (DA 1)</b>		
<p><b>1</b> Remaining LID DCV not met by site design HSC, infiltration, or harvest and use BMP for potential biotreatment (ft<sup>3</sup>): <i>Form 4.2-1 Item 7 - Form 4.3-2 Item 30 – Form 4.3-3 Item 16- Form 4.3-4 Item 9</i></p>	<p>List pollutants of concern <i>Copy from Form 2.3-1.</i></p>	
<p><b>2</b> Biotreatment BMP Selected <i>(Select biotreatment BMP(s) necessary to ensure all pollutants of concern are addressed through Unit Operations and Processes, described in Table 5-5 of the TGD for WQMP)</i></p>	<p style="text-align: center;">Volume-based biotreatment <i>Use Forms 4.3-6 and 4.3-7 to compute treated volume</i></p> <p><input type="checkbox"/> Bioretention with underdrain <input type="checkbox"/> Planter box with underdrain <input type="checkbox"/> Constructed wetlands <input type="checkbox"/> Wet extended detention <input type="checkbox"/> Dry extended detention</p>	<p style="text-align: center;">Flow-based biotreatment <i>Use Form 4.3-8 to compute treated volume</i></p> <p><input type="checkbox"/> Vegetated swale <input type="checkbox"/> Vegetated filter strip <input type="checkbox"/> Proprietary biotreatment</p>
<p><b>3</b> Volume biotreated in volume based biotreatment BMP (ft<sup>3</sup>): <i>Form 4.3-6 Item 15 + Form 4.3-7 Item 13</i></p>	<p><b>4</b> Compute remaining LID DCV with implementation of volume based biotreatment BMP (ft<sup>3</sup>): <i>Item 1 – Item 3</i></p>	<p><b>5</b> Remaining fraction of LID DCV for sizing flow based biotreatment BMP: % <i>Item 4 / Item 1</i></p>
<p><b>6</b> Flow-based biotreatment BMP capacity provided (cfs): <i>Use Figure 5-2 of the TGD for WQMP to determine flow capacity required to provide biotreatment of remaining percentage of unmet LID DCV (Item 5), for the project's precipitation zone (Form 3-1 Item 1)</i></p>		
<p><b>7</b> Metrics for MEP determination:</p> <ul style="list-style-type: none"> <li>• Provided a WQMP with the portion of site area used for suite of LID BMP equal to minimum thresholds in Table 5-7 of the TGD for WQMP for the proposed category of development: <input type="checkbox"/> <i>If maximized on-site retention BMPs is feasible for partial capture, then LID BMP implementation must be optimized to retain and infiltrate the maximum portion of the DCV possible within the prescribed minimum effective area. The remaining portion of the DCV shall then be mitigated using biotreatment BMP.</i></li> </ul>		

### Form 4.3-6 Volume Based Biotreatment (DA 1) – Bioretention and Planter Boxes with Underdrains

Biotreatment BMP Type <i>(Bioretention w/underdrain, planter box w/underdrain, other comparable BMP)</i>	DA    DMA BMP Type	DA    DMA BMP Type	DA    DMA BMP Type <i>(Use additional forms for more BMPs)</i>
<b>1</b> Pollutants addressed with BMP <i>List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the TGD for WQMP</i>			
<b>2</b> Amended soil infiltration rate <i>Typical ~ 5.0</i>			
<b>3</b> Amended soil infiltration safety factor <i>Typical ~ 2.0</i>			
<b>4</b> Amended soil design percolation rate (in/hr) $P_{design} = \text{Item 2} / \text{Item 3}$			
<b>5</b> Poned water drawdown time (hr) <i>Copy Item 6 from Form 4.2-1</i>			
<b>6</b> Maximum ponding depth (ft) <i>see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
<b>7</b> Ponding Depth (ft) $d_{BMP} = \text{Minimum of } (1/12 * \text{Item 4} * \text{Item 5}) \text{ or Item 6}$			
<b>8</b> Amended soil surface area (ft <sup>2</sup> )			
<b>9</b> Amended soil depth (ft) <i>see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
<b>10</b> Amended soil porosity, <i>n</i>			
<b>11</b> Gravel depth (ft) <i>see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
<b>12</b> Gravel porosity, <i>n</i>			
<b>13</b> Duration of storm as basin is filling (hrs) <i>Typical ~ 3hrs</i>			
<b>14</b> Biotreated Volume (ft <sup>3</sup> ) $V_{biotreated} = \text{Item 8} * [(\text{Item 7}/2) + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (\text{Item 13} * (\text{Item 4} / 12))]$			
<b>15</b> Total biotreated volume from bioretention and/or planter box with underdrains BMP: <i>Sum of Item 14 for all volume-based BMPs included in this form</i>			

## Form 4.3-7 Volume Based Biotreatment (DA 1) – Constructed Wetlands and Extended Detention

Biotreatment BMP Type <i>Constructed wetlands, extended wet detention, extended dry detention, or other comparable proprietary BMP. If BMP includes multiple modules (e.g. forebay and main basin), provide separate estimates for storage and pollutants treated in each module.</i>	DA    DMA BMP Type		DA    DMA BMP Type <i>(Use additional forms for more BMPs)</i>	
	Forebay	Basin	Forebay	Basin
<b>1</b> Pollutants addressed with BMP forebay and basin <i>List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the TGD for WQMP</i>				
<b>2</b> Bottom width (ft)				
<b>3</b> Bottom length (ft)				
<b>4</b> Bottom area (ft <sup>2</sup> ) $A_{bottom} = \text{Item 2} * \text{Item 3}$				
<b>5</b> Side slope (ft/ft)				
<b>6</b> Depth of storage (ft)				
<b>7</b> Water surface area (ft <sup>2</sup> ) $A_{surface} = (\text{Item 2} + (2 * \text{Item 5} * \text{Item 6})) * (\text{Item 3} + (2 * \text{Item 5} * \text{Item 6}))$				
<b>8</b> Storage volume (ft <sup>3</sup> ) <i>For BMP with a forebay, ensure fraction of total storage is within ranges specified in BMP specific fact sheets, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i> $V = \text{Item 6} / 3 * [\text{Item 4} + \text{Item 7} + (\text{Item 4} * \text{Item 7})^{0.5}]$				
<b>9</b> Drawdown Time (hrs) <i>Copy Item 6 from Form 2.1</i>				
<b>10</b> Outflow rate (cfs) $Q_{BMP} = (\text{Item } 8_{forebay} + \text{Item } 8_{basin}) / (\text{Item } 9 * 3600)$				
<b>11</b> Duration of design storm event (hrs)				
<b>12</b> Biotreated Volume (ft <sup>3</sup> ) $V_{biotreated} = (\text{Item } 8_{forebay} + \text{Item } 8_{basin}) + (\text{Item } 10 * \text{Item } 11 * 3600)$				
<b>13</b> Total biotreated volume from constructed wetlands, extended dry detention, or extended wet detention : <i>(Sum of Item 12 for all BMP included in plan)</i>				

<b>Form 4.3-8 Flow Based Biotreatment (DA 1)</b>			
Biotreatment BMP Type <i>Vegetated swale, vegetated filter strip, or other comparable proprietary BMP</i>	DA    DMA BMP Type	DA    DMA BMP Type	DA    DMA BMP Type <i>(Use additional forms for more BMPs)</i>
<b>1</b> Pollutants addressed with BMP <i>List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in TGD Table 5-5</i>			
<b>2</b> Flow depth for water quality treatment (ft) <i>BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
<b>3</b> Bed slope (ft/ft) <i>BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
<b>4</b> Manning's roughness coefficient			
<b>5</b> Bottom width (ft) <i><math>b_w = (\text{Form 4.3-5 Item 6} * \text{Item 4}) / (1.49 * \text{Item 2}^{1.67} * \text{Item 3}^{0.5})</math></i>			
<b>6</b> Side Slope (ft/ft) <i>BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
<b>7</b> Cross sectional area (ft <sup>2</sup> ) <i><math>A = (\text{Item 5} * \text{Item 2}) + (\text{Item 6} * \text{Item 2}^2)</math></i>			
<b>8</b> Water quality flow velocity (ft/sec) <i><math>V = \text{Form 4.3-5 Item 6} / \text{Item 7}</math></i>			
<b>9</b> Hydraulic residence time (min) <i>Pollutant specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
<b>10</b> Length of flow based BMP (ft) <i><math>L = \text{Item 8} * \text{Item 9} * 60</math></i>			
<b>11</b> Water surface area at water quality flow depth (ft <sup>2</sup> ) <i><math>SA_{top} = (\text{Item 5} + (2 * \text{Item 2} * \text{Item 6})) * \text{Item 10}</math></i>			

### 4.3.5 Conformance Summary

Complete Form 4.3-9 to demonstrate how on-site LID DCV is met with proposed site design hydrologic source control, infiltration, harvest and use, and/or biotreatment BMP. The bottom line of the form is used to describe the basis for infeasibility determination for on-site LID BMP to achieve full LID DCV, and provides methods for computing remaining volume to be addressed in an alternative compliance plan. If the project has more than one outlet, then complete additional versions of this form for each outlet.

<b>Form 4.3-9 Conformance Summary and Alternative Compliance Volume Estimate (DA 1)</b>	
<b>1</b>	Total LID DCV for the Project DA-1 (ft <sup>3</sup> ): 6,466.5 <i>Copy Item 7 in Form 4.2-1</i>
<b>2</b>	On-site retention with site design hydrologic source control LID BMP (ft <sup>3</sup> ): 0 <i>Copy Item 30 in Form 4.3-2</i>
<b>3</b>	On-site retention with LID infiltration BMP (ft <sup>3</sup> ): 6,987 <i>Copy Item 16 in Form 4.3-3</i>
<b>4</b>	On-site retention with LID harvest and use BMP (ft <sup>3</sup> ): 0 <i>Copy Item 9 in Form 4.3-4</i>
<b>5</b>	On-site biotreatment with volume based biotreatment BMP (ft <sup>3</sup> ): 0 <i>Copy Item 3 in Form 4.3-5</i>
<b>6</b>	Flow capacity provided by flow based biotreatment BMP (cfs): 0 <i>Copy Item 6 in Form 4.3-5</i>
<b>7</b>	<p>LID BMP performance criteria are achieved if answer to any of the following is "Yes":</p> <ul style="list-style-type: none"> <li>• Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <i>If yes, sum of Items 2, 3, and 4 is greater than Item 1</i></li> <li>• Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3-5 Item 6 and Items 2, 3 and 4 are maximized</i></li> <li>▪ On-site retention and infiltration is determined to be infeasible and biotreatment BMP provide biotreatment for all pollutants of concern for full LID DCV: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, Form 4.3-1 Items 7 and 8 were both checked yes</i></li> </ul>
<b>8</b>	<p>If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance:</p> <ul style="list-style-type: none"> <li>• Combination of HSC, retention and infiltration, harvest and use, and biotreatment BMPs provide less than full LID DCV capture: <input type="checkbox"/> <i>Checked yes for Form 4.3-5 Item 7, Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, <math>V_{alt} = (Item\ 1 - Item\ 2 - Item\ 3 - Item\ 4 - Item\ 5) * (100 - Form\ 2.4-1\ Item\ 2)\%</math></i></li> <li>• An approved Watershed Action Plan (WAP) demonstrates that water quality and hydrologic impacts of urbanization are more effective when managed in at an off-site facility: <input type="checkbox"/> <i>Attach appropriate WAP section, including technical documentation, showing effectiveness comparisons for the project site and regional watershed</i></li> </ul>

### 4.3.6 Hydromodification Control BMP

Use Form 4.3-10 to compute the remaining runoff volume retention, after LID BMP are implemented, needed to address HCOC, and the increase in time of concentration and decrease in peak runoff necessary to meet targets for protection of waterbodies with a potential HCOC. Describe hydromodification control BMP that address HCOC, which may include off-site BMP and/or in-stream controls. Section 5.6 of the TGD for WQMP provides additional details on selection and evaluation of hydromodification control BMP.

<b>Form 4.3-10 Hydromodification Control BMPs (DA 1)</b>	
<p><b>1</b> Volume reduction needed for HCOC performance criteria (ft<sup>3</sup>): <i>(Form 4.2-2 Item 4 * 0.95) – Form 4.2-2 Item 1</i></p>	<p><b>2</b> On-site retention with site design hydrologic source control, infiltration, and harvest and use LID BMP (ft<sup>3</sup>): <i>Sum of Form 4.3-9 Items 2, 3, and 4 Evaluate option to increase implementation of on-site retention in Forms 4.3-2, 4.3-3, and 4.3-4 in excess of LID DCV toward achieving HCOC volume reduction</i></p>
<p><b>3</b> Remaining volume for HCOC volume capture (ft<sup>3</sup>): <i>Item 1 – Item 2</i></p>	<p><b>4</b> Volume capture provided by incorporating additional on-site or off-site retention BMPs (ft<sup>3</sup>): <i>Existing downstream BMP may be used to demonstrate additional volume capture (if so, attach to this WQMP a hydrologic analysis showing how the additional volume would be retained during a 2-yr storm event for the regional watershed)</i></p>
<p><b>5</b> If Item 4 is less than Item 3, incorporate in-stream controls on downstream waterbody segment to prevent impacts due to hydromodification <input type="checkbox"/> <i>Attach in-stream control BMP selection and evaluation to this WQMP</i></p>	
<p><b>6</b> Is Form 4.2-2 Item 11 less than or equal to 5%: Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p><i>If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:</i></p> <ul style="list-style-type: none"> <li>• Demonstrate increase in time of concentration achieved by proposed LID site design, LID BMP, and additional on-site or off-site retention BMP <input type="checkbox"/> <i>BMP upstream of a waterbody segment with a potential HCOC may be used to demonstrate increased time of concentration through hydrograph attenuation (if so, show that the hydraulic residence time provided in BMP for a 2-year storm event is equal or greater than the addition time of concentration requirement in Form 4.2-4 Item 15)</i></li> <li>• Increase time of concentration by preserving pre-developed flow path and/or increase travel time by reducing slope and increasing cross-sectional area and roughness for proposed on-site conveyance facilities <input type="checkbox"/></li> <li>• Incorporate appropriate in-stream controls for downstream waterbody segment to prevent impacts due to hydromodification, in a plan approved and signed by a licensed engineer in the State of California <input type="checkbox"/></li> </ul>	
<p><b>7</b> Form 4.2-2 Item 12 less than or equal to 5%: Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p><i>If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:</i></p> <ul style="list-style-type: none"> <li>• Demonstrate reduction in peak runoff achieved by proposed LID site design, LID BMPs, and additional on-site or off-site retention BMPs <input type="checkbox"/> <i>BMPs upstream of a waterbody segment with a potential HCOC may be used to demonstrate additional peak runoff reduction through hydrograph attenuation (if so, attach to this WQMP, a hydrograph analysis showing how the peak runoff would be reduced during a 2-yr storm event)</i></li> <li>• Incorporate appropriate in-stream controls for downstream waterbody segment to prevent impacts due to hydromodification, in a plan approved and signed by a licensed engineer in the State of California <input type="checkbox"/></li> </ul>	

## 4.4 Alternative Compliance Plan (if applicable)

Describe an alternative compliance plan (if applicable) for projects not fully able to infiltrate, harvest and use, or biotreat the DCV via on-site LID practices. A project proponent must develop an alternative compliance plan to address the remainder of the LID DCV. Depending on project type some projects may qualify for water quality credits that can be applied to reduce the DCV that must be treated prior to development of an alternative compliance plan (see Form 2.4-1, Water Quality Credits). Form 4.3-9 Item 8 includes instructions on how to apply water quality credits when computing the DCV that must be met through alternative compliance. Alternative compliance plans may include one or more of the following elements:

- On-site structural treatment control BMP - All treatment control BMP should be located as close to possible to the pollutant sources and should not be located within receiving waters;
- Off-site structural treatment control BMP - Pollutant removal should occur prior to discharge of runoff to receiving waters;
- Urban runoff fund or In-lieu program, if available

Depending upon the proposed alternative compliance plan, approval by the executive officer may or may not be required (see Section 6 of the TGD for WQMP).

## Section 5 Inspection and Maintenance Responsibility for Post Construction BMP

All BMP included as part of the project WQMP are required to be maintained through regular scheduled inspection and maintenance (refer to Section 8, Post Construction BMP Requirements, in the TGD for WQMP). Fully complete Form 5-1 summarizing all BMP included in the WQMP. Attach additional forms as needed. The WQMP shall also include a detailed Operation and Maintenance Plan for all BMP and may require a Maintenance Agreement (consult the jurisdiction's LIP). If a Maintenance Agreement is required, it must also be attached to the WQMP.

<b>Form 5-1 BMP Inspection and Maintenance (use additional forms as necessary)</b>			
BMP	Responsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
Retention Tank	Kareem Oil, LLC	Equipment must be inspected and maintained for sediment buildup or accumulation.	At least bi-annually and right before wet season
Catch Basin	Kareem Oil, LLC	Equipment must be inspected and maintained for debris buildup or accumulation.	At least bi-annually and right before wet season
Drain Inlet	Kareem Oil, LLC	Equipment must be inspected and maintained for debris buildup or accumulation.	At least bi-annually and right before wet season
CDS Unit	Kareem Oil, LLC	Equipment must be inspected and maintained for debris buildup or accumulation.	At least bi-annually and right before wet season
Litter/Debris Control Program	Kareem Oil, LLC	Employees are to properly dispose of trash and debris.	Daily
Vacuum Sweeping	Kareem Oil, LLC	Employees are to properly remove trash and debris.	Weekly

**Water Quality Management Plan (WQMP)**

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## Section 6 WQMP Attachments

### 6.1. 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 Source Control BMP locations
- Site Design Hydrologic Source Control BMP locations
- LID BMP details
- Drainage delineations and flow information
- Drainage connections

### 6.2 Electronic Data Submittal

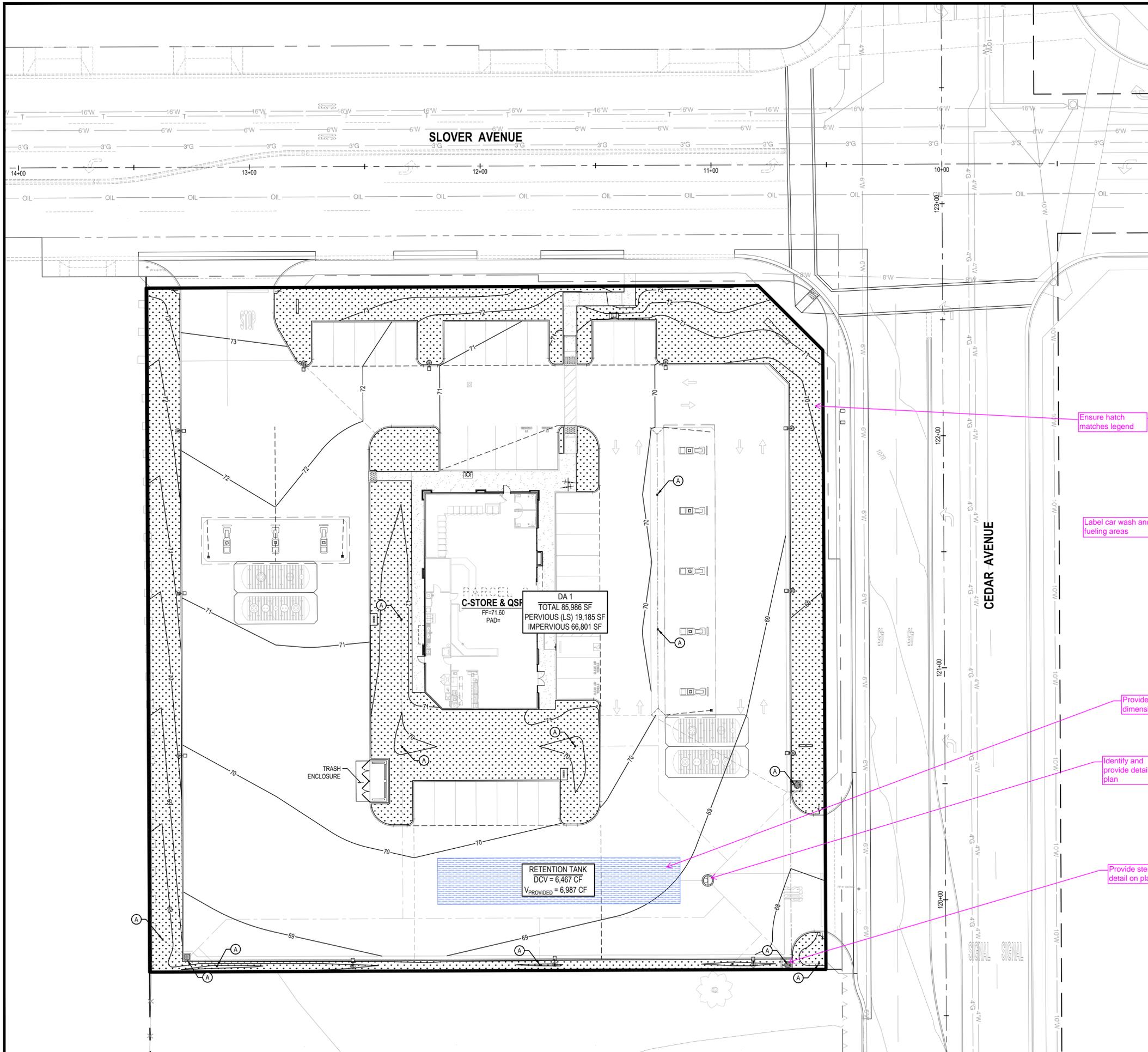
Minimum requirements include submittal of PDF exhibits in addition to hard copies. Format must not require specialized software to open. If the local jurisdiction requires specialized electronic document formats (as described in their local Local Implementation Plan), this section will describe the contents (e.g., layering, nomenclature, geo-referencing, etc.) of these documents so that they may be interpreted efficiently and accurately.

### 6.3 Post Construction

Attach all O&M Plans and Maintenance Agreements for BMP to the WQMP.

### 6.4 Other Supporting Documentation

- BMP Educational Materials
- Activity Restriction – C, C&R's & Lease Agreements



**LEGEND:**

- PROPOSED LANDSCAPE AREA
- PROPOSED DECOMPOSED GRANITE AREA
- PROPOSED RETENTION AREA
- DRAINAGE BOUNDARY
- "NO DUMPING" SIGN

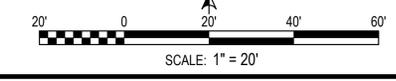
Ensure hatch matches legend

Label car wash and fueling areas

Provide detail and dimensions on plan

Identify and provide detail on plan

Provide stenciling detail on plan



REVISIONS	DESCRIPTION
DATE	

**BENCH MARK**  
 BENCH MARK ELEVATION = 83.10 FEET (NAD 83 DATUM) EPOCH 2010  
 STATION IS LOCATED SOUTHWEST OF SAN BERNARDINO NORTH-NORTHWEST OF  
 RIVERSIDE IN THE CONCRETE HEADWALL OF A DRAINAGE CHANNEL IN THE  
 NORTHEAST CORNER OF THE INTERSECTION OF CEDAR AVENUE AND 5TH STREET.

**BASIS OF BEARINGS**  
 THE BEARINGS SHOWN HEREON ARE BASED UPON THE CENTER LINE OF CEDAR  
 AVENUE BEING S 0° 18' 01" E AS SHOWN ON RECORD OF SURVEY IN BOOK 68, PAGE  
 80 IN THE OFFICE OF THE COUNTY RECORDER OF SAN BERNARDINO COUNTY.



**WQMP SITE PLAN**  
**CIVIL IMPROVEMENT PLANS**  
**CHEVRON BLOOMINGTON**  
 10998 CEDAR AVENUE, BLOOMINGTON, CA 92316

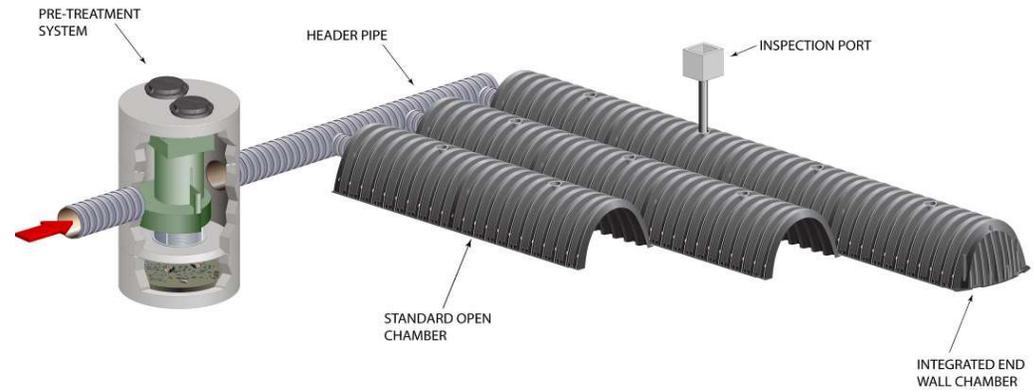
JOB NO. **17041**  
 DATE: **1/17/2018**  
 SHEET **C5**  
 OF 9 SHEETS

- Appendix A - Calculations





For design assistance, drawings, and pricing send completed worksheet to:  
[dyods@contech-cpi.com](mailto:dyods@contech-cpi.com)



**Project Summary**

Date:	1/17/2018
Project Name:	BLOOMINGTON PROJECT
City, State:	BLOOMINGTON
County:	SAN BERNARDINO
Designed By:	
Company:	Contech
Telephone:	

Enter Information in Blue Cells

**ChamberMaxx Calculator**

Storage Volume Required (cf):	6,467	} Waterway Area (ft <sup>2</sup> ) 10.78
Chamber Invert Depth Below Asphalt (ft):	5.10	
Limiting Width (ft):	20	
Porous Stone Backfill Included For Storage:	Yes	
Depth A: Porous Stone Above Chamber (in):	6	
Depth C: Porous Stone Below Chamber (in):	6	
Stone Porosity (0 to 40%):	40	

**System Sizing**

Use Custom Layout (at right) for layout adjustment

Required Chambers:	84 Chambers
Chamber Storage:	4,148 cf
Porous Stone Storage:	2,839 cf
<b>Total Storage Provided:</b>	<b>6,987 cf</b> 108.0% of Req'd Storage
Rectangular Footprint (W x L):	15.7 ft x 206.7 ft

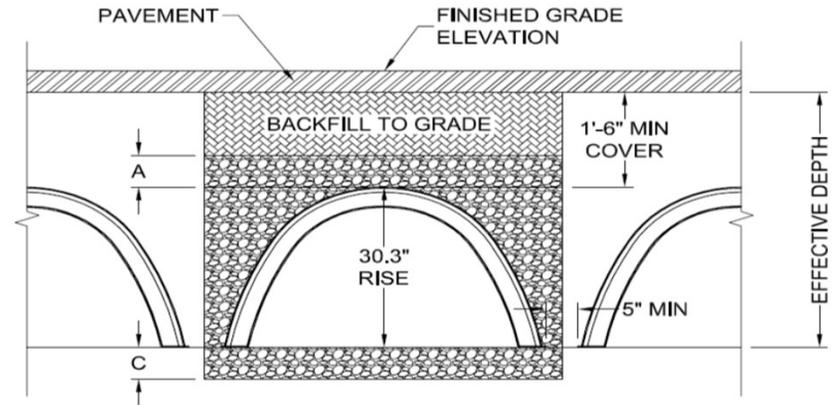
**CONTECH Materials**

ChamberMaxx Middle Units:	78 Chambers @ 7'1" installed length
ChamberMaxx Start Units:	3 Chambers @ 8' installed length
ChamberMaxx End Units:	3 Chambers @ 7'5" installed length
Manifold Fittings (1 manifold):	2 ea Tees and 1ea Elbow
Scour Protection Netting:	16 ft long x 7.5' wide
Approximate Truckloads:	1 Trucks

**Construction Quantities**

Total Excavation:	713 cy (assumes 4" asphalt)
Stone Backfill:	263 cy stone
Remaining Backfill To Asphalt:	257 cy backfill per specifications
Non-Woven Geotextile:	588 sy for top and sides of excavation

**\*\*Construction Quantities are approximate and should be verified upon final design**

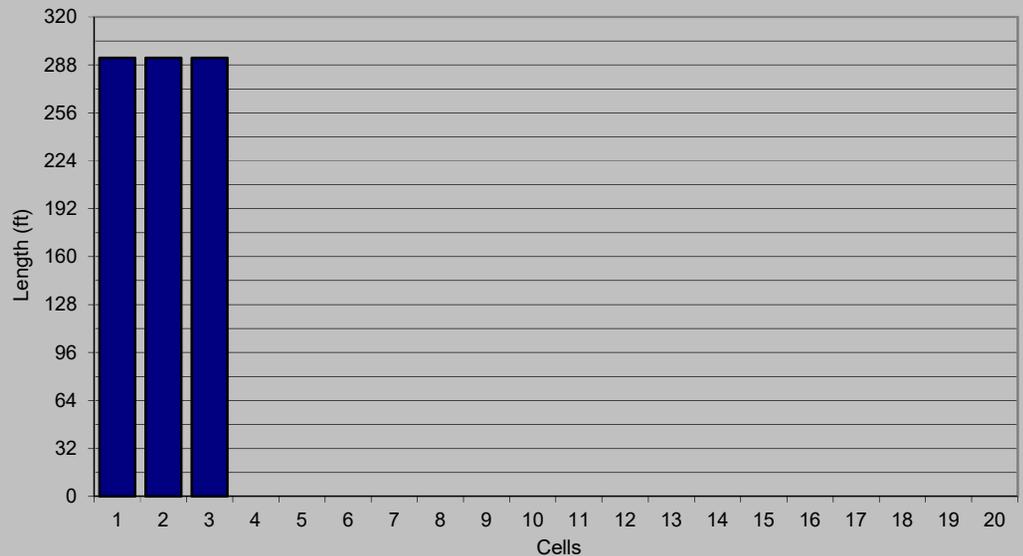


Total Surplus Units = 39

**Custom Layout**

To adjust layout, select the appropriate number of chambers in the light blue boxes below.

41	41	41																	
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**Table 2.7: Infiltration BMP Feasibility Worksheet**

	<b><i>Infeasibility Criteria</i></b>	<b>Yes</b>	<b>No</b>
1	<b>Would Infiltration BMPs pose significant risk for groundwater related concerns?</b> Refer to Appendix VII (Worksheet I) for guidance on groundwater-related infiltration feasibility criteria.		X
<p>Provide basis:                      Infiltration at site is not feasible due to contamination of groundwater per Composite VOC Plume Map dated January 2009 and provided by Orange County Water District. See Section IV.3.2 of this report.</p> <p>Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</p>			
2	<p><b>Would Infiltration BMPs pose significant risk of increasing risk of geotechnical hazards that cannot be mitigated to an acceptable level?</b> (Yes if the answer to any of the following questions is yes, as established by a geotechnical expert):</p> <ul style="list-style-type: none"> <li>• The BMP can only be located less than 50 feet away from slopes steeper than 15 percent</li> <li>• The BMP can only be located less than eight feet from building foundations or an alternative setback.</li> <li>• A study prepared by a geotechnical professional or an available watershed study substantiates that stormwater infiltration would potentially result in significantly increased risks of geotechnical hazards that cannot be mitigated to an acceptable level.</li> </ul>		X
<p>Provide basis: The BMPs can only be located less than 50 feet away from building foundations or an alternative setback.</p> <p>Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</p>			
3	<b>Would infiltration of the DCV from drainage area violate downstream water rights?</b>		X
<p>Provide basis:</p> <p>Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</p>			

**Table 2.7: Infiltration BMP Feasibility Worksheet (continued)**

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

**Table 2.7: Infiltration BMP Feasibility Worksheet (continued)**

<b>Infiltration Screening Results (check box corresponding to result):</b>		
8	<p>Is there substantial evidence that infiltration from the project would result in a significant increase in I&amp;I to the sanitary sewer that cannot be sufficiently mitigated? (See Appendix XVII)</p> <p>Provide narrative discussion and supporting evidence:</p> <p>Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</p>	No.
9	<p>If any answer from row 1-3 is yes: infiltration of any volume is <b>not feasible</b> within the DMA or equivalent.</p> <p>Summarize findings of infeasibility screening</p>	No.
10	<p>If any answer from row 4-7 is yes, infiltration is <b>permissible but is not presumed to be feasible for the entire DCV</b>. Criteria for designing biotreatment BMPs to achieve the maximum feasible infiltration and ET shall apply.</p> <p>Provide basis: Infiltration at site is not feasible due to contamination of groundwater per Composite VOC Plume Map dated January 2009 and provided by Orange County Water District.</p> <p>Summarize findings of infeasibility screening</p>	No.
11	<p>If all answers to rows 1 through 11 are no, infiltration of the full DCV is potentially feasible, BMPs must be designed to infiltrate the full DCV to the maximum extent practicable.</p>	No.

Help Prevent Ocean Pollution:

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

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

Litter, oil, chemicals and other substances that are left on your yard or driveway can be blown or washed into storm drains that flow to the ocean. Over-watering your lawn and washing your car can also flush materials into the storm

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

drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated.

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

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

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

**For emergencies, dial 911.**

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



## Household Tips



**The Ocean Begins at Your Front Door**

PROJECT  
**Pollution**  
PREVENTION

# Pollution Prevention

## Household Activities

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

## Household Hazardous Wastes include:

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

## Gardening Activities

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

## Washing and Maintaining Your Car

- Take your car to a commercial car wash whenever possible.
- Choose soaps, cleaners, or detergents labeled “non-toxic,” “phosphate free” or “biodegradable.” Vegetable and citrus-based products are typically safest for the environment, **but even these should not be allowed into the storm drain.**
- Shake floor mats into a trash can or vacuum to clean.

- Do not use acid-based wheel cleaners and “hose off” engine degreasers at home. They can be used at a commercial facility, which can properly process the washwater.
- **Do not dump washwater onto your driveway, sidewalk, street, gutter or storm drain.** Excess washwater should be disposed of in the sanitary sewers (through a sink, or toilet) or onto an absorbent surface like your lawn.
- Use a nozzle to turn off water when not actively washing down automobile.
- Monitor vehicles for leaks and place pans under leaks. Keep your car well maintained to stop and prevent leaks.
- Use cat litter or other absorbents and sweep to remove any materials deposited by vehicles. Contain sweepings and dispose of at a HHWCC.
- Perform automobile repair and maintenance under a covered area and use drip pans or plastic sheeting to keep spills and waste material from reaching storm drains.
- **Never pour oil or antifreeze in the street, gutter or storm drains.** Recycle these substances at a service station, HHWCC, or used oil recycling center. For the nearest Used Oil Collection Center call 1-800-CLEANUP or visit [www.ciwmb.ca.gov/UsedOil](http://www.ciwmb.ca.gov/UsedOil).

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



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

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

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

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

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

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

**For emergencies, dial 911.**



RECYCLE  
USED OIL



Printed on Recycled Paper

Help Prevent Ocean Pollution:

# Proper Disposal of Household Hazardous Waste



**The Ocean Begins at  
Your Front Door**

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

**ORANGE COUNTY**

# Pollution Prevention

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

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

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

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

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

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

## *Common household hazardous wastes*

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

- Television & monitors (CRTs, flatscreens)

## *Tips for household hazardous waste*

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



# The Ocean Begins at Your Front Door



PROJECT  
**Possution**  
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.oilandfills.com](http://www.oilandfills.com).
- Do not hose down your driveway, sidewalk or patio to the street, gutter or storm drain. Sweep up debris and dispose of it in the trash.

### *Automotive*

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

### *Pool Maintenance*

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

### *Landscape and Gardening*

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

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

**Earth 911** - Community-Specific Environmental Information 1-800-cleanup or visit [www.1800cleanup.org](http://www.1800cleanup.org)

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

**Integrated Waste Management Dept. of Orange County** (714) 834-6752 or visit [www.oclandfills.com](http://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](http://www.ocagcomm.com)

**Stormwater Best Management Practice Handbook**  
Visit [www.cabmphandbooks.com](http://www.cabmphandbooks.com)

**UC Master Gardener Hotline**  
(714) 708-1646 or visit [www.uccemg.com](http://www.uccemg.com)

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

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

On-line Water Pollution Problem Reporting Form

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





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

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

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

**UCCE Master Gardener Hotline:**  
**(714) 708-1646**

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

**For emergencies, dial 911.**

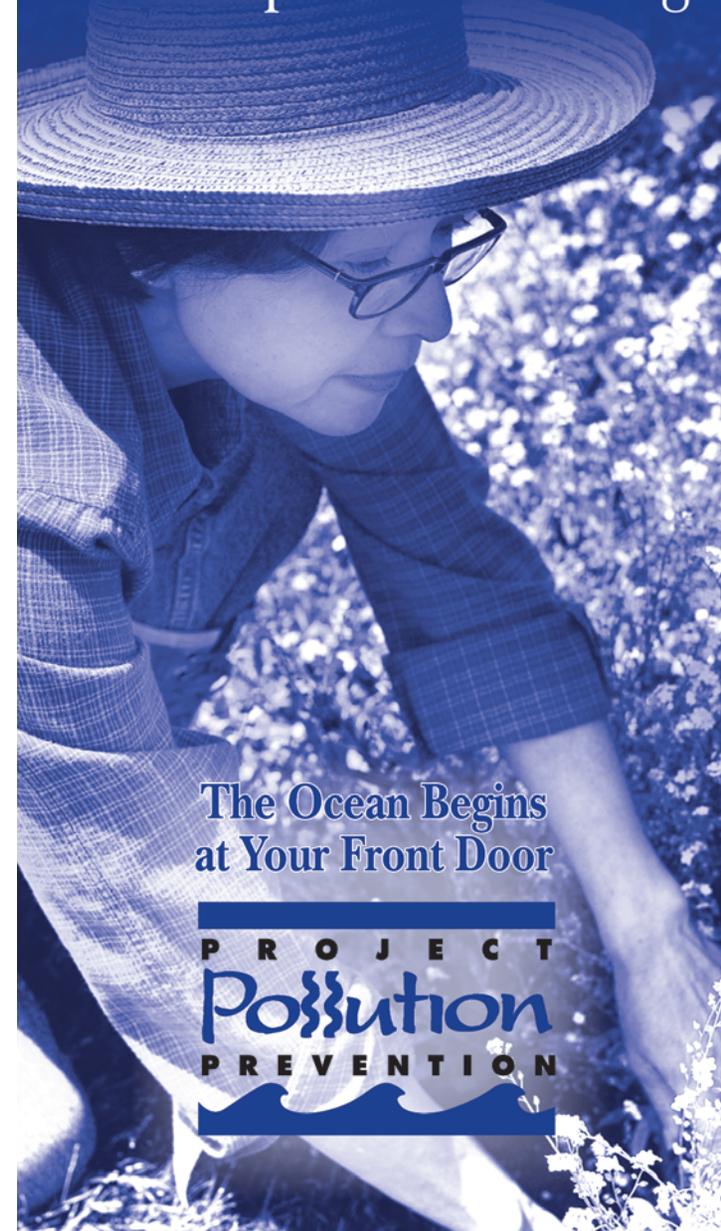
The tips contained in this brochure provide useful information to help prevent water pollution while landscaping or gardening. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.



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Help Prevent Ocean Pollution:

## Tips for Landscape & Gardening



The Ocean Begins  
at Your Front Door



# Tips for Landscape & Gardening

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

## General Landscaping Tips

- Protect stockpiles and materials from wind and rain by storing them under tarps or secured plastic sheeting.
- Prevent erosion of slopes by planting fast-growing, dense ground covering plants. These will shield and bind the soil.
- Plant native vegetation to reduce the amount of water, fertilizers, and pesticide applied to the landscape.
- Never apply pesticides or fertilizers when rain is predicted within the next 48 hours.



## Garden & Lawn Maintenance

- Do not overwater. Use irrigation practices such as drip irrigation, soaker hoses or micro spray systems. Periodically inspect and fix leaks and misdirected sprinklers.

- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of green waste by composting, hauling it to a permitted landfill, or recycling it through your city's program.



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



product. Do not dump rinse water down storm drains. Dispose of empty containers in the trash.

- When available, use non-toxic alternatives to traditional pesticides, and use pesticides specifically designed to control the pest you are targeting. For more information, visit [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu).
- If fertilizer is spilled, sweep up the spill before irrigating. If the spill is liquid, apply an absorbent material such as cat litter, and then sweep it up and dispose of it in the trash.
- Take unwanted pesticides to a Household Hazardous Waste Collection Center to be recycled. Locations are provided below.

## Household Hazardous Waste Collection Centers

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

For more information, call (714) 834-6752 or visit [www.oilandfills.com](http://www.oilandfills.com)



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

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

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

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

**For emergencies, dial 911.**

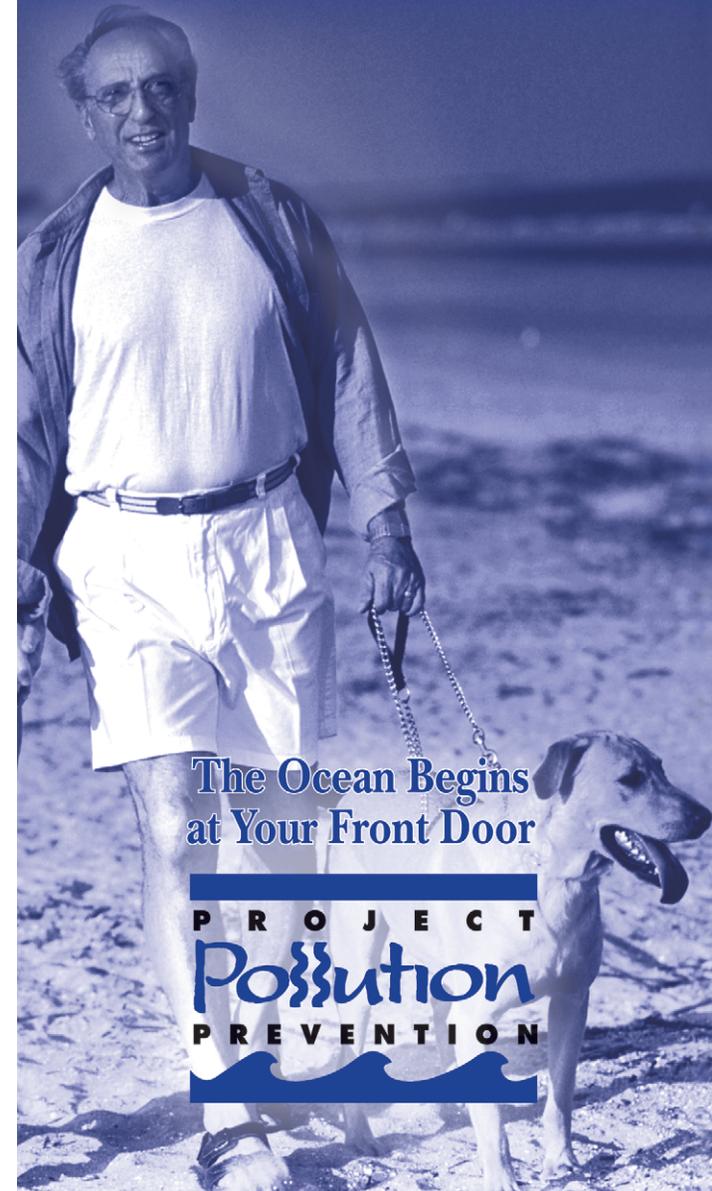
The tips contained in this brochure provide useful information to help prevent water pollution while caring for your pet. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.



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Help Prevent Ocean Pollution:

## Tips for Pet Care



The Ocean Begins  
at Your Front Door

PROJECT  
**Pollution**  
PREVENTION

# Tips for Pet Care

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

## *Washing Your Pets*

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

- If possible, bathe your pets indoors using less-toxic shampoos or have your pet professionally groomed. Follow instructions on the products and clean up spills.
- If you bathe your pet outside, wash it on your lawn or another absorbent/permeable surface to keep the washwater from running into the street, gutter or storm drain.



## *Flea Control*

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



## *Why You Should Pick Up After Your Pet*

It's the law! Every city has an ordinance requiring you to pick up after your pet. Besides being a nuisance, pet



waste can lead to water pollution, even if you live inland. During rainfall, pet waste left outdoors can wash into storm drains. This waste flows directly into our waterways and the ocean where it can harm human health, marine life and the environment.

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

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

- Take a bag with you on walks to pick up after your pet.
- Dispose of the waste in the trash or in a toilet.





**C**lean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. Fats, oils and grease from restaurants and food service facilities can cause sewer line blockages that may result in sewage overflow into your facility and into storm drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways and should never contain washwater, trash, grease or other materials.

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

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

Report sewage spills and discharges that are not contained to your site to the **Orange County 24-Hour Water Pollution Problem Reporting Hotline** at **1-877-89-SPILL** (1-877-897-7455)

For emergencies, dial 911.



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Help Prevent Ocean Pollution:

## Tips for the Food Service Industry



The Ocean Begins at Your Front Door



# Best Kitchen Practices

## *Food Waste Disposal*

- Scrape food waste off of plates, utensils, pots, food preparation and cooking areas and dispose of it in the trash.
- Never put food waste down the drain. Food scraps often contain grease, which can clog sewer pipes and result in sewage backups and overflows.

## *Grease & Oil Disposal*

- Never put oil or grease down the drain. Contain grease and oil by using covered grease storage containers or installing a grease interceptor.
- Never overfill your grease storage container or transport it without a cover.
- Grease control devices must be emptied and cleaned by permitted companies.
- Keep maintenance records on site.



- For a list of oil/grease recycling companies, contact the CIWMB at [www.ciwmb.ca.gov/foodwaste/render.htm](http://www.ciwmb.ca.gov/foodwaste/render.htm) or contact your local sanitation district.

## *Minor Spill Cleanup*

- Always use dry cleanup methods, such as a rag, damp mop or broom.
- Never hose a spill into the street, gutter or storm drain.



## *Major Spill Cleanup*

- Have spill containment and clean-up kits readily available, and train all employees on how to use them.
- Immediately contain and clean the spill using dry methods.
- If the spill leaves your site, call (714) 567-6363.

## *Dumpster Cleanup*

- Pick up all debris around the dumpster.
- Always keep the lid on the dumpster closed.
- Never pour liquids into the dumpster or hose it out.



## *Floor Mat Cleaning*

- Sweep the floor mats regularly, discarding the debris into the trash.
- Hose off the mats in a mop sink, at a floor drain, or in an outdoor area that can contain the water.
- Never hose the mats in an area where the wastewater can flow to the street, gutter or storm drain.



## *Washwater Disposal*

- Dispose of washwater in a mop sink or an area with a floor drain.
- Never dispose of washwater in the street, gutter or storm drain.

# CDS Guide Operation, Design, Performance and Maintenance



## CDS®

Using patented continuous deflective separation technology, the CDS system screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material without blinding. Flow and screening controls physically separate captured solids, and minimize the re-suspension and release of previously trapped pollutants. Inline units can treat up to 6 cfs, and internally bypass flows in excess of 50 cfs (1416 L/s). Available precast or cast-in-place, offline units can treat flows from 1 to 300 cfs (28.3 to 8495 L/s). The pollutant removal capacity of the CDS system has been proven in lab and field testing.

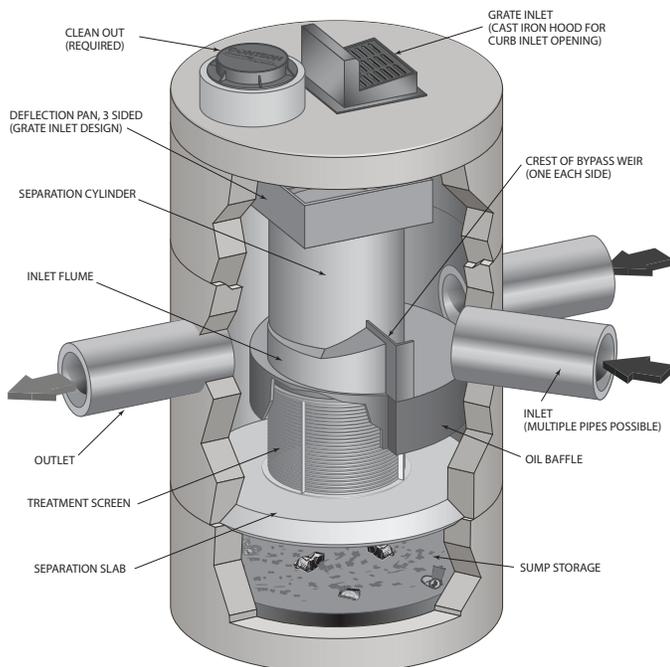
## Operation Overview

Stormwater enters the diversion chamber where the diversion weir guides the flow into the unit's separation chamber and pollutants are removed from the flow. All flows up to the system's treatment design capacity enter the separation chamber and are treated.

Swirl concentration and screen deflection force floatables and solids to the center of the separation chamber where 100% of floatables and neutrally buoyant debris larger than the screen apertures are trapped.

Stormwater then moves through the separation screen, under the oil baffle and exits the system. The separation screen remains clog free due to continuous deflection.

During the flow events exceeding the treatment design capacity, the diversion weir bypasses excessive flows around the separation chamber, so captured pollutants are retained in the separation cylinder.



## Design Basics

There are three primary methods of sizing a CDS system. The Water Quality Flow Rate Method determines which model size provides the desired removal efficiency at a given flow rate for a defined particle size. The Rational Rainfall Method™ or the Probabilistic Method is used when a specific removal efficiency of the net annual sediment load is required.

Typically in the United States, CDS systems are designed to achieve an 80% annual solids load reduction based on lab generated performance curves for a gradation with an average particle size (d50) of 125 microns ( $\mu\text{m}$ ). For some regulatory environments, CDS systems can also be designed to achieve an 80% annual solids load reduction based on an average particle size (d50) of 75 microns ( $\mu\text{m}$ ) or 50 microns ( $\mu\text{m}$ ).

### Water Quality Flow Rate Method

In some cases, regulations require that a specific treatment rate, often referred to as the water quality design flow (WQQ), be treated. This WQQ represents the peak flow rate from either an event with a specific recurrence interval, e.g. the six-month storm, or a water quality depth, e.g. 1/2-inch (13 mm) of rainfall.

The CDS is designed to treat all flows up to the WQQ. At influent rates higher than the WQQ, the diversion weir will direct most flow exceeding the WQQ around the separation chamber. This allows removal efficiency to remain relatively constant in the separation chamber and eliminates the risk of washout during bypass flows regardless of influent flow rates.

Treatment flow rates are defined as the rate at which the CDS will remove a specific gradation of sediment at a specific removal efficiency. Therefore the treatment flow rate is variable, based on the gradation and removal efficiency specified by the design engineer.

### Rational Rainfall Method™

Differences in local climate, topography and scale make every site hydraulically unique. It is important to take these factors into consideration when estimating the long-term performance of any stormwater treatment system. The Rational Rainfall Method combines site-specific information with laboratory generated performance data, and local historical precipitation records to estimate removal efficiencies as accurately as possible.

Short duration rain gauge records from across the United States and Canada were analyzed to determine the percent of the total annual rainfall that fell at a range of intensities. US stations' depths were totaled every 15 minutes, or hourly, and recorded in 0.01-inch increments. Depths were recorded hourly with 1-mm resolution at Canadian stations. One trend was consistent at all sites; the vast majority of precipitation fell at low intensities and high intensity storms contributed relatively little to the total annual depth.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Rainfall Method. Since most sites are relatively small and highly impervious, the Rational Rainfall Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS system are

determined. Performance efficiency curve determined from full scale laboratory tests on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

### Probabilistic Rational Method

The Probabilistic Rational Method is a sizing program Contech developed to estimate a net annual sediment load reduction for a particular CDS model based on site size, site runoff coefficient, regional rainfall intensity distribution, and anticipated pollutant characteristics.

The Probabilistic Method is an extension of the Rational Method used to estimate peak discharge rates generated by storm events of varying statistical return frequencies (e.g. 2-year storm event). Under the Rational Method, an adjustment factor is used to adjust the runoff coefficient estimated for the 10-year event, correlating a known hydrologic parameter with the target storm event. The rainfall intensities vary depending on the return frequency of the storm event under consideration. In general, these two frequency dependent parameters (rainfall intensity and runoff coefficient) increase as the return frequency increases while the drainage area remains constant.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Method. Since most sites are relatively small and highly impervious, the Rational Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS are determined. Performance efficiency curve on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

### Treatment Flow Rate

The inlet throat area is sized to ensure that the WQQ passes through the separation chamber at a water surface elevation equal to the crest of the diversion weir. The diversion weir bypasses excessive flows around the separation chamber, thus preventing re-suspension or re-entrainment of previously captured particles.

### Hydraulic Capacity

The hydraulic capacity of a CDS system is determined by the length and height of the diversion weir and by the maximum allowable head in the system. Typical configurations allow hydraulic capacities of up to ten times the treatment flow rate. The crest of the diversion weir may be lowered and the inlet throat may be widened to increase the capacity of the system at a given water surface elevation. The unit is designed to meet project specific hydraulic requirements.

## Performance

### Full-Scale Laboratory Test Results

A full-scale CDS system (Model CDS2020-5B) was tested at the facility of University of Florida, Gainesville, FL. This CDS unit was evaluated under controlled laboratory conditions of influent flow rate and addition of sediment.

Two different gradations of silica sand material (UF Sediment & OK-110) were used in the CDS performance evaluation. The particle size distributions (PSDs) of the test materials were analyzed using standard method "Gradation ASTM D-422 "Standard Test Method for Particle-Size Analysis of Soils" by a certified laboratory.

UF Sediment is a mixture of three different products produced by the U.S. Silica Company: "Sil-Co-Sil 106", "#1 DRY" and "20/40 Oil Frac". Particle size distribution analysis shows that the UF Sediment has a very fine gradation ( $d_{50} = 20$  to  $30 \mu\text{m}$ ) covering a wide size range (Coefficient of Uniformity, C averaged at 10.6). In comparison with the hypothetical TSS gradation specified in the NJDEP (New Jersey Department of Environmental Protection) and NJCAT (New Jersey Corporation for Advanced Technology) protocol for lab testing, the UF Sediment covers a similar range of particle size but with a finer  $d_{50}$  ( $d_{50}$  for NJDEP is approximately  $50 \mu\text{m}$ ) (NJDEP, 2003).

The OK-110 silica sand is a commercial product of U.S. Silica Sand. The particle size distribution analysis of this material, also included in Figure 1, shows that 99.9% of the OK-110 sand is finer than 250 microns, with a mean particle size ( $d_{50}$ ) of 106 microns. The PSDs for the test material are shown in Figure 1.

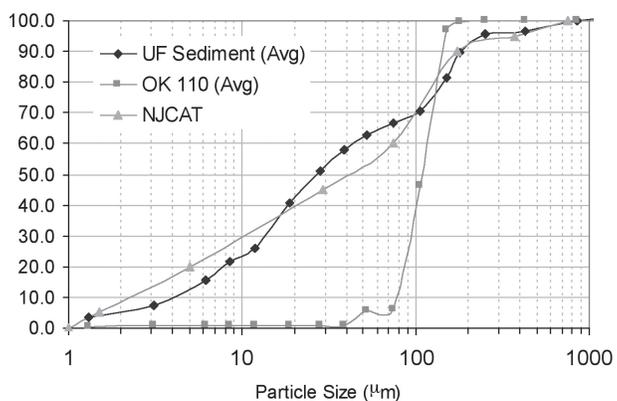


Figure 1. Particle size distributions

Tests were conducted to quantify the performance of a specific CDS unit (1.1 cfs (31.3-L/s) design capacity) at various flow rates, ranging from 1% up to 125% of the treatment design capacity of the unit, using the 2400 micron screen. All tests were conducted with controlled influent concentrations of approximately 200 mg/L. Effluent samples were taken at equal time intervals across the entire duration of each test run. These samples were then processed with a Dekaport Cone sample splitter to obtain representative sub-samples for Suspended Sediment Concentration (SSC) testing using ASTM D3977-97 "Standard Test Methods for Determining Sediment Concentration in Water Samples", and particle size distribution analysis.

## Results and Modeling

Based on the data from the University of Florida, a performance model was developed for the CDS system. A regression analysis was used to develop a fitting curve representative of the scattered data points at various design flow rates. This model, which demonstrated good agreement with the laboratory data, can then be used to predict CDS system performance with respect

to SSC removal for any particle size gradation, assuming the particles are inorganic sandy-silt. Figure 2 shows CDS predictive performance for two typical particle size gradations (NJCAT gradation and OK-110 sand) as a function of operating rate.

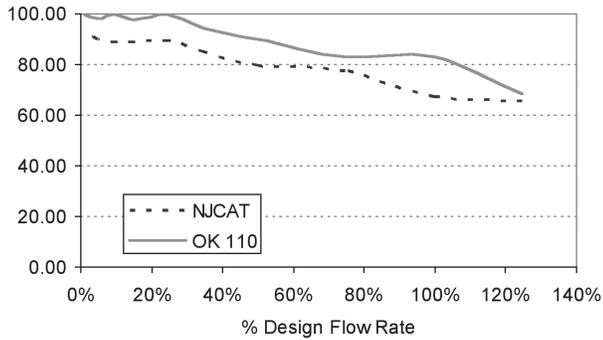


Figure 2. CDS stormwater treatment predictive performance for various particle gradations as a function of operating rate.

Many regulatory jurisdictions set a performance standard for hydrodynamic devices by stating that the devices shall be capable of achieving an 80% removal efficiency for particles having a mean particle size ( $d_{50}$ ) of 125 microns (e.g. Washington State Department of Ecology — WASDOE - 2008). The model can be used to calculate the expected performance of such a PSD (shown in Figure 3). The model indicates (Figure 4) that the CDS system with 2400 micron screen achieves approximately 80% removal at the design (100%) flow rate, for this particle size distribution ( $d_{50} = 125 \mu\text{m}$ ).

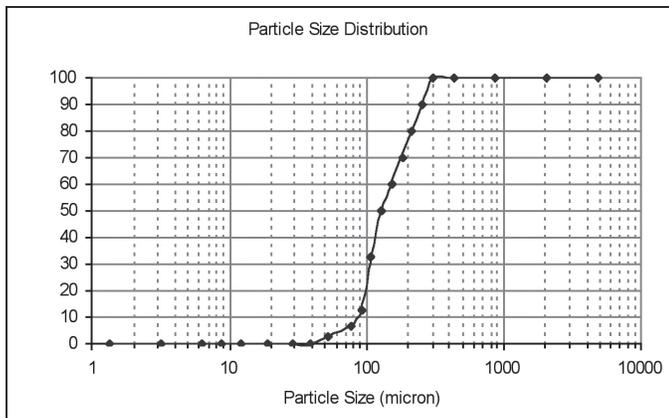


Figure 3. WASDOE PSD

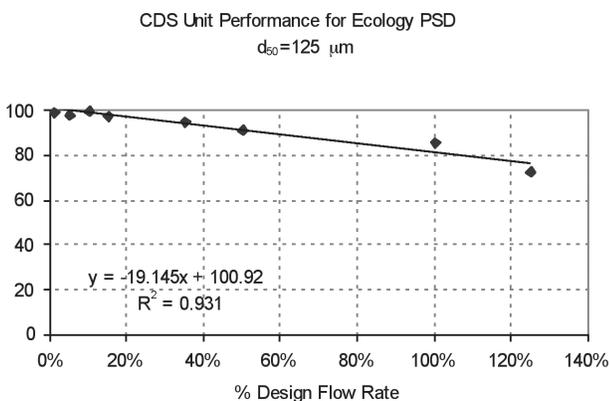


Figure 4. Modeled performance for WASDOE PSD.

## Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

## Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified



during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allow both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine whether the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

## Cleaning

Cleaning of a CDS system should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be cleaned to ensure it is free of trash and debris.

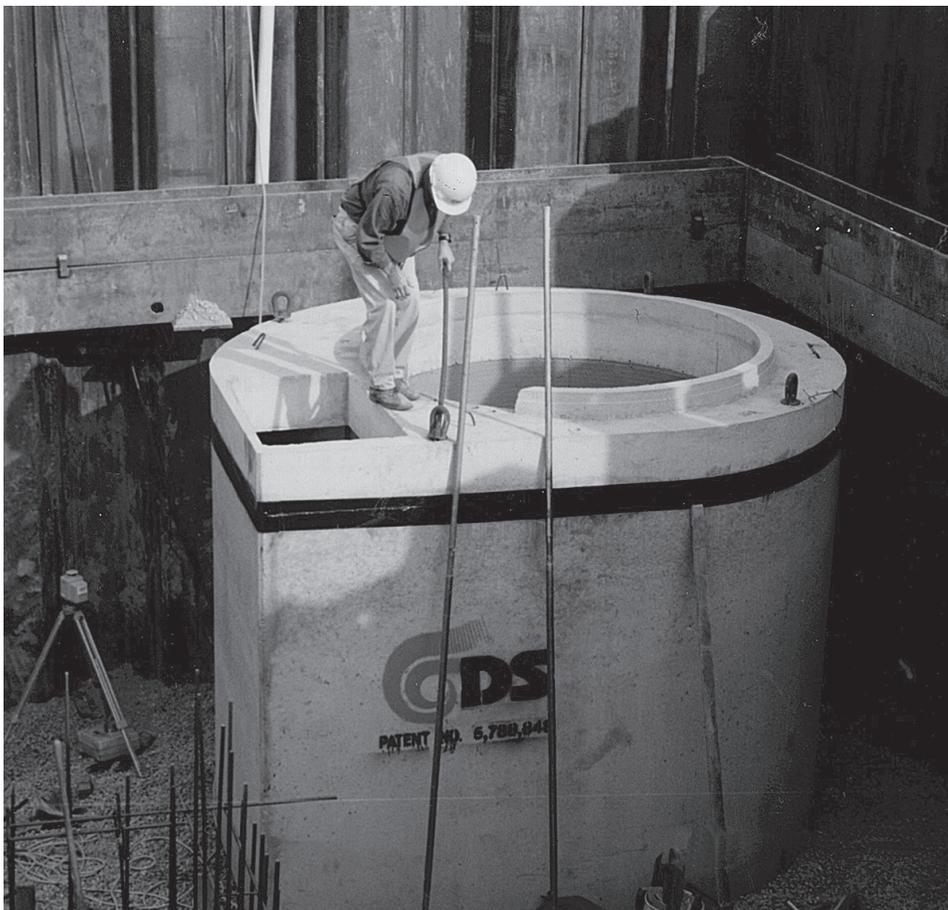
Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.



CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	yd <sup>3</sup>	m <sup>3</sup>
CDS2015-4	4	1.2	3.0	0.9	0.5	0.4
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Note: To avoid underestimating the volume of sediment in the chamber, carefully lower the measuring device to the top of the sediment pile. Finer silty particles at the top of the pile may be more difficult to feel with a measuring stick. These finer particles typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.





## SUPPORT

- Drawings and specifications are available at [www.ContechES.com](http://www.ContechES.com).
- Site-specific design support is available from our engineers.



800-338-1122  
[www.ContechES.com](http://www.ContechES.com)

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# GEO ENVIRON

GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING CONSULTANTS, INC.

4071 E. La Palma Ave., Ste. B, Anaheim, Ca 92807 • (714) 632-3190 • Fax (714) 632-3191

Job No. 16-828P-2

October 28, 2016

**Mr. Joseph Karaki**  
**Western State Eng. & Construction, Inc.**  
**4887 E. La Palma Street, Ste # 707**  
**Anaheim, Ca 92807**

**Subject: Report of Testing for the Proposed Infiltration System, Proposed Commercial Development, 10598 Cedar Ave, Bloomington, San Bernardino County, California**

## **Gentlemen**

In accordance with your request, we have performed percolation testings to calculate infiltration rate for the the proposed infiltration system. The intent of this report is to evaluate the feasibility of the proposed system to be constructed at the subject site. Based on our review of the site plan, it appeared that the system will comply with the requirements as indicated in the referenced bulletin and guide lines provided by the County of Riverside.

**The gross infiltration rate of the subsurface soils was found to be 1.9 inch per hour.** The bottom of the proposed infiltration system is estimated to be within 5.0 feet below the existing natural grade. The calculation is attached herein.

## **SITE GEOLOGY & GROUNDWATER**

The site is underlain by **alluvium consists of fine silty sand** slightly moist, and moderately dense. **Groundwater was not encountered** during this investigation. Groundwater is expected to be deep greater than 50 feet. A more detailed description of the earth materials encountered is presented on the log borings in Appendix 'B'.

## **PERCOLATION TESTING**

A preliminary set of percolation tests were performed in order to determine the suitability of the surface soils as an absorb medium for seepage beds. Two (2) soil borings of 8 inches diameters were drilled to satisfy this investigation. The borings were drilled to depths of 6.0 feet below existing surface within the subject site to conduct percolation tests. One additional boring was drilled to depth of 50.0 feet below existing surface to determine depth to groundwater or any impervious layer.

The test hole was presaturated for at least 24 hours, due to the sandy nature of the subsurface soils. After the presaturation was completed, water level measurements were started. From a fixed reference point, the drop in water levels were measured over a 10 minute periods for an hour and fifty minutes. The drop that occurred during the final reading was used calculate the infiltration rate.

### **TEST RESULTS**

The measured average infiltration rate of the subsurface soils was found to be 0.96 inches per hour using a Factor of safety of two (2).

### **CONCLUSION**

1. The proposed infiltration system is suitable for the intended use, no adverse effects are anticipated.
2. We drilled to a depth of 15 feet below grade, and no groundwater was encountered. Therefore, the impact of the proposed infiltration system to ground water is nil
3. There will be a minim 10 feet horizontal and 1:1 (H:V) set back from the proposed building foundation and the expected zone of saturation of the infiltration system. The depth to groundwater is greater than 15 feet from the bottom of the infiltration pit. Therefore, no perched water conditions are expected, or adversely affect the structures.
5. The system will not be located near a retaining wall or basement wall.
6. The site is underlain with non expansive (sandy soils) soils for the most part and there will be no effect on infiltration behavior.
7. Since the proposed or existing structures will have adequate setbacks, therefore the susceptibility of hydro-consolidation from the proposed infiltration system will be very remote.
8. No ground settlements due to soil saturation from the proposed infiltration system are anticipated.

It is our opinion that the proposed infiltration system will be suitable for storm water infiltration. The system will not result in ground settlement that could affect structures, either or adjacent to the site. The infiltration of the storm water will not result in soil saturation that could affect retaining/ basement structures, if any.

**CLOSURE & LIMITATIONS**

The findings, conclusions, and recommendations presented reflect our best estimate of subsurface conditions based on the data obtained from a limited subsurface exploration performed during the field study. The conclusions and recommendations are based on generally accepted geotechnical engineering principles and practices. No further warranties are implied nor made.

This opportunity to be of service is appreciated. If you have any further questions regarding this matter, please contact our office at your earliest convenience.

Respectfully submitted,

**Geo Environ Eng. Consultants, Inc.**

\_\_\_\_\_  
Jabed Masud  
President/ Associate Engineer

JM/ER/gm

Attachments:  
Drawings  
Boring Logs  
Percolation Test Data



\_\_\_\_\_  
Esmail Rastgari  
Principal, RCE 43332

**PERCOLATION TEST DATA SHEET**

Date: 9/20/16 Project Name: *Proposed Commercial Development*  
 Project No: 16-828P-2 Tested By: *F.M.*  
 Depth to Test Hole (Dt) : 60 inch. USCS Soil Classification: *Fine Silty Sand (SM)*

Test Hole ID: B-1  
 Test Hole Dimensions (inches/feet)  
 Diameters: 8 inch. Rectangular:  
 Sandy Soil Criteria Test \*

Trial No.	Start Time	Stop Time	Time Interval (min)	Initial Depth to Water (inch)	Final Depth to water (inch)	Change in Water Level (inch)	Greater than or Equal to 6"? (Yes/No)
1	8 am	8:25	25	0	12.4	12.4	Y
2	8:30	9:00	30	12.4	24.3	11.9	Y

\* If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	At Time Interval (min)	Di Initial Depth to Water(inch)	Df Final Depth to water (inch)	AD Change in Water Level (inch)	Percolation Rate (min./in)
1	9:15	9:25	10 minute	0	6.5	6.5	
2			10 minute	6.5	12.7	6.2	
3			10 minute	12.7	18.6	5.9	
4			10 minute	18.6	23.8	5.2	
5			10 minute	23.8	28.9	5.1	
6							

Comments: Minor caving occurred

Test Hole ID: B-2  
 Test Hole Dimensions (inches/feet)  
 Diameters: 8 inch. Rectangular:

Sandy Soil Criteria Test \*

Trial No.	Start Time	Stop Time	Time Interval (min)	Initial Depth to Water (inch)	Final Depth to water (inch)	Change in Water Level (inch)	Greater than or Equal to 6"? (Yes/No)
1	8 am	8:25	25	0	12.8	12.8	Y
2	8:30	9:00	30	12.8	24.9	12.1	Y

\* If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	At Time Interval (min)	Di Initial Depth to Water(inch)	Df Final Depth to water (inch)	AD Change in Water Level (inch)	Percolation Rate (min./in)
1	9:15	9:25	10 minute	0	7.2	7.2	
2			10 minute	6.5	14.1	6.9	
3			10 minute	14.1	20.4	6.3	
4			10 minute	20.4	26.3	5.9	
5			10 minute	26.3	31.8	5.5	
6							

Comments: Minor caving occurred

### CALCULATION OF INFILTRATION RATE

Test Hole: B-1

Time Interval: t (minute) = 10

Initial Depth to Water (inch),  $D_i = 28.9$

Final Depth to Water (inch),  $D_f = 33.8$

Total Depth of Test Hole (inch):  $D_t = 60$

Test Hole Radius, r (inch) = 4

$H_i$ , initial ht of water @ selected time interval

$$H_i = (D_t - D_i) = 60 - 28.9 = 31.1$$

$H_f$ , final ht. Of water @ selected time interval

$$H_f = (D_t - D_f) = 60 - 33.8 = 26.2$$

$$\Delta H \text{ (change in ht. over the time interval)} = (H_i - H_f) = 31.1 - 26.2 = 4.9$$

H (avg): avg. head ht. over the time interval:

$$H \text{ (avg)} = (H_i + H_f) / 2 = (31.1 + 26.2) / 2 = 28.6$$

$I_t$  = Test Infiltration Rate

$$I_t = \frac{\Delta H * 60 \text{ min/hr} * r}{t * (r + 2 * H \text{ (avg)})}$$

$$= \frac{(4.9)(60)(4)}{(10)(4 + 2 * 28.6)}$$

$$= 1.92$$

$I_t$  = tested infiltration rate, in/hr

$\Delta H$  = Change in Head over the time interval, inches

$\Delta t$  = time interval, minutes

r = radius of test hole

$H_{avg}$  = average head over the time interval, inches

PROJECT NO: 16-828P  
 PROJECT ADDRESS: 10598 Cedar Ave, Bloomington  
 DRILLING COMPANY: Doug Duxbury  
 BORING DIA: 8 inch.  
 DRILLING METHOD: H.S.A.  
 SAMPLING METHOD: 140 IB/ 30 inch. drop  
 LOGGED BY: J.M.

TRENCH LOG: B-1

Depth (ft)	Samp	Blows per 12"	Mois	Dens	USCS	Symb	EARTH MATERIAL DESCRIPTION
2		28	5.2	99.8	SM		L.b. fine silty sand, slightly moist, mod. compacted
5		32	10.6	110.5	SM/MI		Lt. tan, fine sandy silt, mod. moist, dense
10		28	12.2	108.9	SM/MI		---- fine sandy silt, mod. moist, dense
15							<p>END OF TRENCHING @ 15 FT.            NO GROUNDWATER</p>
20							
25							

 Std. Penetration Test     
  California Ring     
  Bulk Sample

PROJECT NO: 16-828P  
 PROJECT ADDRESS: 10598 Cedar Ave, Bloomington  
 DRILLING COMPANY: Doug Duxbury  
 BORING DIA: 8 inch.  
 DRILLING METHOD: H.S.A.  
 SAMPLING METHOD: 140 IB/ 30 inch. drop  
 LOGGED BY: J.M.

TRENCH LOG: B-2

Depth (ft)	Samp	Blows per 12"	Mois	Dens	USCS	Symb	EARTH MATERIAL DESCRIPTION
2		22	3.3	101.7	SM		L.b. fine silty sand, slightly moist, mod. compacted
5		28	9.8	107.8	SM/ML		Lt. tan, fine sandy silt, mod. moist, dense
10		33	11.3	105.3	SM/ML		----- fine sandy silt, mod. moist, dense
15							
20							
25							
							END OF TRENCHING @ 15 FT. NO GROUNDWATER

 Std. Penetration Test

 California Ring

 Bulk Sample

PROJECT NO: 16-828P  
 PROJECT ADDRESS: 10598 Cedar Ave, Bloomington  
 DRILLING COMPANY: Doug Duxbury  
 BORING DIA: 8 inch.  
 DRILLING METHOD: H.S.A.  
 SAMPLING METHOD: 140 IB/ 30 inch. drop  
 LOGGED BY: J.M.

TRENCH LOG: B-3

Depth (ft)	Sampl	Blows per 12"	Mois	Dens	USCS	Symb	EARTH MATERIAL DESCRIPTION
2		20	4.9	103.6	SM		L.b. fine silty sand, slightly moist, mod. compacted
5		28	9.8	110.2	SM/ML		Lt. tan, fine sandy silt, mod. moist, dense
10							
15							
20							
25							
							END OF TRENCHING @ 5 FT. NO GROUNDWATER

 Std. Penetration Test

 California Ring

 Bulk Sample



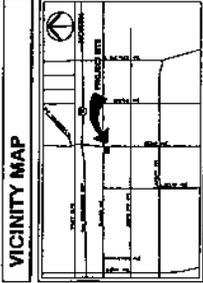
PROJECT NO. \_\_\_\_\_  
DATE \_\_\_\_\_  
REVISIONS BY DATE  
1 \_\_\_\_\_  
2 \_\_\_\_\_  
3 \_\_\_\_\_  
4 \_\_\_\_\_  
5 \_\_\_\_\_

PREPARED BY: \_\_\_\_\_  
CHECKED BY: \_\_\_\_\_  
DATE: \_\_\_\_\_

OWNER: KARAK OIL, LLC  
ISSAM GHARAWATI  
2800 N. GARDEN  
PLAZA, SUITE 200, ANAHEIM, CA 92807  
PROJECT: C-STORE WITH CANTINA  
DESIGNER: KARAK OIL, LLC  
COSTUME: M. CHEN  
DATE: 08/15/2023  
SCALE: AS SHOWN  
PROJECT NO. 23-0001  
SHEET NO. 1 OF 1  
MASTER SITE PLAN

**AS-1.0**  
EXISTING  
CUP NO. \_\_\_\_\_  
**GEO ENVIRON**  
GEOTECHNICAL & ENVIRONMENTAL ENG. CONSULTANTS, INC.  
4071 E. La Palma Ave., Ste B  
Anaheim, CA 92807

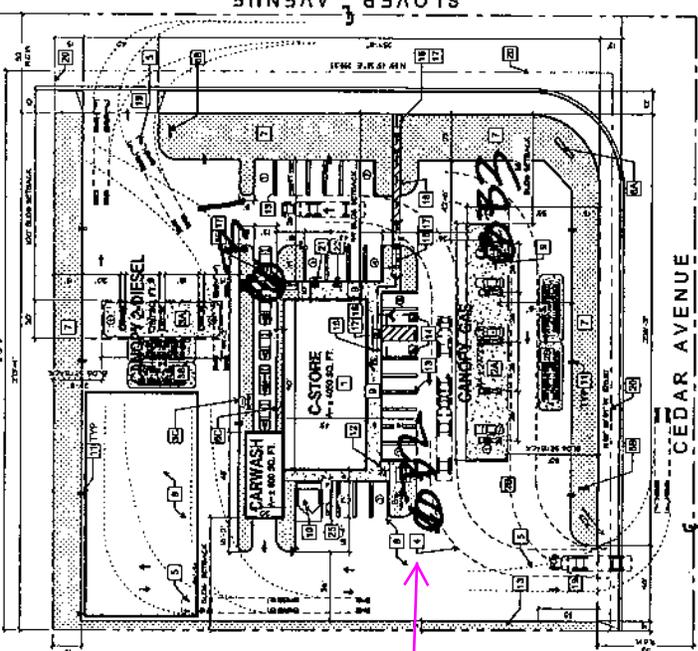
OFFICIAL USE ONLY



ASSESSOR'S PARCEL NO. 0257-013-12 / 0257-013-13

**SITE KEY NOTES**

- 1. ALL EXISTING UTILITIES SHOWN
- 2. ALL EXISTING UTILITIES TO BE MAINTAINED
- 3. ALL EXISTING UTILITIES TO BE REMOVED
- 4. ALL EXISTING UTILITIES TO BE RELOCATED
- 5. ALL EXISTING UTILITIES TO BE PROTECTED
- 6. ALL EXISTING UTILITIES TO BE DELETED
- 7. ALL EXISTING UTILITIES TO BE RECONSTRUCTED
- 8. ALL EXISTING UTILITIES TO BE REPAIRED
- 9. ALL EXISTING UTILITIES TO BE REPLACED
- 10. ALL EXISTING UTILITIES TO BE REINSTALLED
- 11. ALL EXISTING UTILITIES TO BE RECONNECTED
- 12. ALL EXISTING UTILITIES TO BE REWELDED
- 13. ALL EXISTING UTILITIES TO BE REGRINDING
- 14. ALL EXISTING UTILITIES TO BE REBURNING
- 15. ALL EXISTING UTILITIES TO BE REOILING
- 16. ALL EXISTING UTILITIES TO BE REFLUING
- 17. ALL EXISTING UTILITIES TO BE REBLENDING
- 18. ALL EXISTING UTILITIES TO BE REFILTERING
- 19. ALL EXISTING UTILITIES TO BE REELECTROLYSIS
- 20. ALL EXISTING UTILITIES TO BE REEXHAUSTION
- 21. ALL EXISTING UTILITIES TO BE REEVALUATION
- 22. ALL EXISTING UTILITIES TO BE RECALCULATION
- 23. ALL EXISTING UTILITIES TO BE REANALYSIS
- 24. ALL EXISTING UTILITIES TO BE REASSESSMENT
- 25. ALL EXISTING UTILITIES TO BE REAUDIT
- 26. ALL EXISTING UTILITIES TO BE RECERTIFICATION
- 27. ALL EXISTING UTILITIES TO BE REINSPECTION
- 28. ALL EXISTING UTILITIES TO BE RECOMPLIANCE
- 29. ALL EXISTING UTILITIES TO BE RECORRECTION
- 30. ALL EXISTING UTILITIES TO BE REPREVENTION
- 31. ALL EXISTING UTILITIES TO BE RECORRECTION
- 32. ALL EXISTING UTILITIES TO BE REPREVENTION
- 33. ALL EXISTING UTILITIES TO BE RECORRECTION
- 34. ALL EXISTING UTILITIES TO BE REPREVENTION
- 35. ALL EXISTING UTILITIES TO BE RECORRECTION
- 36. ALL EXISTING UTILITIES TO BE REPREVENTION
- 37. ALL EXISTING UTILITIES TO BE RECORRECTION
- 38. ALL EXISTING UTILITIES TO BE REPREVENTION
- 39. ALL EXISTING UTILITIES TO BE RECORRECTION
- 40. ALL EXISTING UTILITIES TO BE REPREVENTION



PROPOSED SITE PLAN  
SCALE: 1" = 30'-0"

**BUILDING DATA**

BLDG. C-STORE (NEW)	CANTINA - DIESEL (NEW)
AREA: 1,420 SF	AREA: 1,212 SF
OCCUPANCY: M	OCCUPANCY: M
TYPE OF CONCT: V-S	TYPE OF CONCT: I-S
NUMBER OF STORY: 1	NUMBER OF STORY: 1
PARKING PROVS: 23	PARKING PROVS: 10
FORMULA: 1 PER 250 SF	FORMULA: 1 PER 125 SF
BLDG. CANTINA (NEW)	CANTINA - DIESEL (NEW)
AREA: 1,400 SF	AREA: 1,200 SF
OCCUPANCY: M	OCCUPANCY: M
TYPE OF CONCT: V-S	TYPE OF CONCT: I-S
NUMBER OF STORY: 1	NUMBER OF STORY: 1
PARKING PROVS: 4	PARKING PROVS: 4
FORMULA: 3 SPACES PER STALL, 1.7 CARING SPACE	FORMULA: 1 PER 125 SF
TOTAL BLDG. AREA: 2,820 SF	TOTAL BLDG. AREA: 2,412 SF

**PROJECT DATA**

ZONING: C-2	PROPOSED: 1,300 SF
OVERLAY: COMMERCIAL	PROPOSED: 1,300 SF
LAND USE: COMMERCIAL	PROPOSED: 1,300 SF
AREA OF SITE: 1.82 ACRES (2.05 ACRES) (BEFORE DEVELOPMENT)	PROPOSED: 1,300 SF
BLDG. SETBACKS: 35'-0"	PROPOSED: 1,300 SF
FRONT (EAST): 1,300 SF	PROPOSED: 1,300 SF
REAR (WEST): 1,300 SF	PROPOSED: 1,300 SF
SIDE (NORTH): 25'-0"	PROPOSED: 1,300 SF
SIDE (SOUTH): 40'-0"	PROPOSED: 1,300 SF
LANDSCAPE AREA: 1,300 SF	PROPOSED: 1,300 SF
FLOOR AREA RATIO: 0.3	PROPOSED: 1,300 SF
MAXIMUM HEIGHT: 35'-0"	PROPOSED: 1,300 SF
PARKING: 35	PROPOSED: 1,300 SF

**PARKING ANALYSIS**

PARKING STANDARDS	REQUIRED	PROPOSED
REGULAR	14	14
CONTRACT	14	14
HANDICAP	3	3
LOADING	0	0
TOTAL PARKING SPACES	35	35

Infiltration test locations will need to be updated to the new underground chamber location

OR1 SOIL BORING



SCALE: 1"=1/2 MILE

**GEO ENVIRON**  
 ANAHEIM, CALIFORNIA

**FIG. 1**  
**SITE LOCATION MAP**