

# Preliminary Water Quality Management Plan

FOR:

## Pioneer Park

Tentative Tract 20797

(APN 0167-091-09, -10, -11, &-12)

Prepared for:

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Job No. 10385

Approval Date: To be Determined



### Project Owner's Certification

This Water Quality Management Plan (WQMP) has been prepared for Redlands Pioneer Partners, by Hicks & Hartwick, Inc.. The WQMP is intended to comply with the requirements of the County of San Bernardino 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):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):	Tract 20797	Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			APN 0167-091-09, -10, -11, &-12
Owner's Signature			
<b>Owner Name: Qantas Corman</b>			
Title	Owner		
Company	Redlands Pioneer Partners, LLC		
Address	4350 Von Karmen Ave., Suite 200, Newport, CA 92660		
Email	qcorman@citivestinc.com		
Telephone #	949-325-3025		
Signature		Date	

### Preparer's Certification

Project Data			
Permit/Application Number(s):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):	Tract 20797	Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			APN 0167-091-09, -10, -11, &-12

“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.”

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Date	5/26/2025	

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## Section 1 Discretionary Permit(s)

<b>Form 1-1 Project Information</b>					
Project Name		Redlands Pioneer Partners			
Project Owner Contact Name:		Qantas Corman			
Mailing Address:	4350 Von Karman Ave., Suite 200 Newport Beach, CA 92660	E-mail Address:	qcorman@citivestinc.com	Telephone:	949-325-3025
Permit/Application Number(s):		Tract/Parcel Map Number(s):		Tract 20797	
Additional Information/ Comments:		None			
Description of Project:		<p><b>Water Treatment Overview</b></p> <p>Pioneer Park is a residential development project located on approximately 32.9 acres. The project consists of 255 single family lots with a minimum lot size of 2,000 SF and a single multi-family lot with a 2-story apartment building. Tract 20797 is bounded on the north by Pioneer Avenue and on the south by San Bernardino Avenue and lies between the Foothill Freeway (I-210) on the west and Tr. 20257 to the east. Site access will be provided from San Bernardino Avenue, Pioneer Avenue and the proposed extension of New York Street along the project's easterly boundary.</p> <p>Project surface flows drain generally east to west through the proposed street system with storm drain outlets into two infiltration basins located at the northwest and southwest corners of the project site. A storm drain system also conveys runoff from catch basins located at the ends of the motor-court and alleyway streets to the two infiltration basins.</p> <p>The project site is within soils group A &amp; B indicating infiltration feasibility. Infiltration testing results confirm that the on-site soils are suitable for infiltration according to County of San Bernardino WQMP criteria. The full LID DCV requirements will be handled by the proposed infiltration basins. The project site is located within an HCOC exempt area of the city and no HCOC analysis was performed with this study. Higher flow rates exceeding the DCV volumes will pass through the basins and into the existing Caltrans maintained storm drain system and concrete channel along the east side of the Foothill Freeway.</p> <p>Maintenance of lot BMP's will be handled by the Lot owner. The infiltration basins and associated inlet storm drains and appurtenances will be maintained by the City of Redlands through a CFD.</p>			
Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.					

## 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 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 checked="" 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 type="checkbox"/> Parking lots of 5,000 ft <sup>2</sup> or more exposed to storm water	<input 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> ):	1,223,573	<b>3</b> Number of Dwelling Units:	256	<b>4</b> SIC Code:	1521
<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:

Water Quality Management Plan related storm water facilities maintenance and ownership will be addressed as follows:

1. The Homeowners will be responsible for maintenance on their individual lots (Lots 1-255).
2. The Apartment Owner will be responsible for maintenance on the multi-family lot (Lot 256).
3. A CFD will be responsible for maintenance of open space Lots A-N including two infiltration basins, storm drain pipe, inlets and appurtenances. Ownership of Lots A-N and storm drain facilities in those lots will be transferred to the City upon recordation of the tract map and City acceptance of the facilities. Storm drain facilities (catch basins, pipe, sidewalk drains, etc.) located within proposed public right of way will be transferred to the City upon project completion and City acceptance of the facilities.

## 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).

<b>Form 2.3-1 Pollutants of Concern</b>			
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"/>	The proliferation of bacteria and viruses is generally caused by the transport of animal or fecal waste within stormwater runoff from a project site. Infiltration BMPs are incorporated into the site design to treat pathogens with medium removal efficiency.
Nutrients - Phosphorous	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	The primary source of nutrients is typically the overuse of fertilizers and eroded soils. Slope grading will be stabilized in accordance with City standard grading guidelines and the potential of nutrient laden run-off from erodible soils is considered minimal. The project will have fertilized landscape areas and infiltration BMPs are incorporated into the site design to treat nutrients with medium removal efficiency.
Nutrients - Nitrogen	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Noxious Aquatic Plants	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Construction/land development is a known source of this pollutant. Infiltration BMPs are incorporated into the site design to treat noxious aquatic plants with medium removal efficiency.
Sediment	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Sediments are generally caused by eroded soils, transport of sediment not properly contained and poorly maintained landscape and pavements. Infiltration BMPs are incorporated into the site design that will treat for sediments with high removal efficiency.
Metals	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	The apartment complex parking lot and drive aisles are expected to gather metals from various sources on vehicles parking and driving through the lot. Infiltration BMPs will be incorporated into the site design that will treat for metals with high removal efficiency.
Oil and Grease	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	The project streets and driveways are expected to gather oil and grease from various sources on vehicles parking and driving through the project. Infiltration BMPs are incorporated into the site design that will treat for oil and grease with high removal efficiency.
Trash/Debris	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Trash and other debris including papers, plastic, foam, aluminum, leaves, cut grass and food wastes are expected from common residential waste containers. Infiltration BMPs are incorporated into the site design that will treat for trash/debris with high removal efficiency.
Pesticides / Herbicides	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Pesticides and herbicides are commonly used for landscaping and pest control. Their use should be kept to a minimum and applied per the manufacturer's specifications. Infiltration BMPs are incorporated into the site design that will treat for pesticides/herbicides with medium removal efficiency.
Organic Compounds	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Sources of organic compounds include waste container storage areas and landscape maintenance equipment stored outside. Infiltration BMPs are incorporated into the site design that will treat for organic compounds with medium removal efficiency.
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	

## 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 % 0 <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.***

<b>Form 3-1 Site Location and Hydrologic Features</b>			
Site coordinates take GPS measurement at approximate center of site	Latitude 34.079148°	Longitude -117.197603°	Thomas Bros Map page 648
<p><sup>1</sup> San Bernardino County climatic region: <input checked="" type="checkbox"/> Valley <input type="checkbox"/> Mountain</p>			
<p><sup>2</sup> Does the site have more than one drainage area (DA): Yes <input checked="" type="checkbox"/> No <input 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></p>			
<pre> graph BT     DA1[DA-1 DMA A] --&gt; O1[Outlet 1]     DA2[DA-2 DMA A] --&gt; O2[Outlet 2]             </pre>			
Conveyance	Briefly describe on-site drainage features to convey runoff that is not retained within a DMA		
DA-1 DMA A flows to Outlet 1	Project flows in DA-1 will travel through the internal street system to a series of catch basins located at low-points and street intersections in the project site. Flows captured by the catch basins will travel through a storm drain system and outlet into Infiltration Basin 'A' for DCV treatment.		
DA-2 DMA A flows to Outlet 2	Project flows in DA 2 will travel through the internal street system to a series of catch basins located at low-points and street intersections in the project site. Flows captured by the catch basins will travel through a storm drain system and outlet into Infiltration Basin 'B' for DCV treatment.		

<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	DMA D
<b>1</b> DMA drainage area (ft <sup>2</sup> )	1,102,794			
<b>2</b> Existing site impervious area (ft <sup>2</sup> )	35,562			
<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>	2			
<b>4</b> Hydrologic soil group <i>Refer to Watershed Mapping Tool – <a href="http://sbcounty.permitrack.com/WAP">http://sbcounty.permitrack.com/WAP</a></i>	A/B			
<b>5</b> Longest flowpath length (ft)	1,396			
<b>6</b> Longest flowpath slope (ft/ft)	0.010			
<b>7</b> Current land cover type(s) <i>Select from Fig C-3 of Hydrology Manual</i>	Annual Grass			
<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>	fair			

<b>Form 3-2 Existing Hydrologic Characteristics for Drainage Area 2</b>				
For Drainage Area 2's sub-watershed DMA, provide the following characteristics	DMA A	DMA B	DMA C	DMA D
<b>1</b> DMA drainage area (ft <sup>2</sup> )	329,345			
<b>2</b> Existing site impervious area (ft <sup>2</sup> )	11,994			
<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>	2			
<b>4</b> Hydrologic soil group <i>Refer to Watershed Mapping Tool – <a href="http://sbcounty.permitrack.com/WAP">http://sbcounty.permitrack.com/WAP</a></i>	A/B			
<b>5</b> Longest flowpath length (ft)	835			
<b>6</b> Longest flowpath slope (ft/ft)	0.015			



Photo 1: On north side of Pioneer Avenue looking south across the project site along the east project boundary.

<p>8 Pre-developed pervious area condition: 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</p>	<p>fair</p>			
<p>7 Current land cover type(s) Select from Fig C-3 of Hydrology Manual</p>	<p>Annual Grass</p>			

## Water Quality Management Plan (WQMP)

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*Photo 2: At northwest corner of project site on Pioneer Avenue looking south along the west project boundary and Foothill Freeway right of way.*



*Photo 3: At Tennessee Street/Pioneer Avenue intersection looking south across the project site.*



## Water Quality Management Plan (WQMP)

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*Photo 4: At southeast corner of project site on San Bernardino Avenue looking west along south project boundary.*



*Photo 5: At southeast corner of project site on San Bernardino Avenue looking north along east project boundary and future New York Street.*



<b>Form 3-3 Watershed Description for Drainage Area</b>	
<p>Receiving waters                      Refer to Watershed Mapping Tool -  <a href="http://sbcounty.permitrack.com/WAP">http://sbcounty.permitrack.com/WAP</a>                      See "Drainage Facilities" link at this website</p>	<p>Santa Ana River Reach 5                      v                      Santa Ana River Reach 4                      v                      Santa Ana River Reach 3                      v                      Prado Basin</p>
<p>Applicable TMDLs                      Refer to Local Implementation Plan</p>	<p>Santa Ana River Reach 4 – pathogens                      Santa Ana River Reach 3 – pathogens / Metals</p>
<p>303(d) listed impairments                      Refer to Local Implementation Plan and Watershed Mapping Tool –  <a href="http://sbcounty.permitrack.com/WAP">http://sbcounty.permitrack.com/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></p>	<p>None for immediate receiving waters                      Santa Ana River Reach 4 – pathogens                      Santa Ana River Reach 3 – pathogens / Metals</p>
<p>Environmentally Sensitive Areas (ESA)                      Refer to Watershed Mapping Tool –  <a href="http://sbcounty.permitrack.com/WAP">http://sbcounty.permitrack.com/WAP</a></p>	<p>None</p>
<p>Unlined Downstream Water Bodies                      Refer to Watershed Mapping Tool –  <a href="http://sbcounty.permitrack.com/WAP">http://sbcounty.permitrack.com/WAP</a></p>	<p>Santa Ana River Reach 5, Reach 4, Reach 3</p>
<p>Hydrologic Conditions of Concern</p>	<p><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</p>
<p>Watershed-based BMP included in a RWQCB approved WAP</p>	<p><input type="checkbox"/> Yes Attach verification of regional BMP evaluation criteria in WAP                      • More Effective than On-site LID                      • Remaining Capacity for Project DCV                      • Upstream of any Water of the US                      • Operational at Project Completion                      • Long-Term Maintenance Plan  <input checked="" type="checkbox"/> No</p>

## 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.

Form 4.1-1 Non-Structural Source Control BMPs				
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"/>	The project owners will provide educational materials to property owners/tenants within the project. The materials will discuss water quality management issues relating to the project and property owners/tenants individual and corporate responsibilities. The materials will contain appropriate information from private and government resources. These materials will include information on general good housekeeping practices that contribute to protection of Storm water quality, and BMPs that eliminate or reduce pollution. The materials will describe the use of chemicals (including household type) that should be limited to the property, with no discharge of specified wastes via hosing or other direct discharge to gutters, catch basins, and storm drains. These materials will be made available by the owner and are included in the WQMP in <b>Section 6.4C – Educational Information</b> . The owner will note the availability of stormwater information and educational materials available on the San Bernardino County Website <a href="http://www.sbcountystormwater.org/">http://www.sbcountystormwater.org/</a> . A copy of these materials and a copy of the WQMP must be given to each property owner with the purchase of a lot within the subdivision at the close of purchase.
N2	Activity Restrictions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	All activities are restricted for which there isn't an appropriate BMP provided for in this WQMP.
N3	Landscape Management BMPs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The homeowners of Lots 1-255 and apartment complex owner shall comply with landscape management guidelines described in the Stormwater Pollution Prevention Home & Garden educational sheet found in Section 6.4C – Educational Information.
N4	BMP Maintenance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<ol style="list-style-type: none"> <li>1. The homeowners will be responsible for BMP maintenance on their individual lots (Lots 1-255).</li> <li>2. The apartment complex owner will be responsible for BMP maintenance for the property.</li> <li>3. The City of Redlands will own Lots A-M in Fee Title and will be responsible for BMP Maintenance of the infiltration basins in Lots A and B via a Community Facilities District.</li> </ol>

Form 4.1-1 Non-Structural Source Control BMPs				
N5	Title 22 CCR Compliance (How development will comply)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The home and apartment complex owners must comply the County ordinances for Hazardous waste and waste disposal. The City of Redlands through the Fire Department provides for household hazardous waste collection. The home and apartment complex owners shall comply by using this facility to dispose of all leftover pesticides, fertilizers, herbicides, oil, paints, antifreeze, batteries, corrosives and flammables. Alternate approved sites for disposal are available. See the San Bernardino County stormwater website for additional disposal locations. Additionally, there are educational material covering hazardous waste covered under N1. The current educational materials are attached to this WQMP.
N6	Local Water Quality Ordinances	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The Project must comply with any applicable local water quality ordinances. The local jurisdiction (City of Redlands), under local water quality ordinances (Ord. 13.54), has authority to ensure clean stormwater discharges from areas of concern to public properties.
N7	Spill Contingency Plan	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not required for single family residences and there are no hazardous materials to be stored on the apartment complex lot.
N8	Underground Storage Tank Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No underground storage tanks on this project
N9	Hazardous Materials Disclosure Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not required for single family residences and there are no hazardous materials to be stored on the apartment complex lot.
N10	Uniform Fire Code Implementation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The project shall comply with Article 80 of the Uniform Fire Code enforced by the City of Redlands Fire department. All hazardous materials covered by this code are banned from this project.
N11	Litter/Debris Control Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<ol style="list-style-type: none"> <li>1. The homeowners will be responsible for litter and debris on their individual lots (Lots 1-255).</li> <li>2. The apartment complex owner will be responsible for contracting with a landscape maintenance company or hiring a groundskeeper to provide litter and debris control on the property limits.</li> <li>3. The City of Redlands will own Lot A-M in Fee Title and will be responsible for litter and debris control via a CFD.</li> </ol>

Form 4.1-1 Non-Structural Source Control BMPs				
N12	Employee Training	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The apartment complex owner will provide water quality training for all employees of the complex. The training shall be based on this WQMP and educational materials supplied herein. Initial training shall occur within six months of employment and shall be refreshed on a yearly basis.
N13	Housekeeping of Loading Docks	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No loading docks on this project.
N14	Catch Basin Inspection Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	There are no catch basins located in the single family or apartment complex lots. The proposed catch basins will be within the City of Redlands maintenance areas and will be covered by their own inspection program.
N15	Vacuum Sweeping of Private Streets and Parking Lots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The apartment complex owner shall have the project parking and drive areas swept on a regular frequency based on usage and field observations of waste accumulation, using a vacuum assisted sweeper.
N16	Other Non-structural Measures for Public Agency Projects	<input type="checkbox"/>	<input checked="" type="checkbox"/>	This is not a public agency project.
N17	Comply with all other applicable NPDES permits	<input checked="" type="checkbox"/>	<input type="checkbox"/>	A SWPPP will be prepared for construction activities and a notice of intent will be filed with the State Water Resources Control Board.

<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 stencilling and signage (CASQA New Development BMP Handbook SD-13)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Storm drain stenciling and signage notices regarding discharge prohibitions will be placed at storm drain inlets to eliminate or reduce dumping and littering. The stenciling shall be blue on a white background with lettering 2-1/2" in height and reading "No Dumping – Drains to river". A fish or similar water dependent creature silhouette may be included subject to City approval. In lieu of a stencil, a catch basin curb marker, circular or rectangular, at least 4" in height or diameter may be used. The message will be the same and is subject to City approval. A painted circular stencil shall not be bigger than 8" in diameter.
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"/>	There are no outdoor material storage on this 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"/>	The trash and waste storage areas in the apartment complex property will be walled to prevent off-site transport of trash. The trash enclosure will have a roof or awning cover with fixed lids attached to the trash containers. They are located to avoid drainage run-on from the project site and no storm drain systems are located in the immediate vicinity of the storage area.
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"/>	Irrigation methods will be utilized to minimize runoff of excess irrigation water across impervious surfaces and into the storm water conveyance system. Such measures shall include employing rain-triggered shutoff devices to eliminate or reduce irrigation during and immediately after precipitation, using mulches (such as wood chips) to minimize sediment in runoff and to maintain soil infiltration capacity, and coordinating design of the irrigation system and landscape to minimize overspray and runoff. Irrigation systems shall use flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or water supply lines. Water conservation devices such as programmable irrigation timers and soil moisture sensors shall be used. This project will be designed for efficient irrigation by implementation of BMP SD-12. Reference SD-12 attached under the BMP section 6.4B.

**Water Quality Management Plan (WQMP)**

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 parkway strips 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 checked="" type="checkbox"/>	<input type="checkbox"/>	<p>Project plans will include Source-Control BMPs to decrease the potential for erosion of slopes, channels, and storm drain outlets. Slope runoff will be conveyed safely from the tops of slopes.</p> <ol style="list-style-type: none"> <li>1. All manufactured slopes within the project will be landscaped and protected.</li> <li>2. Prior to slope landscaping slopes shall be stabilized per the SWPPP.</li> <li>3. Install energy dissipaters per the Final project plans at the outlet locations shown on the attached BMP exhibit.</li> <li>4. Onsite conveyance channels (drainage swales) will be lined, where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area.</li> </ol>
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A There are no covered dock areas.
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A There are no covered maintenance bays.
S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A There are no vehicle wash areas.
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A There are no outdoor processing areas.

Water Quality Management Plan (WQMP)

<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	
S11	Equipment wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A None on this site.
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A None on this site.
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A None on this site.
S14	Wash water control for food preparation areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A None on this site.
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A None on this site.

### 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>
<p>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></p>
<p>Minimize impervious areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>                      Explanation: Sidewalks will be designed to connect to the driveway only, eliminating some impervious area. The minimum City standard street width is being utilized to reduce impervious site area and the houses will only be offered as 2-story further reducing impervious site areas.</p>
<p>Maximize natural infiltration capacity: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>                      Explanation: The two site areas (infiltration basins) that will be used for infiltration will be staked off during grading operations to preserve the natural infiltration capacity of those areas and prevent compaction during construction.</p>
<p>Preserve existing drainage patterns and time of concentration: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>                      Explanation: The project maintains the existing site drainage pattern and the use of infiltration basins is intended to preserve the existing time of concentration that typically decreases due to the addition of impervious site area.</p>
<p>Disconnect impervious areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>                      Explanation: The project is proposing to direct runoff to planters and landscaped areas and incorporates permeable areas throughout the site to accept runoff. All roof downspouts will drain to pervious areas.</p>
<p>Protect existing vegetation and sensitive areas: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>                      Explanation: There are no existing vegetative or sensitive areas on this site.</p>
<p>Re-vegetate disturbed areas: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>                      Explanation: The existing site is a barren field and the proposed grading disturbance will not remove any existing vegetated areas that would require re-vegetation after construction.</p>
<p>Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>                      Explanation: Unnecessary compaction will be avoided by staking off the infiltration basin areas during grading operations to prevent equipment from entering those areas.</p>
<p>Utilize vegetated drainage swales in place of underground piping or imperviously lined swales: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>                      Explanation: Individual lots will be surrounded with a vegetated swale sloping at 1% minimum in lieu of using imperviously lined swales. Due to site drainage constraints some lots will require the use of area drain piping although used sparingly.</p>
<p>Stake off areas that will be used for landscaping to minimize compaction during construction: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>                      Explanation: The house pads and street areas will not utilize this feature, but Lots A &amp; B (infiltration basins) will use this feature.</p>

## 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.

Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA-1 – DMA A)		
<b>1</b> Project area DA 1 (ft <sup>2</sup> ): 1,102,794	<b>2</b> Imperviousness after applying preventative site design practices (Imp%): 63.75%	<b>3</b> Runoff Coefficient (Rc): 0.44 $R_c = 0.858(Imp\%)^{0.3} - 0.78(Imp\%)^{0.2} + 0.774(Imp\%) + 0.04$
<b>4</b> Determine 1-hour rainfall depth for a 2-year return period P <sub>2yr-1hr</sub> (in): 0.44 <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>		
<b>5</b> Compute P <sub>6</sub> , Mean 6-hr Precipitation (inches): 0.71 <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> ): 56,252 $DCV = 1/12 * [Item 1 * Item 3 * Item 5 * C_2]$ , where C <sub>2</sub> is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963) <i>Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2</i>		

<b>Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA-2 – DMA A)</b>		
<b>1</b> Project area DA 2 (ft <sup>2</sup> ): 329,345	<b>2</b> Imperviousness after applying preventative site design practices (Imp%): 58.43%	<b>3</b> Runoff Coefficient (Rc): 0.40 $R_c = 0.858(Imp\%)^{0.3} - 0.78(Imp\%)^{0.2} + 0.774(Imp\%) + 0.04$
<b>4</b> Determine 1-hour rainfall depth for a 2-year return period P <sub>2yr-1hr</sub> (in): 0.48 <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>		
<b>5</b> Compute P <sub>6</sub> , Mean 6-hr Precipitation (inches): 0.71 <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> ): 15,207 <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) Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2</i>		

<b>Form 4.2-2 Summary of HCOC Assessment (DA-1)</b>			
Does project have the potential to cause or contribute to an HCOC in a downstream channel: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>			
Go to: <a href="http://sbcounty.permitrack.com/WAP">http://sbcounty.permitrack.com/WAP</a>			
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 <i>(Forms 4.2-3 through 4.2-5 may be replaced by computer software analysis based on the San Bernardino County Hydrology Manual)</i>			
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 4.2-2 Summary of HCOC Assessment (DA-2)

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

Go to: <http://sbcounty.permitrack.com/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)**

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

**Form 4.2-3 HCOC Assessment for Runoff Volume (DA-2)**

<b>Weighted Curve Number Determination for: Pre-developed DA</b>	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								
<b>Weighted Curve Number Determination for: Post-developed DA</b>	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								
<b>5</b> Pre-Developed area-weighted CN:	<b>7</b> Pre-developed soil storage capacity, S (in): $S = (1000 / \text{Item 5}) - 10$				<b>9</b> Initial abstraction, I <sub>a</sub> (in): $I_a = 0.2 * \text{Item 7}$			
<b>6</b> Post-Developed area-weighted CN:	<b>8</b> Post-developed soil storage capacity, S (in): $S = (1000 / \text{Item 6}) - 10$				<b>10</b> Initial abstraction, I <sub>a</sub> (in): $I_a = 0.2 * \text{Item 8}$			
<b>11</b> 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>								
<b>12</b> Pre-developed Volume (ft <sup>3</sup> ): $V_{pre} = (1 / 12) * (\text{Item sum of Item 3}) * [(\text{Item 11} - \text{Item 9})^2 / ((\text{Item 11} - \text{Item 9} + \text{Item 7}))]$								
<b>13</b> Post-developed Volume (ft <sup>3</sup> ): $V_{pre} = (1 / 12) * (\text{Item sum of Item 3}) * [(\text{Item 11} - \text{Item 10})^2 / ((\text{Item 11} - \text{Item 10} + \text{Item 8}))]$								
<b>14</b> 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>	0				0			
<b>7</b> Cross-sectional area of channel (ft <sup>2</sup> )	N/A				N/A			
<b>8</b> Wetted perimeter of channel (ft)	N/A				N/A			
<b>9</b> Manning's roughness of channel (n)	N/A				N/A			
<b>10</b> Channel flow velocity (ft/sec) $V_{fps} = (1.49 / \text{Item 9}) * (\text{Item 7}/\text{Item 8})^{0.67} * (\text{Item 3})^{0.5}$	N/A				N/A			
<b>11</b> Travel time to outlet (min) $T_t = \text{Item 6} / (\text{Item 10} * 60)$	N/A				N/A			
<b>12</b> Total time of concentration (min) $T_c = \text{Item 5} + \text{Item 11}$	N/A				N/A			
<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 4.2-4 HCOC Assessment for Time of Concentration (DA-2)

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>	0				0			
<b>7</b> Cross-sectional area of channel (ft <sup>2</sup> )	N/A				N/A			
<b>8</b> Wetted perimeter of channel (ft)	N/A				N/A			
<b>9</b> Manning's roughness of channel (n)	N/A				N/A			
<b>10</b> Channel flow velocity (ft/sec) $V_{fps} = (1.49 / \text{Item 9}) * (\text{Item 7}/\text{Item 8})^{0.67} * (\text{Item 3})^{0.5}$	N/A				N/A			
<b>11</b> Travel time to outlet (min) $T_t = \text{Item 6} / (\text{Item 10} * 60)$	N/A				N/A			
<b>12</b> Total time of concentration (min) $T_c = \text{Item 5} + \text{Item 11}$	N/A				N/A			
<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			Post-developed DA to Project Outlet		
	DMA A	DMA B	DMA C	DMA A	DMA B	DMA C
<b>1</b> Rainfall Intensity for storm duration equal to time of concentration $I_{peak} = 10^{(LOG Form 4.2-1 Item 4 - 0.6 LOG Form 4.2-4 Item 5 / 60)}$						
<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) $F_m = Item 3 * Item 4$ <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 drainage from DMA C)</i>						
<b>6</b> Peak Flow from DMA (cfs) $Q_p = Item 2 * 0.9 * (Item 1 - Item 5)$						
<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	n/a		n/a		
	DMA B		n/a		n/a	
	DMA C			n/a		n/a
<b>8</b> Pre-developed $Q_p$ at $T_c$ for DMA A: $Q_p = Item 6_{DMAA} + [Item 6_{DMAB} * (Item 1_{DMAA} - Item 5_{DMAB}) / (Item 1_{DMAB} - Item 5_{DMAB}) * Item 7_{DMAA/2}] + [Item 6_{DMAC} * (Item 1_{DMAA} - Item 5_{DMAC}) / (Item 1_{DMAC} - Item 5_{DMAC}) * Item 7_{DMAA/3}]$	<b>9</b> Pre-developed $Q_p$ at $T_c$ for DMA B: $Q_p = Item 6_{DMAB} + [Item 6_{DMAA} * (Item 1_{DMAB} - Item 5_{DMAA}) / (Item 1_{DMAA} - Item 5_{DMAA}) * Item 7_{DMAB/1}] + [Item 6_{DMAC} * (Item 1_{DMAB} - Item 5_{DMAC}) / (Item 1_{DMAC} - Item 5_{DMAC}) * Item 7_{DMAB/3}]$			<b>10</b> Pre-developed $Q_p$ at $T_c$ for DMA C: $Q_p = Item 6_{DMAC} + [Item 6_{DMAA} * (Item 1_{DMAC} - Item 5_{DMAA}) / (Item 1_{DMAA} - Item 5_{DMAA}) * Item 7_{DMAC/1}] + [Item 6_{DMAB} * (Item 1_{DMAC} - Item 5_{DMAB}) / (Item 1_{DMAB} - Item 5_{DMAB}) * Item 7_{DMAC/2}]$		
<b>10</b> Peak runoff from pre-developed condition confluence analysis (cfs): <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>Maximum of Item 11, 12, and 13 (including additional forms as needed)</i>						
<b>15</b> Peak runoff reduction needed to meet HCOC Requirement (cfs): $Q_{p-HCOC} = (Item 14 * 0.95) - Item 10$						

## Form 4.2-5 HCOC Assessment for Peak Runoff (DA-2)

Compute peak runoff for pre- and post-developed conditions

Variables	Pre-developed DA to Project Outlet			Post-developed DA to Project Outlet		
	DMA A	DMA B	DMA C	DMA A	DMA B	DMA C
<b>1</b> Rainfall Intensity for storm duration equal to time of concentration $I_{peak} = 10^{(LOG Form 4.2-1 Item 4 - 0.6 LOG Form 4.2-4 Item 5 / 60)}$						
<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) $F_m = Item 3 * Item 4$ <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 drainage from DMA C)</i>						
<b>6</b> Peak Flow from DMA (cfs) $Q_p = Item 2 * 0.9 * (Item 1 - Item 5)$						
<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	n/a		n/a		
	DMA B		n/a		n/a	
	DMA C			n/a		n/a
<b>8</b> Pre-developed $Q_p$ at $T_c$ for DMA A: $Q_p = Item 6_{DMAA} + [Item 6_{DMAB} * (Item 1_{DMAA} - Item 5_{DMAB}) / (Item 1_{DMAB} - Item 5_{DMAB}) * Item 7_{DMAA/2}] + [Item 6_{DMAC} * (Item 1_{DMAA} - Item 5_{DMAC}) / (Item 1_{DMAC} - Item 5_{DMAC}) * Item 7_{DMAA/3}]$	<b>9</b> Pre-developed $Q_p$ at $T_c$ for DMA B: $Q_p = Item 6_{DMAB} + [Item 6_{DMAA} * (Item 1_{DMAB} - Item 5_{DMAA}) / (Item 1_{DMAA} - Item 5_{DMAA}) * Item 7_{DMAB/1}] + [Item 6_{DMAC} * (Item 1_{DMAB} - Item 5_{DMAC}) / (Item 1_{DMAC} - Item 5_{DMAC}) * Item 7_{DMAB/3}]$			<b>10</b> Pre-developed $Q_p$ at $T_c$ for DMA C: $Q_p = Item 6_{DMAC} + [Item 6_{DMAA} * (Item 1_{DMAC} - Item 5_{DMAA}) / (Item 1_{DMAA} - Item 5_{DMAA}) * Item 7_{DMAC/1}] + [Item 6_{DMAB} * (Item 1_{DMAC} - Item 5_{DMAB}) / (Item 1_{DMAB} - Item 5_{DMAB}) * Item 7_{DMAC/2}]$		
<b>10</b> Peak runoff from pre-developed condition confluence analysis (cfs): <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>Maximum of Item 11, 12, and 13 (including additional forms as needed)</i>						
<b>15</b> Peak runoff reduction needed to meet HCOC Requirement (cfs): $Q_{p-HCOC} = (Item 14 * 0.95) - Item 10$						

## 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.**

### Form 4.3-1 Infiltration BMP Feasibility (DA 1 & DA 2)

Feasibility Criterion – Complete evaluation for each DA on the Project Site

**1** Would infiltration BMP pose significant risk for groundwater related concerns? Yes  No

*Refer to Section 5.3.2.1 of the TGD for WQMP*

If Yes, Provide basis: (attach)

**2** Would installation of infiltration BMP significantly increase the risk of geotechnical hazards? Yes  No

(Yes, if the answer to any of the following questions is yes, as established by a geotechnical expert):

- The location is less than 50 feet away from slopes steeper than 15 percent
- The location is less than eight feet from building foundations or an alternative setback.
- 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.

If Yes, Provide basis: (attach)

**3** Would infiltration of runoff on a Project site violate downstream water rights? Yes  No

If Yes, Provide basis: (attach)

**4** 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? Yes  No

If Yes, Provide basis: (attach)

**5** 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)? Yes  No

If Yes, Provide basis: (attach)

**6** 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? Yes  No

*See Section 3.5 of the TGD for WQMP and WAP*

If Yes, Provide basis: (attach)

**7** Any answer from Item 1 through Item 3 is “Yes”: Yes  No

*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.*

**8** Any answer from Item 4 through Item 6 is “Yes”: Yes  No

*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.*

**9** All answers to Item 1 through Item 6 are “No”:

*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.*

### 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 1 DMA A BMP Type	DA 1 DMA B 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 Site Design Hydrologic Source Control BMPs (DA 1)</b>			
<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: 0 <span style="float: right;"><i>Sum of Items 5, 13, 20, 25 and 29</i></span>			

### 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> ): 56,252 $V_{unmet} = \text{Form 4.2-1 Item 7} - \text{Form 4.3-2 Item 30}$			
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 BMP Type (Bioinfiltration Trench)	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	2.56		
<b>3</b> Infiltration safety factor See TGD Section 5.4.2 and Appendix D	2.81		
<b>4</b> Design percolation rate (in/hr) $P_{design} = \text{Item 2} / \text{Item 3}$	0.91		
<b>5</b> Ponded 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	3.64		
<b>7</b> Ponding Depth (ft) $d_{BMP} = \text{Minimum of } (1/12 * \text{Item 4} * \text{Item 5}) \text{ or Item 6}$	3.00		
<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	22,090		
<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	0		
<b>10</b> Amended soil porosity	0		
<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	0		
<b>12</b> Gravel porosity	0		
<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> ) $V_{retention} = \text{Item 8} * [\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (\text{Item 13} * (\text{Item 4} / 12))]$	71,301		
<b>15</b> Underground Retention Volume (ft <sup>3</sup> ) Volume determined using manufacturer's specifications and calculations	0		
<b>16</b> Total Retention Volume from LID Infiltration BMPs: 71,301 (Sum of Items 14 and 15 for all infiltration BMP included in plan)			
<b>17</b> Fraction of DCV achieved with infiltration BMP: 126.75% $\text{Retention\%} = \text{Item 16} / \text{Form 4.2-1 Item 7}$			
<b>18</b> Is full LID DCV retained on-site with combination of hydrologic source control and LID retention and infiltration BMPs? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> 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.			

**Form 4.3-3 Infiltration LID BMP - including underground BMPs (DA-2)**

<b>1</b> Remaining LID DCV not met by site design HSC BMP (ft <sup>3</sup> ): 15,207 $V_{unmet} = \text{Form 4.2-1 Item 7} - \text{Form 4.3-2 Item 30}$			
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 2 DMA A BMP Type (Infiltration Basin)	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	2.56		
<b>3</b> Infiltration safety factor See TGD Section 5.4.2 and Appendix D	2.81		
<b>4</b> Design percolation rate (in/hr) $P_{design} = \text{Item 2} / \text{Item 3}$	0.91		
<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	3.64		
<b>7</b> Ponding Depth (ft) $d_{BMP} = \text{Minimum of } (1/12 * \text{Item 4} * \text{Item 5}) \text{ or Item 6}$	3.50		
<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	8,735		
<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	0		
<b>10</b> Amended soil porosity	0		
<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	0		
<b>12</b> Gravel porosity	0		
<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> ) $V_{retention} = \text{Item 8} * [\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (\text{Item 13} * (\text{Item 4} / 12))]$	32,562		
<b>15</b> Underground Retention Volume (ft <sup>3</sup> ) Volume determined using manufacturer's specifications and calculations	0		
<b>16</b> Total Retention Volume from LID Infiltration BMPs: 32,562 (Sum of Items 14 and 15 for all infiltration BMP included in plan)			
<b>17</b> Fraction of DCV achieved with infiltration BMP: 214.12% $\text{Retention}\% = \text{Item 16} / \text{Form 4.2-1 Item 7}$			
<b>18</b> Is full LID DCV retained on-site with combination of hydrologic source control and LID retention and infiltration BMPs? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> 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.			

### 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> ): 0 <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 BMP Type	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 0 <i>Sum of Item 8 for all harvest and use BMP included in plan</i>			
<b>10</b> Is the full DCV retained with a combination of LID HSC, retention and infiltration, and harvest and use BMPs? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <i>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.</i>			

### 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>): 0 Form 4.2-1 Item 7 - Form 4.3-2 Item 30 – Form 4.3-3 Item 16- Form 4.3-4 Item 9</p>	<p>List pollutants of concern <i>Copy from Form 2.3-1.</i></p> <ul style="list-style-type: none"> <li>Pathogens (Bacterial / Virus)</li> <li>Nutrients - Phosphorous</li> <li>Nutrients - Nitrogen</li> <li>Noxious Aquatic Plants</li> <li>Sediment</li> <li>Oil and Grease</li> <li>Trash/Debris</li> <li>Pesticides / Herbicides</li> <li>Organic Compounds</li> </ul>	
<p><b>2</b> Biotreatment BMP Selected</p> <p><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</p> <p style="text-align: center;"><i>Use Forms 4.3-6 and 4.3-7 to compute treated volume</i></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Bioretention with underdrain</li> <li><input type="checkbox"/> Planter box with underdrain</li> <li><input type="checkbox"/> Constructed wetlands</li> <li><input type="checkbox"/> Wet extended detention</li> <li><input type="checkbox"/> Dry extended detention</li> </ul>	<p style="text-align: center;">Flow-based biotreatment</p> <p style="text-align: center;"><i>Use Form 4.3-8 to compute treated volume</i></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Vegetated swale</li> <li><input type="checkbox"/> Vegetated filter strip</li> <li><input type="checkbox"/> Proprietary biotreatment</li> </ul>
<p><b>3</b> Volume biotreated in volume based biotreatment BMP (ft<sup>3</sup>): 0 Form 4.3-6 Item 15 + Form 4.3-7 Item 13</p>	<p><b>4</b> Compute remaining LID DCV with implementation of volume based biotreatment BMP (ft<sup>3</sup>): 0 Item 1 – Item 3</p>	<p><b>5</b> Remaining fraction of LID DCV for sizing flow based biotreatment BMP: 0% Item 4 / Item 1</p>
<p><b>6</b> Flow-based biotreatment BMP capacity provided (cfs): 0 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)</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> Ponded 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: 0 <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 : 0 <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 1 DMA B 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> ): 56,252 <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> ): 71,301 <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 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 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>

## Form 4.3-9 Conformance Summary and Alternative Compliance Volume Estimate (DA-2)

**1** Total LID DCV for the Project DA-2 (ft<sup>3</sup>): 15,207 *Copy Item 7 in Form 4.2-1*

**2** On-site retention with site design hydrologic source control LID BMP (ft<sup>3</sup>): 0 *Copy Item 30 in Form 4.3-2*

**3** On-site retention with LID infiltration BMP (ft<sup>3</sup>): 32,562 *Copy Item 16 in Form 4.3-3*

**4** On-site retention with LID harvest and use BMP (ft<sup>3</sup>): 0 *Copy Item 9 in Form 4.3-4*

**5** On-site biotreatment with volume based biotreatment BMP (ft<sup>3</sup>): 0 *Copy Item 3 in Form 4.3-5*

**6** Flow capacity provided by flow based biotreatment BMP (cfs): 0 *Copy Item 6 in Form 4.3-5*

**7** LID BMP performance criteria are achieved if answer to any of the following is "Yes":

- Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: Yes  No   
*If yes, sum of Items 2, 3, and 4 is greater than Item 1*
- 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  No   
*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*
- 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  No   
*If yes, Form 4.3-1 Items 7 and 8 were both checked yes*

**8** 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:

- Combination of HSC, retention and infiltration, harvest and use, and biotreatment BMPs provide less than full LID DCV capture:   
*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,  $V_{alt} = (Item\ 1 - Item\ 2 - Item\ 3 - Item\ 4 - Item\ 5) * (100 - Form\ 2.4-1\ Item\ 2)\%$*
- 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:   
*Attach appropriate WAP section, including technical documentation, showing effectiveness comparisons for the project site and regional watershed*

### 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>): (Form 4.2-2 Item 4 * 0.95) – Form 4.2-2 Item 1</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>): 0 <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>): Item 1 – Item 2</p>	<p><b>4</b> Volume capture provided by incorporating additional on-site or off-site retention BMPs (ft<sup>3</sup>): 0 <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"/>  <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"/>  <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>	

Form 4.3-10 Hydromodification Control BMPs (DA-2)	
<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>): 0 <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>): 0 <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"/>  <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"/>  <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
Education of Property Owners, Tenants and Occupants	Lot Owners	The project owner is responsible for the initial distribution of the WQMP and educational materials to the individual lot owners at the close of escrow on each lot. Individual lot owners are responsible for staying informed regarding current storm water quality requirements by downloading the latest educational material published by the County of San Bernardino and available on the County’s website at: <a href="http://www.sbcountystormwater.org/">http://www.sbcountystormwater.org/</a> agency.	Yearly
Activity Restrictions	Lot Owners	Lot owner to review activity restrictions for the community (e.g. – car washing restrictions, hazardous material storage requirements, etc.) on an annual basis for changes in local City ordinance. These restrictions include any activities that violate the ordinances in Chapter 13.54 of the City of Redlands Municipal Codes and any activities for which adequate BMPs have not been provided.	Yearly
BMP Maintenance	Lot Owners and City of Redlands through a CFD	Lot owners to inspect and maintain routine structural BMPs (irrigation, roof run-off controls, slope maintenance) on their lots per the BMP maintenance recommendations provided on BMP reference sheets in Section 6.4B of this manual. The City of Redlands, through a CFD, to inspect and maintain Lots A and Bioinfiltration trenches along Highland Avenue per the BMP maintenance recommendations provided on BMP reference sheets in Section 6.4B of this manual. City inspection and maintenance will not commence until the infrastructure is accepted by the City.	See frequency of activities under each specific non-structural or structural BMP in this section
Local Water Quality Ordinances	Lot Owners	City regulated compliance. Check with City of Redlands regarding changes in local water quality ordinance on annual basis. The ordinances may be found in Chapter 13.54 of the City of Redlands Municipal Code and on the City’s web site at <a href="http://www.cityofredlands.org">www.cityofredlands.org</a>	Yearly

**Water Quality Management Plan (WQMP)**

<b>Form 5-1 BMP Inspection and Maintenance (use additional forms as necessary)</b>			
BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
Litter / Debris Control Program	Lot Owners and City of Redlands	Maintenance shall consist of litter patrol, emptying of trash receptacles (trash collection service provided by City of Redlands), picking up pet waste and using the proper containers for trash pickup. Containers should be cleaned at least every six months by Lot Owners.	Daily & 6 Months
Storm Drain Signage	Project Owner (prior to City acceptance) then City of Redlands	Owner to inspect signage for legibility and repaint/replace storm drain signage as necessary.  The City of Redlands will not inspect or maintain any devices until the infrastructure is accepted by the City. Until that time it is the owner's responsibility to inspect and maintain this BMP.	Annually until accepted by City and then City Determined
Landscape Finished Grade	Lot Owners	This inspection and maintenance normally refers to some areas of the the lot and parkway grade held at a lower grade than the surrounding area. Verify landscaping is 1-2" below the adjacent finished surface grade to allow for ponding. Remove excessive soil and/or vegetation to restore 1" minimum depth of landscaping area below adjacent grade. Replant landscaping areas disturbed during soil removal.	Monthly
Protect Slopes and Channels	Lot Owners and City of Redlands	Channels (Drainage Swales) – Lot owner's to inspect for debris and/or overgrowth, clean, repair and replace all channel stabilization and vegetation.  Slopes - Lot owner's to inspect for erosion and/or overgrowth, clean, repair and replace all slope stabilization and vegetation as necessary.  Rock Outlet Pad at Infiltration Basin in Lot A – The City of Redlands, through a CFD, to inspect and maintain the rock outlet pad including removal of debris, overgrown vegetation and sediment build up.	Monthly
Landscape Planning	Lot Owners	Landscapes shall be maintained to ensure water efficiency and healthy appearance. A regular maintenance schedule shall include, but not be limited to, checking, adjusting, and repairing the irrigation equipment; resetting the automatic controller; aerating and dethatching turf areas; replenishing mulch; fertilizing; pruning, weeding, removing litter and replacement of plants as required.  Verify fertilizer and pesticide usage requirements consistent with the instructions contained on product labels and with the regulations administered by the State Department of Pesticide Regulation Comply	Weekly

**Water Quality Management Plan (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
		with product labels as new products are purchased and update new regulations by the State Department of Pesticide Regulation ( <a href="http://www.cdpr.ca.gov/">http://www.cdpr.ca.gov/</a> )	
Roof Runoff Controls	Lot Owners	Roof Inlets and Outlets - Inspect and clean as necessary all roof inlets, outlets and drains (CASQA New Development BMP Handbook SD-11)	Twice a year – once in October and once in April/May
Efficient Irrigation	Lot Owners	<ol style="list-style-type: none"> <li>1. Rain and pressure shutoff devices inspect and replace as necessary</li> <li>2. Timers inspect and replace as necessary</li> <li>3. Mulch Add mulch (wood chips)</li> <li>4. Overspray Inspect and adjust system</li> </ol>	Monthly
SD-21 Alternative Building Materials	Lot Owners	Decking & Fencing - inspect, repair and replace. Use no Chromated Copper Arsenate products for repair or replacement. Roofing - inspect, repair and replace. If repair or replacement product is metal, use only appropriately coated products. Paved areas - see pervious pavement maintenance. Building siding - inspect, repair and replace. Pesticide reduction - inspect, repair and replace termite barriers	Yearly
TC-11 Infiltration Basin	Project Owner (prior to City acceptance) then the City of Redlands through a CFD	City Determined  The City of Redlands will not inspect or maintain any facilities until the infrastructure is accepted by the City. Until that time it is the owner's responsibility to inspect and maintain this BMP.	City Determined

## 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

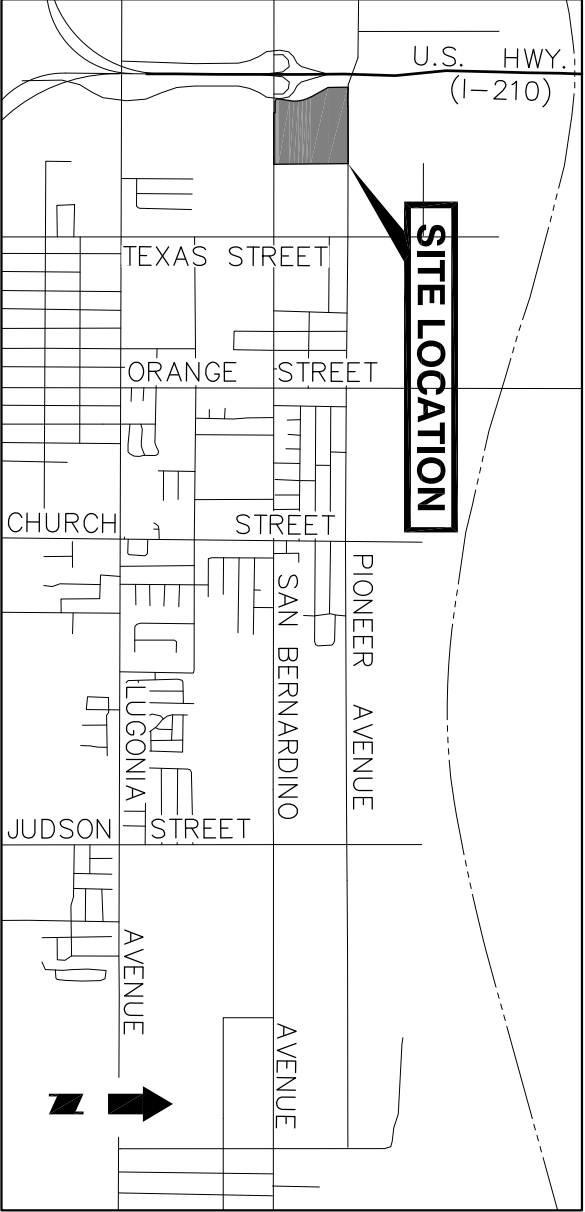
Minimum requirements include submittal of PDF exhibits in addition to hard copies. Format must not require specialized software to open. If the local jurisdiction requires specialized electronic document formats (as described in their Local Implementation Plan), this section will describe the contents (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

- 6.4A Hydrology
- 6.4B BMP Educational Materials
- 6.4C Educational Materials
- 6.4D Calculations
- 6.4E Miscellaneous Data



**VICINITY MAP**  
 CITY OF REDLANDS, CALIFORNIA  
 SCALE: NTS

# Project Drainage Path



# PRELIMINARY WATER QUALITY MANAGEMENT PLAN

## TENTATIVE TRACT No. 20797

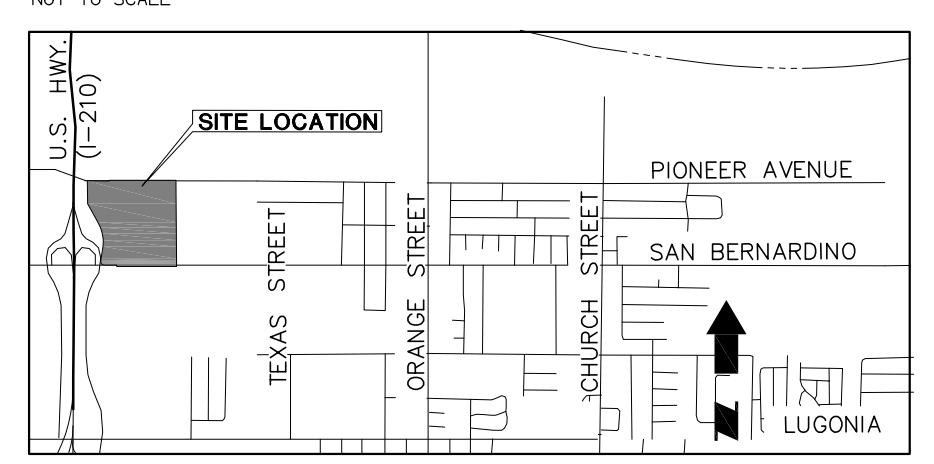
**OWNER / APPLICANT**  
 REDLANDS PIONEER PARTNERS, LLC  
 ATTN: GAYLES CORRYAN AND MICHAEL MOSSMAN  
 4350 VON KARMAN AVENUE, SUITE 200  
 NEWPORT BEACH, CA 92660

**CIVIL ENGINEER**  
 HICKS & HARTWICK, INC.  
 37 EAST OLIVE AVENUE, SUITE C  
 REDLANDS, CA 92373  
 PH: (909) 793-2252

**TENTATIVE MAP PREPARED BY:**  
 Hicks & Hartwick, Inc.  
 37 East Olive Ave. Ste C  
 Redlands, CA 92373  
 909.793.2252



**VICINITY MAP**  
 NOT TO SCALE



**GENERAL NOTES**

- TOTAL WQMP PROJECT AREA: 1,432,139 SF (32.88 AC)
- DATE PREPARED: 06-01-25

**SITE IMPLEMENTED BMP's**

NOTE: ALL BMP'S LISTED ARE PER CALIFORNIA STORMWATER QUALITY ASSOCIATION BEST MANAGEMENT PRACTICE HANDBOOK, (CONSTRUCTION, JULY 2012)

SOURCE CONTROL BMP'S	ROUTINE STRUCTURAL	SD-10
1. LANDSCAPE PLANNING	SD-10	
2. ROOF RUNOFF CONTROLS	SD-11	
3. EFFICIENT IRRIGATION	SD-12	
4. PROTECT SLOPES AND CHANNELS	SD-13	
5. STORM DRAIN SIGNAGE	SD-13	
6. INLET TRASH RACKS	SD-13	
7. ENERGY DISSIPATORS	SD-13	
ALTERNATIVE MATERIAL	SD-20	
8. PERVIOUS PAVEMENT (DECOMPOSED GRANITE, ETC.)	SD-20	
9. ALTERNATIVE BUILDING MATERIALS	SD-21	
DESIGN BASIS OF TREATMENT CONTROL BMP'S	TC-11	
10. TREATMENT CONTROL BMP	TC-11	
11. INFILTRATION BASIN	TC-11	

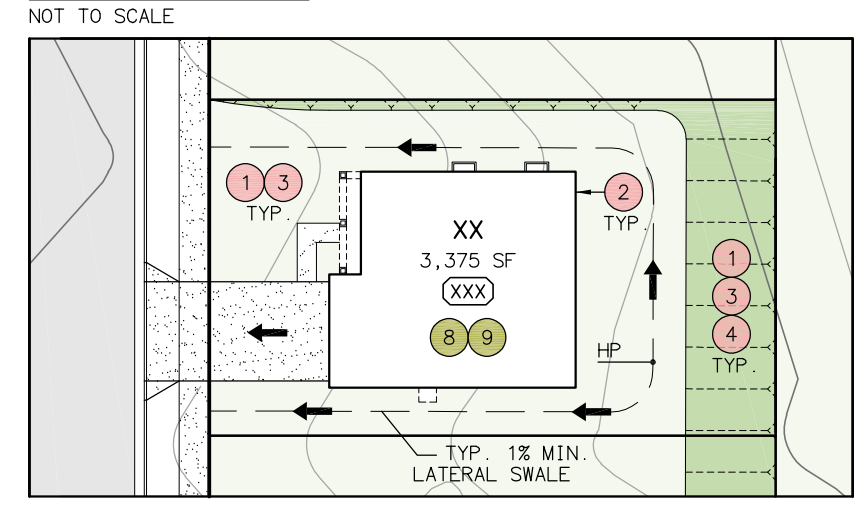
**LEGEND**

- EXISTING 5' CONTOUR
- EXISTING 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED 1' CONTOUR
- TOTAL WQMP PROJECT AREA BOUNDARY
- DRAINAGE AREAS PER HYDRO STUDY
- PROPOSED STORM DRAIN PIPE
- OPEN SPACE & LANDSCAPING
- 2:1 SLOPE OR LESS
- AC PAVEMENT
- CONCRETE
- BASIN/PLAY AREA
- BUILDING
- FLOW ARROW

**ABBREVIATIONS**

- AC ASPHALT CONCRETE/ACRES
- AVE AVENUE
- BLDG. BUILDING
- BLDG. CENTERLINE
- CF CUBIC FEET
- CFS CUBIC FEET PER SECOND
- ELEV. ELEVATION
- EX. EXISTING
- EX. EXISTING
- L. LENGTH
- MAX. MAXIMUM
- MB MAP BOOK
- MIN. MINIMUM
- PROP. PROPOSED
- R. RADIUS
- SD STORM DRAIN
- SF SQUARE FEET
- TYP. TYPICAL

**TYPICAL LOT BMP'S**  
 NOT TO SCALE



- 8 - APPLIES TO PATIO AND WALKWAY AREAS
- 9 - APPLIES TO FENCING AND DECKING

**WQMP STUDY AREA SUMMARY**

TOTAL WQMP STUDY AREA: 1,432,139 SF (32.88 AC)

DA-1 DMA A	1,102,794 SF	25.32 AC
BUILDINGS - CONVENTIONAL (1,500 SF TYPICAL) X 54 LOTS	81,000 SF	
BUILDINGS - STUB/MOTORCOURT (1,000 SF TYPICAL) X 152 LOTS	152,000 SF	
APARTMENT BUILDING	4,500 SF	
ASPHALT CONCRETE PAVEMENT	252,797 SF	
CONC. SIDEWALK, CONC. CURB/GUTTER, TRASH ENCLOSURE ETC.	212,148 SF	
<b>TOTAL IMPERVIOUS</b>	<b>703,045 SF</b>	<b>16.14 AC</b>
LANDSCAPING (TURF, PLANTERS, SLOPES & DECOMPOSED GRANITE)	399,749 SF	
<b>TOTAL PERVIOUS</b>	<b>399,749 SF</b>	<b>9.18 AC</b>
DA-2 DMA A	329,345 SF	7.56 AC
BUILDINGS - CONVENTIONAL (1,500 SF TYPICAL) X 43 LOTS	64,500 SF	
BUILDINGS - STUB/MOTORCOURT (1,000 SF TYPICAL) X 6 LOTS	6,000 SF	
ASPHALT CONCRETE PAVEMENT	70,503 SF	
CONC. SIDEWALK, CONC. CURB/GUTTER, TRASH ENCLOSURE ETC.	51,448 SF	
<b>TOTAL IMPERVIOUS</b>	<b>192,451 SF</b>	<b>4.42 AC</b>
LANDSCAPING (TURF, PLANTERS, SLOPES & DECOMPOSED GRANITE)	136,894 SF	
<b>TOTAL PERVIOUS</b>	<b>136,894 SF</b>	<b>3.14 AC</b>

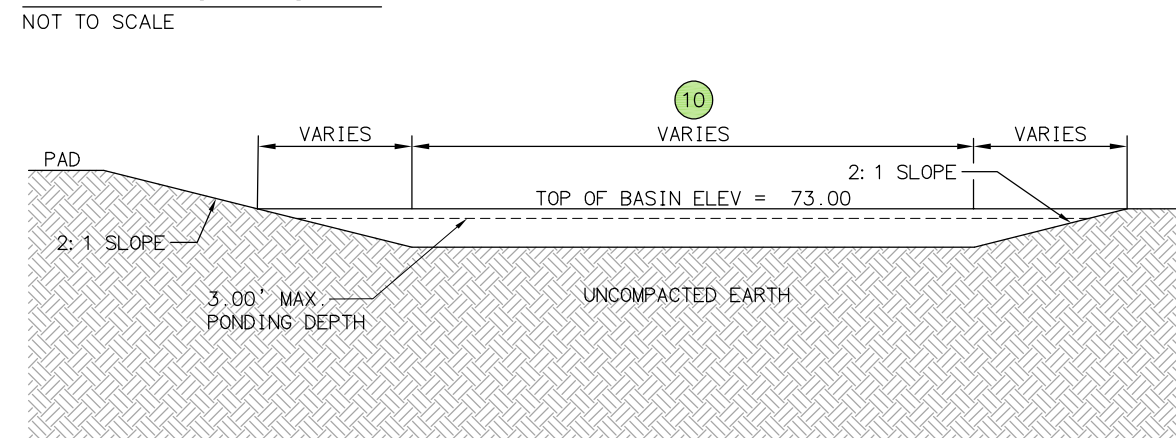
**TREATMENT FLOW SUMMARY**

	TREATMENT VOLUME REQUIRED	TREATMENT VOLUME PROVIDED
DA-1	1,102,794 SF (25.32 AC) [DCV 56,252 c.f.]	DCV 71,301 c.f.
IMPERVIOUS AREA	703,045 SF	
DA-2	329,345 SF (7.56 AC) [DCV 15,207 c.f.]	DCV 32,562 c.f.
IMPERVIOUS AREA	192,451 SF	

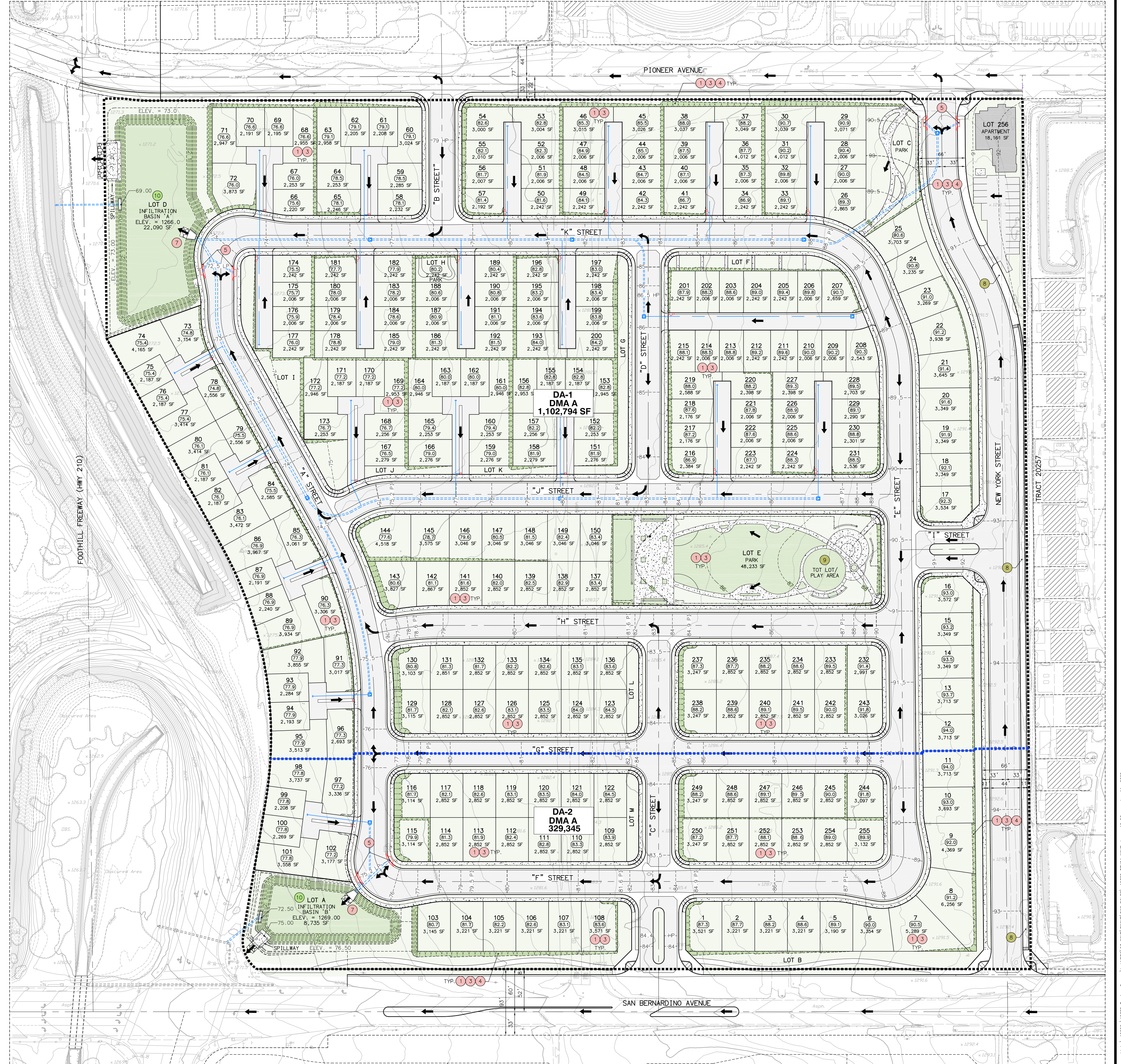
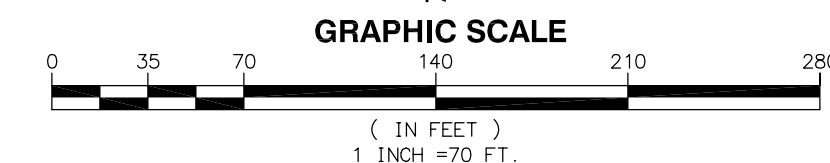
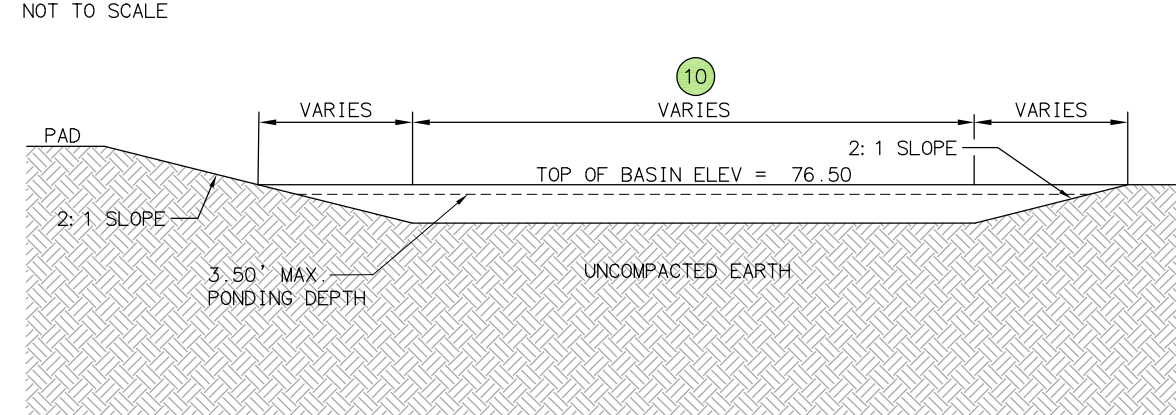
**TREATMENT FLOW TOTAL**

	TREATMENT VOLUME REQUIRED	TREATMENT VOLUME PROVIDED
DA-1 & DA-2	1,562,059 SF (35.86 AC) [DCV 71,459 c.f.]	DCV 103,863 c.f.
IMPERVIOUS AREA	895,496 SF	

**INFILTRATION BASIN 'A'**  
 NOT TO SCALE



**INFILTRATION BASIN 'B'**  
 NOT TO SCALE



# Site Design & Landscape Planning SD-10



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## Design Objectives

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

## Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

## Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

## Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

## Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.



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

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## ***Designing New Installations***

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.
- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

## ***Conserve Natural Areas during Landscape Planning***

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

## ***Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit***

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.
- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

# Site Design & Landscape Planning SD-10

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regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

## *Protection of Slopes and Channels during Landscape Design*

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

## *Redeveloping Existing Installations*

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

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

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Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

## **Other Resources**

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

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

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

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

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



Rain Garden

## Design Objectives

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

## Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

## Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

## Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

## Design Considerations

### *Designing New Installations*

#### *Cisterns or Rain Barrels*

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain



barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say  $\frac{1}{4}$  to  $\frac{1}{2}$  inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

#### *Dry wells and Infiltration Trenches*

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. These are described under Treatment Controls.

#### *Pop-up Drainage Emitter*

Roof downspouts can be directed to an underground pipe that daylights some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

## *Foundation Planting*

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

## ***Redeveloping Existing Installations***

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

## **Supplemental Information**

### ***Examples***

- City of Ottawa’s Water Links Surface –Water Quality Protection Program
- City of Toronto Downspout Disconnection Program
- City of Boston, MA, Rain Barrel Demonstration Program

### **Other Resources**

Hager, Marty Catherine, Stormwater, “Low-Impact Development”, January/February 2003.  
[www.stormh2o.com](http://www.stormh2o.com)

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD.  
[www.lid-stormwater.net](http://www.lid-stormwater.net)

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition





## Design Objectives

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

## Description

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

## Approach

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

## Suitable Applications

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

## Design Considerations

### *Designing New Installations*

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

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



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

### ***Redeveloping Existing Installations***

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

### **Other Resources**

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

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

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

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



## Design Objectives

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- ✓ Prohibit Dumping of Improper Materials
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- Collect and Convey

## Description

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

## Approach

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

## Suitable Applications

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

## Design Considerations

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

## *Designing New Installations*

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

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



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

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

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

### ***Redeveloping Existing Installations***

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

### **Additional Information**

#### ***Maintenance Considerations***

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

#### ***Placement***

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

### **Supplemental Information**

#### ***Examples***

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

### **Other Resources**

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

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

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## Design Objectives

- ✓ Maximize Infiltration
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## Description

Pervious paving is used for light vehicle loading in parking areas. The term describes a system comprising a load-bearing, durable surface together with an underlying layered structure that temporarily stores water prior to infiltration or drainage to a controlled outlet. The surface can itself be porous such that water infiltrates across the entire surface of the material (e.g., grass and gravel surfaces, porous concrete and porous asphalt), or can be built up of impermeable blocks separated by spaces and joints, through which the water can drain. This latter system is termed 'permeable' paving. Advantages of pervious pavements is that they reduce runoff volume while providing treatment, and are unobtrusive resulting in a high level of acceptability.

## Approach

Attenuation of flow is provided by the storage within the underlying structure or sub base, together with appropriate flow controls. An underlying geotextile may permit groundwater recharge, thus contributing to the restoration of the natural water cycle. Alternatively, where infiltration is inappropriate (e.g., if the groundwater vulnerability is high, or the soil type is unsuitable), the surface can be constructed above an impermeable membrane. The system offers a valuable solution for drainage of spatially constrained urban areas.

Significant attenuation and improvement in water quality can be achieved by permeable pavements, whichever method is used. The surface and subsurface infrastructure can remove both the soluble and fine particulate pollutants that occur within urban runoff. Roof water can be piped into the storage area directly, adding areas from which the flow can be attenuated. Also, within lined systems, there is the opportunity for stored runoff to be piped out for reuse.

## Suitable Applications

Residential, commercial and industrial applications are possible. The use of permeable pavement may be restricted in cold regions, arid regions or regions with high wind erosion. There are some specific disadvantages associated with permeable pavement, which are as follows:

- Permeable pavement can become clogged if improperly installed or maintained. However, this is countered by the ease with which small areas of paving can be cleaned or replaced when blocked or damaged.

- Their application should be limited to highways with low traffic volumes, axle loads and speeds (less than 30 mph limit), car parking areas and other lightly trafficked or non-trafficked areas. Permeable surfaces are currently not considered suitable for adoptable roads due to the risks associated with failure on high speed roads, the safety implications of ponding, and disruption arising from reconstruction.
- When using un-lined, infiltration systems, there is some risk of contaminating groundwater, depending on soil conditions and aquifer susceptibility. However, this risk is likely to be small because the areas drained tend to have inherently low pollutant loadings.
- The use of permeable pavement is restricted to gentle slopes.
- Porous block paving has a higher risk of abrasion and damage than solid blocks.

### Design Considerations

#### *Designing New Installations*

If the grades, subsoils, drainage characteristics, and groundwater conditions are suitable, permeable paving may be substituted for conventional pavement on parking areas, cul de sacs and other areas with light traffic. Slopes should be flat or very gentle. Scottish experience has shown that permeable paving systems can be installed in a wide range of ground conditions, and the flow attenuation performance is excellent even when the systems are lined.

The suitability of a pervious system at a particular pavement site will, however, depend on the loading criteria required of the pavement.

Where the system is to be used for infiltrating drainage waters into the ground, the vulnerability of local groundwater sources to pollution from the site should be low, and the seasonal high water table should be at least 4 feet below the surface.

Ideally, the pervious surface should be horizontal in order to intercept local rainfall at source. On sloping sites, pervious surfaces may be terraced to accommodate differences in levels.

#### *Design Guidelines*

The design of each layer of the pavement must be determined by the likely traffic loadings and their required operational life. To provide satisfactory performance, the following criteria should be considered:

- The subgrade should be able to sustain traffic loading without excessive deformation.
- The granular capping and sub-base layers should give sufficient load-bearing to provide an adequate construction platform and base for the overlying pavement layers.
- The pavement materials should not crack or suffer excessive rutting under the influence of traffic. This is controlled by the horizontal tensile stress at the base of these layers.

There is no current structural design method specifically for pervious pavements. Allowances should be considered the following factors in the design and specification of materials:

- Pervious pavements use materials with high permeability and void space. All the current UK pavement design methods are based on the use of conventional materials that are dense and relatively impermeable. The stiffness of the materials must therefore be assessed.
- Water is present within the construction and can soften and weaken materials, and this must be allowed for.
- Existing design methods assume full friction between layers. Any geotextiles or geomembranes must be carefully specified to minimize loss of friction between layers.
- Porous asphalt loses adhesion and becomes brittle as air passes through the voids. Its durability is therefore lower than conventional materials.

The single sized grading of materials used means that care should be taken to ensure that loss of finer particles between unbound layers does not occur.

Positioning a geotextile near the surface of the pervious construction should enable pollutants to be trapped and retained close to the surface of the construction. This has both advantages and disadvantages. The main disadvantage is that the filtering of sediments and their associated pollutants at this level may hamper percolation of waters and can eventually lead to surface ponding. One advantage is that even if eventual maintenance is required to reinstate infiltration, only a limited amount of the construction needs to be disturbed, since the sub-base below the geotextile is protected. In addition, the pollutant concentration at a high level in the structure allows for its release over time. It is slowly transported in the stormwater to lower levels where chemical and biological processes may be operating to retain or degrade pollutants.

The design should ensure that sufficient void space exists for the storage of sediments to limit the period between remedial works.

- Pervious pavements require a single size grading to give open voids. The choice of materials is therefore a compromise between stiffness, permeability and storage capacity.
- Because the sub-base and capping will be in contact with water for a large part of the time, the strength and durability of the aggregate particles when saturated and subjected to wetting and drying should be assessed.
- A uniformly graded single size material cannot be compacted and is liable to move when construction traffic passes over it. This effect can be reduced by the use of angular crushed rock material with a high surface friction.

In pollution control terms, these layers represent the site of long term chemical and biological pollutant retention and degradation processes. The construction materials should be selected, in addition to their structural strength properties, for their ability to sustain such processes. In general, this means that materials should create neutral or slightly alkaline conditions and they should provide favorable sites for colonization by microbial populations.

### *Construction/Inspection Considerations*

- Permeable surfaces can be laid without cross-falls or longitudinal gradients.
- The blocks should be laid level

- They should not be used for storage of site materials, unless the surface is well protected from deposition of silt and other spillages.
- The pavement should be constructed in a single operation, as one of the last items to be built, on a development site. Landscape development should be completed before pavement construction to avoid contamination by silt or soil from this source.
- Surfaces draining to the pavement should be stabilized before construction of the pavement.
- Inappropriate construction equipment should be kept away from the pavement to prevent damage to the surface, sub-base or sub-grade.

#### *Maintenance Requirements*

The maintenance requirements of a pervious surface should be reviewed at the time of design and should be clearly specified. Maintenance is required to prevent clogging of the pervious surface. The factors to be considered when defining maintenance requirements must include:

- Type of use
- Ownership
- Level of trafficking
- The local environment and any contributing catchments

Studies in the UK have shown satisfactory operation of porous pavement systems without maintenance for over 10 years and recent work by Imbe et al. at 9th ICUD, Portland, 2002 describes systems operating for over 20 years without maintenance. However, performance under such regimes could not be guaranteed, Table 1 shows typical recommended maintenance regimes:

Activity	Schedule
<ul style="list-style-type: none"> <li>■ Minimize use of salt or grit for de-icing</li> <li>■ Keep landscaped areas well maintained</li> <li>■ Prevent soil being washed onto pavement</li> </ul>	Ongoing
<ul style="list-style-type: none"> <li>■ Vacuum clean surface using commercially available sweeping machines at the following times:                             <ul style="list-style-type: none"> <li>- End of winter (April)</li> <li>- Mid-summer (July / August)</li> <li>- After Autumn leaf-fall (November)</li> </ul> </li> </ul>	2/3 x per year
<ul style="list-style-type: none"> <li>■ Inspect outlets</li> </ul>	Annual
<ul style="list-style-type: none"> <li>■ If routine cleaning does not restore infiltration rates, then reconstruction of part of the whole of a pervious surface may be required.</li> <li>■ The surface area affected by hydraulic failure should be lifted for inspection of the internal materials to identify the location and extent of the blockage.</li> <li>■ Surface materials should be lifted and replaced after brush cleaning. Geotextiles may need complete replacement.</li> <li>■ Sub-surface layers may need cleaning and replacing.</li> <li>■ Removed silts may need to be disposed of as controlled waste.</li> </ul>	As needed (infrequent) Maximum 15-20 years

Permeable pavements are up to 25 % cheaper (or at least no more expensive than the traditional forms of pavement construction), when all construction and drainage costs are taken into account. (Accepting that the porous asphalt itself is a more expensive surfacing, the extra cost of which is offset by the savings in underground pipework etc.) (Niemczynowicz, et al., 1987)

Table 1 gives US cost estimates for capital and maintenance costs of porous pavements (Landphair et al., 2000)

### ***Redeveloping Existing Installations***

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

## **Additional Information**

### *Cost Considerations*

Permeable pavements are up to 25 % cheaper (or at least no more expensive than the traditional forms of pavement construction), when all construction and drainage costs are taken into account. (Accepting that the porous asphalt itself is a more expensive surfacing, the extra cost of which is offset by the savings in underground pipework etc.) (Niemczynowicz, et al., 1987)

Table 2 gives US cost estimates for capital and maintenance costs of porous pavements (Landphair et al., 2000)

Table 2 Engineer's Estimate for Porous Pavement

Porous Pavement													
Item	Units	Price	Cycles/Year	Quant. 1 Acre WS	Total	Quant. 2 Acre WS	Total	Quant. 3 Acre WS	Total	Quant. 4 Acre WS	Total	Quant. 5 Acre WS	Total
Grading	SY	\$2.00		604	\$1,208	1209	\$2,418	1812	\$3,624	2419	\$4,838	3020	\$6,040
Paving	SY	\$19.00		212	\$4,028	424	\$8,056	636	\$12,084	848	\$16,112	1060	\$20,140
Excavation	CY	\$3.60		201	\$724	403	\$1,451	604	\$2,174	806	\$2,902	1008	\$3,629
Filter Fabric	SY	\$1.15		700	\$805	1400	\$1,610	2000	\$2,300	2800	\$3,220	3600	\$4,140
Stone Fill	CY	\$16.00		201	\$3,216	403	\$6,448	604	\$9,664	806	\$12,896	1008	\$16,128
Sand	CY	\$7.00		100	\$700	200	\$1,400	300	\$2,100	400	\$2,800	500	\$3,500
Sight Well	EA	\$300.00		2	\$600	3	\$900	4	\$1,200	7	\$2,100	7	\$2,100
Seeding	LF	\$0.05		644	\$32	1288	\$64	1932	\$97	2576	\$129	3220	\$161
Check Dam	CY	\$35.00		0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
<b>Total Construction Costs</b>							<b>\$10,105</b>		<b>\$19,929</b>		<b>\$29,619</b>		<b>\$40,158</b>
<b>Construction Costs Amortized for 20 Years</b>							<b>\$505</b>		<b>\$996</b>		<b>\$1,481</b>		<b>\$2,008</b>
Annual Maintenance Expense													
Item	Units	Price	Cycles/Year	Quant. 1 Acre WS	Total	Quant. 2 Acre WS	Total	Quant. 3 Acre WS	Total	Quant. 4 Acre WS	Total	Quant. 5 Acre WS	Total
Sweeping	AC	\$250.00	6	1	\$1,500	2	\$3,000	3	\$4,500	4	\$6,000	5	\$7,500
Washing	AC	\$250.00	6	1	\$1,500	2	\$3,000	3	\$4,500	4	\$6,000	5	\$7,500
Inspection	MH	\$20.00	5	5	\$100	5	\$100	5	\$100	5	\$100	5	\$100
Deep Clean	AC	\$450.00	0.5	1	\$225	2	\$450	3	\$675	3.9	\$878	5	\$1,125
<b>Total Annual Maintenance Expense</b>							<b>\$3,960</b>		<b>\$7,792</b>		<b>\$11,651</b>		<b>\$15,483</b>

**Supplemental Information**

■

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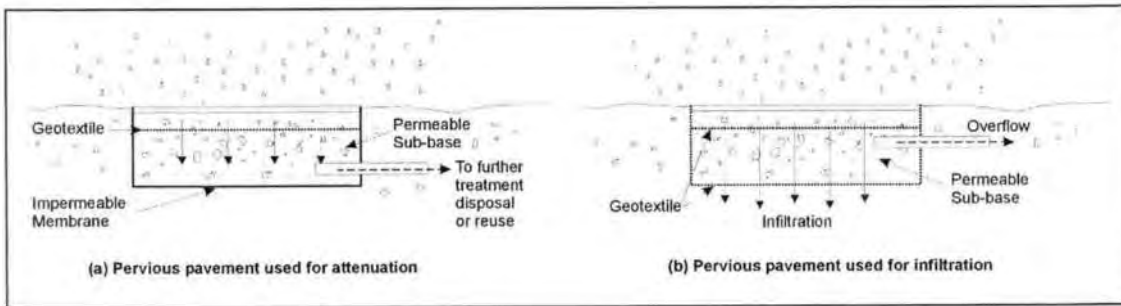
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Schematics of a Pervious Pavement System



## Design Objectives

- ✓ Maximize Infiltration
- ✓ Provide Retention
- ✓ Source Control
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutant
- Collect and Convey

## Description

Alternative building materials are selected instead of conventional materials for new construction and renovation. These materials reduce potential sources of pollutants in stormwater runoff by eliminating compounds that can leach into runoff, reducing the need for pesticide application, reducing the need for painting and other maintenance, or by reducing the volume of runoff.

## Approach

Alternative building materials are available for use as lumber for decking, roofing materials, home siding, and paving for driveways, decks, and sidewalks.

## Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

## Design Considerations

### ***Designing New Installations***

#### *Decking*

One of the most common materials for construction of decks and other outdoor construction has traditionally been pressure treated wood, which is now being phased out. The standard treatment is called CCA, for chromated copper arsenate. The key ingredients are arsenic (which kills termites, carpenter ants and other insects), copper (which kills the fungi that cause wood to rot) and chromium (which reacts with the other ingredients to bind them to the wood). The amount of arsenic is far from trivial. A deck just 8 feet x 10 feet contains more than 1 1/3 pounds of this highly potent poison. Replacement materials include a new type of pressure treated wood, plastic and composite lumber.

There are currently over 20 products in the market consisting of plastic or plastic-wood composites. Plastic lumber is made from 100% recycled plastic, # 2 HDPE and polyethylene plastic milk jugs



and soap bottles. Plastic-wood composites are a combination of plastic and wood fibers or sawdust. These materials are a long lasting exterior weather, insect, and chemical resistant wood lumber replacement for non structural applications. Use it for decks, docks, raised garden beds and planter boxes, pallets, hand railings, outdoor furniture, animal pens, boat decks, etc.

New pressure treated wood uses a much safer recipe, ACQ, which stands for ammoniacal copper quaternary. It contains no arsenic and no chromium. Yet the American Wood Preservers Association has found it to be just as effective as the standard formula. ACQ is common in Japan and Europe.

### *Roofing*

Several studies have indicated that metal used as roofing material, flashing, or gutters can leach metals into the environment. The leaching occurs because rainfall is slightly acidic and slowly dissolved the exposed metals. Common traditional applications include copper sheathing and galvanized (zinc) gutters.

Coated metal products are available for both roofing and gutter applications. These products eliminate contact of bare metal with rainfall, eliminating one source of metals in runoff. There are also roofing materials made of recycled rubber and plastic that resemble traditional materials.

A less traditional approach is the use of green roofs. These roofs are not just green, they're alive. Planted with grasses and succulents, low- profile green roofs reduce the urban heat island effect, stormwater runoff, and cooling costs, while providing wildlife habitat and a connection to nature for building occupants. These roofs are widely used on industrial facilities in Europe and have been established as experimental installations in several locations in the US, including Portland, Oregon. Their feasibility is questionable in areas of California with prolonged, dry, hot weather.

### *Paved Areas*

Traditionally, concrete is used for construction of patios, sidewalks, and driveways. Although it is non-toxic, these paved areas reduce stormwater infiltration and increase the volume and rate of runoff. This increase in the amount of runoff is the leading cause of stream channel degradation in urban areas.

There are a number of alternative materials that can be used in these applications, including porous concrete and asphalt, modular blocks, and crushed granite. These materials, especially modular paving blocks, are widely available and a well established method to reduce stormwater runoff.

### *Building Siding*

Wood siding is commonly used on the exterior of residential construction. This material weathers fairly rapidly and requires repeated painting to prevent rotting. Alternative "new" products for this application include cement-fiber and vinyl. Cement-fiber siding is a masonry product made from Portland cement, sand, and cellulose and will not burn, cup, swell, or shrink.

### **Pesticide Reduction**

A common use of powerful pesticides is for the control of termites. Chlordane was used for many years for this purpose and is now found in urban streams and lakes nationwide. There are a

number of physical barriers that can be installed during construction to help reduce the use of pesticides.

Sand barriers for subterranean termites are a physical deterrent because the termites cannot tunnel through it. Sand barriers can be applied in crawl spaces under pier and beam foundations, under slab foundations, and between the foundation and concrete porches, terraces, patios and steps. Other possible locations include under fence posts, underground electrical cables, water and gas lines, telephone and electrical poles, inside hollow tile cells and against retaining walls.

Metal termite shields are physical barriers to termites which prevent them from building invisible tunnels. In reality, metal shields function as a helpful termite detection device, forcing them to build tunnels on the outside of the shields which are easily seen. Metal termite shields also help prevent dampness from wicking to adjoining wood members which can result in rot, thus making the material more attractive to termites and other pests. Metal flashing and metal plates can also be used as a barrier between piers and beams of structures such as decks, which are particularly vulnerable to termite attack.

### ***Redeveloping Existing Installations***

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

### **Other Resources**

There are no good, independent, comprehensive sources of information on alternative building materials for use in minimizing the impacts of stormwater runoff. Most websites or other references to “green” or “alternative” building materials focus on indoor applications, such as formaldehyde free plywood and low VOC paints, carpets, and pads. Some supplemental information on alternative materials is available from the manufacturers.

Fires are a source of concern in many areas of California. Information on the flammability of alternative decking materials is available from the University of California Forest Product Laboratory (UCFPL) website at: <http://www.ucfpl.ucop.edu/WDDeckIntro.htm>





## Description

An infiltration basin is a shallow impoundment that is designed to infiltrate stormwater. Infiltration basins use the natural filtering ability of the soil to remove pollutants in stormwater runoff. Infiltration facilities store runoff until it gradually exfiltrates through the soil and eventually into the water table. This practice has high pollutant removal efficiency and can also help recharge groundwater, thus helping to maintain low flows in stream systems. Infiltration basins can be challenging to apply on many sites, however, because of soils requirements. In addition, some studies have shown relatively high failure rates compared with other management practices.

## California Experience

Infiltration basins have a long history of use in California, especially in the Central Valley. Basins located in Fresno were among those initially evaluated in the National Urban Runoff Program and were found to be effective at reducing the volume of runoff, while posing little long-term threat to groundwater quality (EPA, 1983; Schroeder, 1995). Proper siting of these devices is crucial as underscored by the experience of Caltrans in siting two basins in Southern California. The basin with marginal separation from groundwater and soil permeability failed immediately and could never be rehabilitated.

## Advantages

- Provides 100% reduction in the load discharged to surface waters.
- The principal benefit of infiltration basins is the approximation of pre-development hydrology during which a

## Design Considerations

- Soil for Infiltration
- Slope
- Aesthetics

## Targeted Constituents

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

### Legend (Removal Effectiveness)

- |          |        |
|----------|--------|
| ● Low    | ■ High |
| ▲ Medium |        |



significant portion of the average annual rainfall runoff is infiltrated and evaporated rather than flushed directly to creeks.

- If the water quality volume is adequately sized, infiltration basins can be useful for providing control of channel forming (erosion) and high frequency (generally less than the 2-year) flood events.

### **Limitations**

- May not be appropriate for industrial sites or locations where spills may occur.
- Infiltration basins require a minimum soil infiltration rate of 0.5 inches/hour, not appropriate at sites with Hydrologic Soil Types C and D.
- If infiltration rates exceed 2.4 inches/hour, then the runoff should be fully treated prior to infiltration to protect groundwater quality.
- Not suitable on fill sites or steep slopes.
- Risk of groundwater contamination in very coarse soils.
- Upstream drainage area must be completely stabilized before construction.
- Difficult to restore functioning of infiltration basins once clogged.

### **Design and Sizing Guidelines**

- Water quality volume determined by local requirements or sized so that 85% of the annual runoff volume is captured.
- Basin sized so that the entire water quality volume is infiltrated within 48 hours.
- Vegetation establishment on the basin floor may help reduce the clogging rate.

### ***Construction/Inspection Considerations***

- Before construction begins, stabilize the entire area draining to the facility. If impossible, place a diversion berm around the perimeter of the infiltration site to prevent sediment entrance during construction or remove the top 2 inches of soil after the site is stabilized. Stabilize the entire contributing drainage area, including the side slopes, before allowing any runoff to enter once construction is complete.
- Place excavated material such that it can not be washed back into the basin if a storm occurs during construction of the facility.
- Build the basin without driving heavy equipment over the infiltration surface. Any equipment driven on the surface should have extra-wide (“low pressure”) tires. Prior to any construction, rope off the infiltration area to stop entrance by unwanted equipment.
- After final grading, till the infiltration surface deeply.
- Use appropriate erosion control seed mix for the specific project and location.

## Performance

As water migrates through porous soil and rock, pollutant attenuation mechanisms include precipitation, sorption, physical filtration, and bacterial degradation. If functioning properly, this approach is presumed to have high removal efficiencies for particulate pollutants and moderate removal of soluble pollutants. Actual pollutant removal in the subsurface would be expected to vary depending upon site-specific soil types. This technology eliminates discharge to surface waters except for the very largest storms; consequently, complete removal of all stormwater constituents can be assumed.

There remain some concerns about the potential for groundwater contamination despite the findings of the NURP and Nightingale (1975; 1987a,b,c; 1989). For instance, a report by Pitt et al. (1994) highlighted the potential for groundwater contamination from intentional and unintentional stormwater infiltration. That report recommends that infiltration facilities not be sited in areas where high concentrations are present or where there is a potential for spills of toxic material. Conversely, Schroeder (1995) reported that there was no evidence of groundwater impacts from an infiltration basin serving a large industrial catchment in Fresno, CA.

## Siting Criteria

The key element in siting infiltration basins is identifying sites with appropriate soil and hydrogeologic properties, which is critical for long term performance. In one study conducted in Prince George's County, Maryland (Galli, 1992), all of the infiltration basins investigated clogged within 2 years. It is believed that these failures were for the most part due to allowing infiltration at sites with rates of less than 0.5 in/hr, basing siting on soil type rather than field infiltration tests, and poor construction practices that resulted in soil compaction of the basin invert.

A study of 23 infiltration basins in the Pacific Northwest showed better long-term performance in an area with highly permeable soils (Hilding, 1996). In this study, few of the infiltration basins had failed after 10 years. Consequently, the following guidelines for identifying appropriate soil and subsurface conditions should be rigorously adhered to.

- Determine soil type (consider RCS soil type 'A, B or C' only) from mapping and consult USDA soil survey tables to review other parameters such as the amount of silt and clay, presence of a restrictive layer or seasonal high water table, and estimated permeability. The soil should not have more than 30% clay or more than 40% of clay and silt combined. Eliminate sites that are clearly unsuitable for infiltration.
- Groundwater separation should be at least 3 m from the basin invert to the measured ground water elevation. There is concern at the state and regional levels of the impact on groundwater quality from infiltrated runoff, especially when the separation between groundwater and the surface is small.
- Location away from buildings, slopes and highway pavement (greater than 6 m) and wells and bridge structures (greater than 30 m). Sites constructed of fill, having a base flow or with a slope greater than 15% should not be considered.
- Ensure that adequate head is available to operate flow splitter structures (to allow the basin to be offline) without ponding in the splitter structure or creating backwater upstream of the splitter.

- Base flow should not be present in the tributary watershed.

**Secondary Screening Based on Site Geotechnical Investigation**

- At least three in-hole conductivity tests shall be performed using USBR 7300-89 or Bouwer-Rice procedures (the latter if groundwater is encountered within the boring), two tests at different locations within the proposed basin and the third down gradient by no more than approximately 10 m. The tests shall measure permeability in the side slopes and the bed within a depth of 3 m of the invert.
- The minimum acceptable hydraulic conductivity as measured in any of the three required test holes is 13 mm/hr. If any test hole shows less than the minimum value, the site should be disqualified from further consideration.
- Exclude from consideration sites constructed in fill or partially in fill unless no silts or clays are present in the soil boring. Fill tends to be compacted, with clays in a dispersed rather than flocculated state, greatly reducing permeability.
- The geotechnical investigation should be such that a good understanding is gained as to how the stormwater runoff will move in the soil (horizontally or vertically) and if there are any geological conditions that could inhibit the movement of water.

**Additional Design Guidelines**

- (1) Basin Sizing - The required water quality volume is determined by local regulations or sufficient to capture 85% of the annual runoff.
- (2) Provide pretreatment if sediment loading is a maintenance concern for the basin.
- (3) Include energy dissipation in the inlet design for the basins. Avoid designs that include a permanent pool to reduce opportunity for standing water and associated vector problems.
- (4) Basin invert area should be determined by the equation:

$$A = \frac{WQV}{kt}$$

where A = Basin invert area (m<sup>2</sup>)

WQV = water quality volume (m<sup>3</sup>)

k = 0.5 times the lowest field-measured hydraulic conductivity (m/hr)

t = drawdown time ( 48 hr)

- (5) The use of vertical piping, either for distribution or infiltration enhancement shall not be allowed to avoid device classification as a Class V injection well per 40 CFR146.5(e)(4).

## Maintenance

Regular maintenance is critical to the successful operation of infiltration basins. Recommended operation and maintenance guidelines include:

- Inspections and maintenance to ensure.
- Observe drain time for the design storm after completion or modification of the facility to confirm that the desired drain time has been obtained.
- Schedule semiannual inspections for beginning and end of the wet season to identify potential problems such as erosion of the basin side slopes and invert, standing water, trash and debris, and sediment accumulation.
- Remove accumulated trash and debris in the basin at the start and end of the wet season.
- Inspect for standing water at the end of the wet season.
- Trim vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector reasons.
- Remove accumulated sediment and regrade when the accumulated sediment volume exceeds 10% of the basin.
- If erosion is occurring within the basin, revegetate immediately and stabilize with an erosion control mulch or mat until vegetation cover is established.
- To avoid reversing soil development, scarification or other disturbance should only be performed when there are actual signs of clogging, rather than on a routine basis. Always remove deposited sediments before scarification, and use a hand-guided rotary tiller, if possible, or a disc harrow pulled by a very light tractor.

## Cost

Infiltration basins are relatively cost-effective practices because little infrastructure is needed when constructing them. One study estimated the total construction cost at about \$2 per ft (adjusted for inflation) of storage for a 0.25-acre basin (SWRPC, 1991). As with other BMPs, these published cost estimates may deviate greatly from what might be incurred at a specific site. For instance, Caltrans spent about \$18/ft<sup>3</sup> for the two infiltration basins constructed in southern California, each of which had a water quality volume of about 0.34 ac.-ft. Much of the higher cost can be attributed to changes in the storm drain system necessary to route the runoff to the basin locations.

Infiltration basins typically consume about 2 to 3% of the site draining to them, which is relatively small. Additional space may be required for buffer, landscaping, access road, and fencing. Maintenance costs are estimated at 5 to 10% of construction costs.

One cost concern associated with infiltration practices is the maintenance burden and longevity. If improperly maintained, infiltration basins have a high failure rate. Thus, it may be necessary to replace the basin with a different technology after a relatively short period of time.

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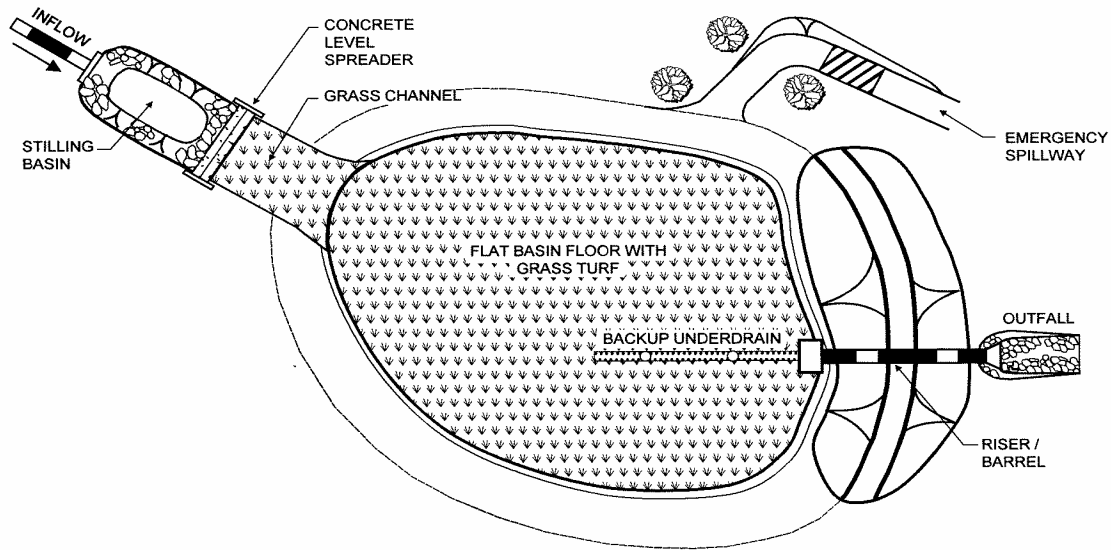
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***Information Resources***

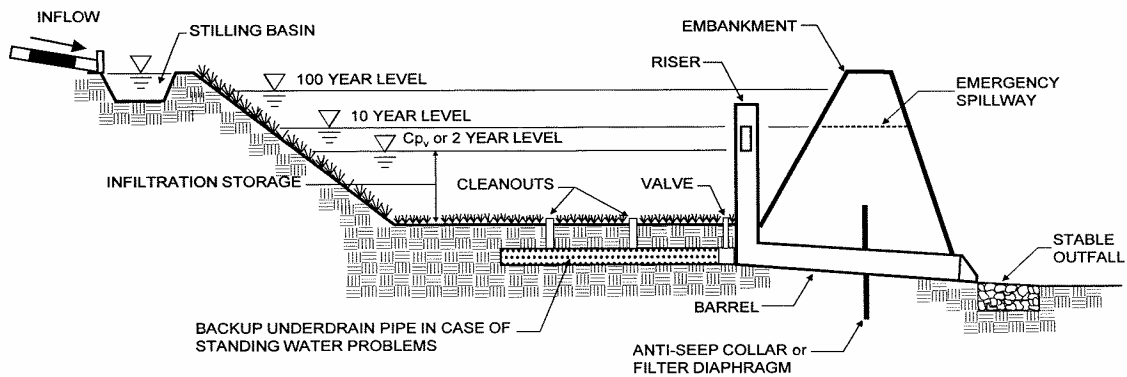
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PLAN VIEW



PROFILE

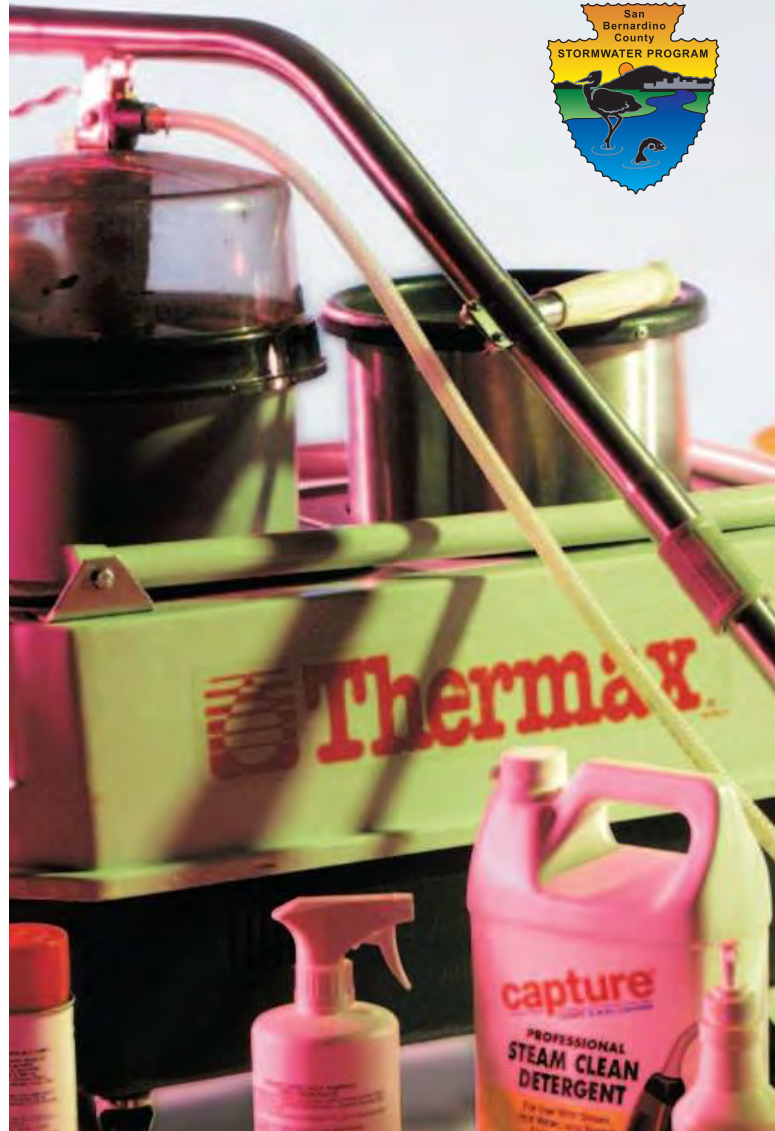
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# STORMWATER Pollution Prevention

## CARPET CLEANING ACTIVITIES



# Pollution <sup>STORMWATER</sup> Prevention

## Stormwater Management Practices for Carpet Cleaning Activities

These guidelines apply even if the cleaning products are labeled “nontoxic” or “biodegradable”. Although these products may be less harmful to the environment, they can still have harmful effects if they enter the storm drain untreated.

Toxic chemicals and discharged waste water from carpet, drapery, furniture and window cleaning often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates local waterways, making them unsafe for people and wildlife. Following these best management practices will prevent pollution, comply with regulations and protect public health.

### Dispose of Wastewater Properly

Wastewater from cleaning equipment must be discharged into a sink, toilet, or other drain connected to the sanitary sewer system within sanitary sewer discharge limits, hauled off and disposed of properly, or may be discharged to a pervious area, for example, a lawn area, as long as it does not overflow into the street, gutter, parking lot or storm drain. Wastewater should never be discharged into a street, gutter, parking lot or storm drain.

### Filter Wastewater

Carpet cleaning wastewater should be filtered before discharging it to the sanitary sewer since fibers and other debris in the wastewater can clog pipes. The filtered material can be disposed of in the garbage, provided that the waste is not contaminated with hazardous pollutants.

To report illegal dumping call  
**(877) WASTE18**  
or visit our website:  
**[sbcountystormwater.org](http://sbcountystormwater.org)**





# WASH YOUR CAR THE ECO-FRIENDLY WAY!

When possible, wash in a professional car wash.

- 1 **Locate** the nearest storm drain and ensure that wash water does not flow into it.



- 2 **Wash** in a contained area or on grass\*, gravel or other permeable surface. Dispose of excess soapy water into the sanitary sewer (*ie. sink or toilet*) or onto grass.

- 3 **Use** eco-friendly cleaning products (*non-toxic, phosphate free or biodegradable*). Use as little soap as possible and wipe brake dust off tires with a rag before washing.

- 4 **Conserve** water by using a high pressure hose and turn off the water when not in use.

*\*Some local ordinances may not allow a car to be parked on the front lawn. Check with your City's Building and Code department if you are unsure.*

## How Does Eco Car Washing Help Local Waterways?

When excess wash water travels through the street it has the potential to pick up oil, grease and other chemicals along the way before it ends up in the curb, gutter and the storm drain system. **This contaminated water then travels to our creeks and the Santa Ana River making it unsafe for people and wildlife.**



To report illegal dumping, call **(877) WASTE18** or visit **[sbcountystormwater.org](http://sbcountystormwater.org)**

To find a Hazardous Waste Facility, call **(800) OILY CAT**

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# ¡LAVE SU AUTO DE MANERA ECOLÓGICA!

Quando sea posible, lávelo en un lavadero profesional de autos.

1

**Ubique** el desagüe pluvial más cercano y asegúrese de que nada pueda entrar en él que pueda descargarse allí.



2

**Lave** su auto sobre el césped, grava u otras superficies permeables. Elimine el exceso de agua jabonosa en un drenaje sanitario (*por ejemplo, lavamanos o inodoro*) o en el césped.

3

**Use** productos de limpieza ecológicos (*no tóxicos, sin fosfato o biodegradables*). Use la menor cantidad de jabón posible y limpie el polvo de frenos de los neumáticos con un trapo antes de lavar.

4

**Conserve** agua usando una manguera de alta presión y cierre el agua cuando no la use.

*\* Es posible que algunas ordenanzas locales no permitan estacionar sobre el césped en el frente de la casa. Consulte con el departamento de Código Urbano y Edificación de su ciudad si no está seguro.*



## ¿De qué Manera el Lavado de Autos Ecológico Ayuda a Proteger los Canales Fluviales Locales?

Quando el exceso de agua de lavado viaja por la calle, es posible que recoja aceite, grasa y otros elementos químicos en el camino antes de que llegue en el desagüe pluvial y el sistema de la boca de tormenta. **Esa agua contaminada luego viaja hacia nuestros arroyos y al Río Santa Ana, haciendo que sea inseguro para la gente y los animales.**

Para reportar actividades ilegales, llame a **(877) WASTE18** o visite **[sbcountystormwater.org](http://sbcountystormwater.org)**. Para encontrar un establecimiento de Desechos Peligrosos, llame al **(800) OILY CAT**

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# Pool Discharge Tips

Maintain your pool properly and help protect the environment

## DID YOU KNOW?

Routine swimming pool maintenance generates a variety of wastes such as cleaning wastewater, filter back-wash residues, biocides and acid washes that can contribute to stormwater pollution. Chlorine and other pool chemicals can harm our waterways when they are discharged improperly.



Share these good housekeeping practices with your pool service personnel to keep pollutants out of our waterways:

## HOLD IT BEFORE YOU DRAIN IT.

- De-chlorinate the water before draining the pool to the storm drain.
- Consult with your pool contractor before de-chlorinating the pool to learn about your options.

### SHUT:

Shut off the chlorination system or stop adding chlorine.

### HOLD:

Hold the water in the pool for at least 5 days or add a de-chlorinating agent.

### TEST:

Use a pool testing kit to ensure the level of chlorine is at 0.1ppm before discharging the water.

- Make sure all debris is removed and chemicals are dissipated.
- pH of pool water should be between 6.5 and 8.5 before discharging.
- Make sure the water is free of any discoloration, mosquitoes, dirt or algae.

## IMPORTANT:

- Dispose of filter backwash solids in the trash or landscape area.
- Neutralize acid washes before discharging to the sewer. Do not discharge to the storm drain.

### DRAIN:

Check with your city for local requirements before discharging your pool to the storm drain or sewer.

- **Alternative 1: Sanitary Sewer** — Some cities allow pools to be drained to the sanitary sewer during non-peak hours.
- **Alternative 2: Lawn or Garden** — Discharge the pool water through the lawn or garden. The flow should be controlled to prevent erosion problems or the water entering a neighbor's property.
- **For Saltwater Pools:** Saltwater pools should only be drained to the sewer or hauled away.



To report illegal dumping, call (877) WASTE18 or visit [sbcountystormwater.org](http://sbcountystormwater.org)  
[facebook.com/sbcountystormwater](https://www.facebook.com/sbcountystormwater)

# Consejos para Vaciar su Piscina

Conserve su piscina en buen estado y ayude a proteger el medio ambiente

## ¿Sabía que...?

El mantenimiento de la piscina genera desechos, como las aguas residuales de limpieza, los residuos del agua estancada de los filtros y los lavados al ácido y otros químicos, que pueden contribuir a la contaminación de las aguas en las alcantarillas. El cloro y otros productos químicos para piscinas pueden dañar el medio ambiente cuando se desechan de manera inadecuada.



Comparta estas buenas prácticas de limpieza con su personal de servicio de piscinas para mantener las alcantarillas libres de contaminantes:

## ESPERE ANTES DE VACIAR.

- Debe eliminar el cloro del agua antes de vaciar la piscina en las alcantarillas.
- Consulte con su contratista de piscina para obtener más información sobre sus opciones.

## IMPORTANTE:

- Deseche los sólidos del agua estancada de los filtros en la basura o en el jardín.
- Neutralice los lavados al ácido antes de vaciarlos en la alcantarilla. No deseche nada contaminante en las alcantarillas.

### CORTAR:

Corte el sistema de cloración o deje de agregar cloro.

### CONSERVAR:

Conserve el agua en la piscina 5 días o agregue un agente de descloración.

### PROBAR:

Utilice un equipo de pruebas para piscinas con el fin de asegurar que el nivel de cloro esté en 0.1ppm antes de vaciar el agua.

- Asegúrese de retirar todos los desechos y disipar los químicos.
- El pH del agua de la piscina debe estar entre 6.5 y 8.5 antes del vaciado.
- Asegúrese de que el agua no contenga contaminación, zancudos, suciedad o algas.

### VACIAR:

Verifique los requisitos locales de su ciudad antes de vaciar su piscina en el desagüe de las alcantarillas.

- **Alternativa 1: Drenaje Sanitario** — Algunas ciudades permiten que las piscinas se vacíen en el drenaje sanitario.
- **Alternativa 2: Césped o Jardín** — Vacíe el agua de la piscina en el césped o jardín. Se debe controlar la corriente de agua para evitar problemas de erosión o que el agua entre en la propiedad del vecino.
- **Para las Piscinas de Agua Salada:** Estas piscinas solo se deben ser vaciados en la alcantarilla o se debe transportar el agua y los residuos a algún lugar adecuado.



Para reportar desechos ilegales, comuníquese al (877) WASTE18 o visite [sbcountystormwater.org](http://sbcountystormwater.org)  
[facebook.com/sbcountystormwater](https://www.facebook.com/sbcountystormwater)

# WISHFUL THINKING...



UNTIL THIS IS A REALITY,  
**PLEASE PICK UP AFTER YOUR PET.**



[sbcountystormwater.org](http://sbcountystormwater.org)  
or (877) WASTE18

Artwork Courtesy of the City of Los Angeles Stormwater Program.



# MOBILE VEHICLE CLEANING & MAINTENANCE

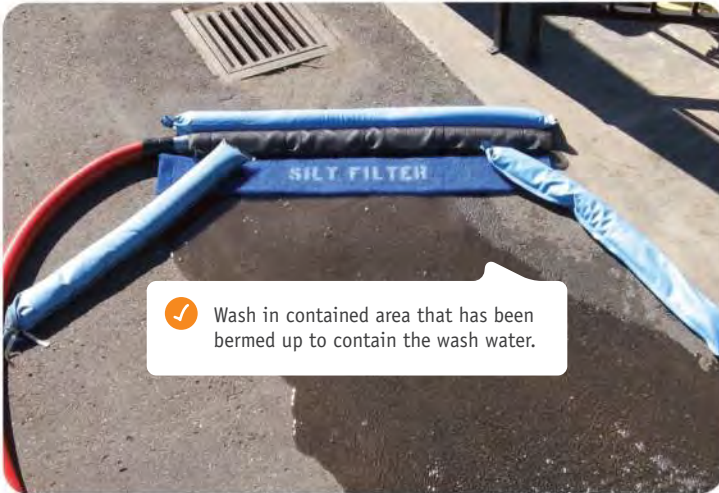
DISCHARGE INTO THE STORM DRAIN, ACCIDENTAL OR NOT, CAN LEAD TO ENFORCEMENT ACTIONS, WHICH CAN INCLUDE FINES.

These best management practices will help you **prevent polluted water and other materials from flowing into the street, gutter and storm drain.**

## WASH WATER DISPOSAL



## HAZARDOUS WASTE SPILL CLEAN-UP & DISPOSAL



- ✓ When washing items contaminated by hazardous materials, wash water should be collected and hauled off-site for proper disposal.
- ✓ Wash in customers wash bay or pump wastewater to the wash bays' pretreatment system.

**!** Engine cleaning must be performed at a facility that has the equipment to properly process the contaminated wash water runoff.

- ✓ If a spill occurs, use an absorbent material such as kitty litter or absorbent pads.
- ✓ Clean up the excess. Properly dispose of absorbent material used to clean up spills - contact an approved hauler for assistance/disposal. Sweep work area thoroughly after cleaning.
- ✓ Keep toxics out of the trash by disposing of them properly, this includes absorbent materials used to clean up toxic waste spills. Toxic materials may include used motor oil and oil filters, antifreeze, batteries and gasoline. Make sure to maintain hauling records for all hazardous waste.



To report illegal dumping, call (877) WASTE18 or visit [sbcountystormwater.org](http://sbcountystormwater.org)  
To report toxic spills call (800) 33 TOXIC  
To dispose of hazardous waste, call the CUPA Program (909) 386-8401

[sbcountystormwater.org](http://sbcountystormwater.org)

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## SAN BERNARDINO COUNTY STORMWATER POLLUTION PREVENTION

### ■ Regulatory information

The Federal Water Pollution Control Act prohibits the discharge of any pollutant to navigable waters from a point source unless the discharge is authorized by a National Pollutant Discharge Elimination System (NPDES) permit. The 1987 passage of the Water Quality Act established NPDES permit requirements for discharges of storm water. The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

Industrial facilities and construction sites are regulated by the Regional Water Quality Control Board and State Water Resources Control Board, through general storm water permits. Most industrial, manufacturing or transportation businesses that store materials, products or equipment outdoors, or conduct vehicle washing or process operations outdoors are required to obtain coverage under the State Water Resources Control Board's General Industrial Activities Stormwater Permit. For more information about this permit, visit [www.swrcb.ca.gov/stormwtr/industrial.html](http://www.swrcb.ca.gov/stormwtr/industrial.html) or contact your local storm water coordinator.

If your business conducts construction activities, including clearing, grading, stockpiling or excavation that results in soil disturbances of at least one acre, you are subject to the State Water Resources Control Board's General Construction Activities Stormwater Permit. To find out more about this storm water permit for construction, visit: [www.swrcb.ca.gov/stormwtr/construction.html](http://www.swrcb.ca.gov/stormwtr/construction.html).

Cities and counties are regulated through permits issued by the Regional Boards. Since 1990, operators of large storm drain systems such as San Bernardino County's have been required to:

- Develop a storm water management program designed to prevent harmful pollutants from being dumped or washed by storm water runoff, into the storm water system, then discharged into local water bodies; and
- Obtain a National Pollutant Discharge Elimination System (NPDES) permit.

The NPDES permit programs in California are administered by the State Water Resources Control Board and by nine regional boards that issue NPDES permits and enforce regulations within their respective region.

San Bernardino County lies within the jurisdiction of the Santa Ana Region. This regional board issues a permit to the San Bernardino County Permittees, which includes the County of San Bernardino, San Bernardino County Flood Control District and incorporated cities of San Bernardino County. Since the program's inception, the County of San Bernardino has served as the principal permittee.



## SAN BERNARDINO COUNTY STORMWATER POLLUTION PREVENTION

### Documents & reports:

The following documents describe the regulations and programs for water quality in San Bernardino County. You can review the latest Basin Plan, National Pollutant Discharge Elimination System (NPDES) Permit and Drainage Area Management Plan (DAMP).

- **Basin Plans:** The document for each region of the State Water Quality Board's jurisdiction, including Santa Ana, is the Water Quality Control Plan, commonly referred to as the Basin Plan. It is the foundation for the regulatory programs of each regional board. The Basin Plan documents the beneficial uses of the region's ground and surface waters, existing water quality conditions, problems, and goals, and actions by the regional board and others that are necessary to achieve and maintain water quality standards.

► [Water Control Plan for the Santa Ana River Basin](#)

- **Municipal National Pollutant Discharge Elimination System (NPDES) Permits:** The permits of each region outline additional steps for a storm water management program and specify requirements to help protect the beneficial uses of the receiving waters. They require permittees to develop and implement Best Management Practices (BMPs) to control/reduce the discharge of pollutants to waters of the United States to the maximum extent practicable (MEP).

► [Santa Ana Regional Water Quality Control Board Municipal NPDES Permit Order No. R8-2002-0012](#)

- **Report of Waste Discharge:** The Report of Waste Discharge (ROWD) describes the San Bernardino Stormwater Program, implemented by the County and cities to comply with their jointly held stormwater permit. It is the principle policy and guidance document for the NPDES Stormwater Program.

► [Report of Waste Discharge 2000](#)

- **San Bernardino County Storm Water Program Annual Status Report:** The Annual Status Report is a requirement of the NPDES permit for submittal to the Regional Boards and United States Environmental Protection Agency. The report presents an analysis and assessment of permit compliance activities.

► [Annual report](#) - will be posted soon

For more information about how you can prevent stormwater pollution:

[www.sbcountystormwater.org](http://www.sbcountystormwater.org)

# IT'S A WIN WIN FOR A **FREE** RAIN BARREL

Be part of the solution  
and join the great giveaway!

Sign up for San Bernardino County  
Stormwater's e-newsletter **for a**  
**chance to win this FREE rain barrel**  
(estimated value: \$125 dollars).

*Note: we will not share, sell or otherwise distribute  
email addresses to other organizations or companies.*



# EVERY DROP COUNTS!

**Safely capture rainwater on your property and then reuse it for your home's irrigation. Join others in saving on water expenses and preserving our local waterways.**

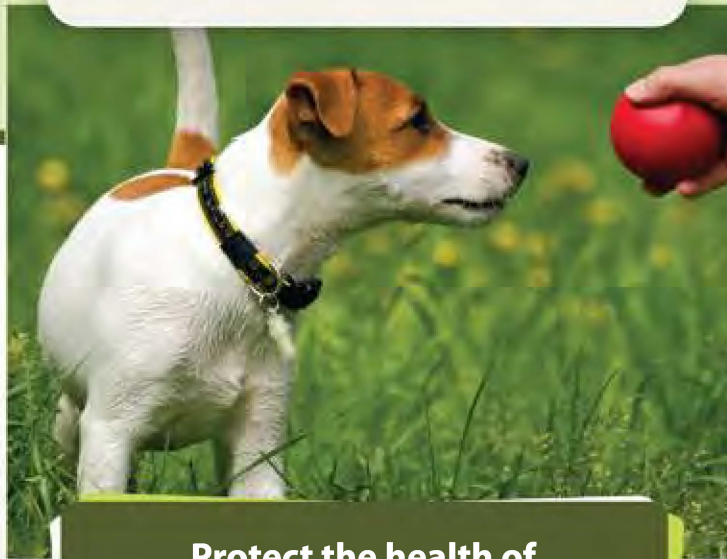


# PICK UP After Your Pet!



For more information about  
current campaigns visit  
[sbcountystormwater.org/dog](http://sbcountystormwater.org/dog)

 [facebook.com/sbcountystormwater](https://facebook.com/sbcountystormwater)



Protect the health of  
your pet and the environment

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Montclair • Ontario • Rancho Cucamonga • Redlands • Rialto • San Bernardino •  
San Bernardino County • San Bernardino County Flood Control District • Upland • Yucaipa

San Bernardino County Stormwater Program



# WHY IT MATTERS



## PROTECT YOUR FAMILY AND YOUR PET

- » Dog waste can infect children and adults with disease-causing bacteria and parasites.
- » Your dog can get infected from the waste of other dogs.

## PROTECT OUR ENVIRONMENT



Leaving dog waste on the streets or on your property can have a negative impact on water quality. Pet waste that's not disposed of properly flows untreated through the storm drain system and directly into our local water bodies. Pet waste is a pollutant that contains nutrients, parasites and bacteria that can affect the quality of our rivers and the ocean and make the water unsafe for swimming, drinking or fishing.

## BAG IT AND TRASH IT

*It's that simple to protect our health and the environment!*



- » Keep a supply of bags near your dog leash or tie them to the leash
- » Use a poop scooper
- » Bring several plastic bags with you
- » Reuse plastic grocery bags or purchase special doggie waste bags at pet supplies stores
- » Make sure your pet's waste gets into a trash can

*Encourage your neighbors and other pet owners to do the right thing and pick up after their pets.*





Si desea más información, visite  
[sbcountystormwater.org/dog](http://sbcountystormwater.org/dog)

 [facebook.com/sbcountystormwater](https://facebook.com/sbcountystormwater)

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¡**RECOJA** los desechos  
de sus mascotas!



**Proteja la salud de su mascota  
y el medio ambiente**

San Bernardino County Stormwater Program



## POR QUÉ ES IMPORTANTE



## PROTEJA A SU FAMILIA Y A SU MASCOTA

- » Los desechos de los perros pueden infectar a niños y adultos con enfermedades causadas por bacterias y parásitos.
- » Su perro puede contraer una infección de los desechos de otros perros.

## PROTEJA EL MEDIO AMBIENTE



Dejar desechos de perros en la calle o en su propiedad puede tener un impacto negativo en la calidad del agua. Los desechos de mascotas que no se eliminan de la propiedad fluyen sin tratamiento por el sistema de drenaje de tormentas y llegan directamente a las masas de agua locales. Los desechos de mascotas son agentes contaminantes que contienen nutrientes, parásitos y bacterias que pueden afectar la calidad de nuestros ríos y océanos, y hacer que el agua no sea segura para nadar, beber o pescar.

## COLÓQUELA EN UNA BOLSA Y TÍRELA EN LA BASURA

*Así de simple es proteger nuestra salud y el medio ambiente.*



- » Guarde algunas bolsas cerca de la correa de su perro o átelas a la correa;
- » Use una cuchara para recoger el desecho;
- » Lleve varias bolsas plásticas;
- » Reutilice bolsas plásticas de comestibles o compre bolsas especiales para desechos de perros en las tiendas para mascotas;
- » Asegúrese de tirar los desechos de su perro en un cesto de basura.

*Aliente a sus vecinos y otros dueños de mascotas a hacer lo correcto y levantar los desechos de sus mascotas.*





# WE DID IT OURSELVES AND WE DID IT RIGHT



When painting your home,  
protect your family and community.

- **PAINTS** that are water-based are less toxic and should be used whenever possible.
- **BRUSHES** with water-based paint should be washed in the sink. Those with oil-based paint should be cleaned with paint thinner.
- **SAFELY** dispose of unwanted paint. The County of San Bernardino offers 9 HHW Centers that accept paint and other toxic waste **FREE** of charge.

To report illegal dumping, call  
**(877) WASTE18** or visit  
[sbcountystormwater.org](http://sbcountystormwater.org)





# LO HICIMOS NOSOTROS MISMOS Y LO HICIMOS BIEN



Cuando pinte su casa, proteja a su familia y a su comunidad.

- **PINTURAS** a base de agua son menos tóxicas y debe de utilizarlas cuando sea posible.
- **BROCHAS** a base de agua deben ser lavadas en el lavabo. Esas con pintura a base de aceite deben ser limpiadas con disolvente.
- **SANAMENTE** deshágase de la pintura que no necesita. El Condado de San Bernardino ofrece 9 centros de recolección que aceptan pintura y otros desechos tóxicos **GRATUITAMENTE**.

Para reportar actividades ilegales llamar al  
**(877) WASTE18** o visite  
[sbcountystormwater.org](http://sbcountystormwater.org)



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[sbcountystormwater.org](http://sbcountystormwater.org)

Arte Cortesía del Programa de Agua Pluvial de la Ciudad de Los Angeles. Impreso en papel reciclado.



# Paint

S

A

F

E

L



**PAINTS** that are water-based are less toxic and should be used whenever possible.

**BRUSHES** with water-based paint should be washed in the sink. Those with oil-based paint should be cleaned with paint thinner.

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**WE DID IT OURSELVES  
AND WE DID IT RIGHT**



To report illegal dumping, call  
**(877) WASTE18** or visit  
[sbcountystormwater.org](http://sbcountystormwater.org)



# Pinte De Manera

SANA



**PINTURAS** a base de agua son menos tóxicas y debe de utilizarlas cuando sea posible.

**BROCHAS** a base de agua deben ser lavadas en el lavabo. Esas con pintura a base de aceite deben ser limpiadas con disolvente.

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LO HICIMOS NOSOTROS MISMOS  
**Y LO HICIMOS BIEN**



Para reportar actividades ilegales llamar al  
**(877) WASTE18** o visite  
[sbcountystormwater.org](http://sbcountystormwater.org)





## SAN BERNARDINO COUNTY STORMWATER POLLUTION PREVENTION

### ■ **Mobile vehicle maintenance**

Wash in a designated area that has been bermed up to contain the wash water.

Common water control devices are: recycling systems; pretreatment or sewer discharge systems; limited recycling systems; wash pits(portable vinyl wash pads), vacuum sludge filtering systems; wet-dry vacuums, sump pumps; drain covers; portable dams; vacu-brooms; oil absorbent pads, booms, pillows, and tubes; plastic sheeting; filter tubs; buckets; pans; and squeegees.

When cleaning engines using chemical additives like soaps, solvents or degreasers, the cleaning must be performed at a facility that has the equipment to properly process the contaminated wastewater runoff, or using a leak-proof ground cover device that will catch and contain all contaminated wastewater runoff for later disposal in a manner that complies with city, county, state and federal codes.

Wastewater from cleaning equipment must be discharged into a sink, toilet, or other drain connected to the sanitary sewer

For more information about how you can prevent stormwater pollution:  
[www.sbcountystormwater.org](http://www.sbcountystormwater.org)



# LANDSCAPE MAINTENANCE

DISCHARGE TO THE STORM DRAIN, ACCIDENTAL OR NOT, COULD LEAD TO ENFORCEMENT ACTIONS, WHICH COULD INCLUDE FINES.

Follow the best practices below to **prevent water pollution from landscaping activities.**

## RECYCLE YARD WASTE



- ✓ Recycle leaves, grass clippings and other yard waste.
- ✓ Do not blow, sweep, rake or hose yard waste into the street or catch basin.
- ✓ **Try grasscycling:** the natural recycling of grass by leaving clippings on the lawn when mowing.

For more information, please visit:  
[www.calrecycle.ca.gov/organics/grasscycling](http://www.calrecycle.ca.gov/organics/grasscycling)

## USE FERTILIZERS, HERBICIDES AND PESTICIDES SAFELY



- ✓ Fertilizers, herbicides and pesticides are often carried into the storm drain system by sprinkler runoff. Use natural and non-toxic alternatives as often as possible.
- ✓ If you must use chemical fertilizers, herbicides or pesticides:
  - Spot apply, rather than blanketing entire areas.
  - Avoid applying near curbs and driveways, and **never** before a rain.
  - Apply fertilizers as needed: when plants could best use it and when the potential runoff would be low.
  - Follow the manufacturer's instructions carefully—this will not only give the best results, but will save money.

## USE WATER WISELY



- ✓ Control the amount of water and direction of sprinklers. Sprinklers should only be on long enough to allow water to soak into the ground, but not so long as to cause runoff.
- ✓ Periodically inspect, fix leaks and realign sprinkler heads.
- ✓ Plant native vegetation to reduce the need of water, fertilizers, herbicides and pesticides.

## ! HOMEOWNERS

KEEP THESE TIPS IN MIND WHEN HIRING PROFESSIONAL LANDSCAPERS AND REMIND AS NECESSARY.



Leftover pesticides, fertilizers, and herbicides contaminate landfills and should be disposed of through a Hazardous Waste Facility.

For more information on proper disposal call,  
**(909) 382-5401 or 1-800-OILY CAT.**

\*FREE for San Bernardino County residents only. Businesses can call for cost inquiries and to schedule an appointment.



To report illegal dumping, call (877) WASTE18 or visit [sbcountystormwater.org](http://sbcountystormwater.org)  
To report toxic spills, call 1(800) 33 TOXIC  
To dispose of hazardous waste, call 1(800) OILY CAT

[sbcountystormwater.org](http://sbcountystormwater.org)

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# MANTENIMIENTO DE JARDINERÍA

LAS DESCARGAS A LOS DESAGUES PLUVIALES, DE MANERA ACCIDENTAL O NO, PUEDEN INDUCIR A LA APLICACIÓN DE MULTAS Y OTRAS MEDIDAS.

Siga las mejores prácticas descritas debajo para evitar la contaminación del agua por actividades de jardinería.

## RECICLAJE DE LOS DESECHOS DE JARDÍN



- ✓ Reciclar las hojas, recortes de césped y otros desechos de jardín.
- ✓ No soplar, barrer, o usar la manguera para empujar los desechos de jardín a la calle.
- ✓ **Poner a prueba el reciclaje de césped (grasscycling): la manera natural de reciclar el césped dejando los recortes sobre el césped cuando son cortados. Para más información, visite la página web: [www.calrecycle.ca.gov/organics/grasscycling](http://www.calrecycle.ca.gov/organics/grasscycling)**

## USAR FERTILIZANTES, HERBICIDAS Y PESTICIDAS DE MANERA SEGURA



- ✓ Los fertilizantes, herbicidas y pesticidas son arrastrados con frecuencia hacia el sistema de desagüe pluvial mediante el escurrimiento de los rociadores. Use alternativas naturales no tóxicas siempre que sea posible.
- ✓ Si tiene que usar fertilizantes, herbicidas o pesticidas químicos: Aplicar solo en el sitio necesario, en lugar de cubrir todas las áreas. Evitar aplicar cerca de los bordillos y las calzadas, y nunca antes de que llueva. Aplicar los fertilizantes cuando sea necesario: esto es, cuando las plantas mejor podrían usarlo y el posible escurrimiento sea bajo. Seguir las instrucciones del fabricante cuidadosamente – esto no solo le proporcionará los mejores resultados, pero le permitirá ahorrar dinero.

## USAR EL AGUA DE MANERA PRUDENTE



- ✓ Controlar la cantidad de agua y la orientación de los rociadores. Los rociadores deben ser **solo lo suficientemente largos como para permitir que el agua remoje el suelo**, pero no tan largos que causen un escurrimiento.
- ✓ Inspeccione, repare los escapes y alinee los aspersores periódicamente.
- ✓ Siembre plantas nativas para reducir el uso de agua, fertilizantes, herbicidas y pesticidas.

## ! PROPIETARIOS DE HOGARES

Tengan en cuenta estos consejos cuando contraten a paisajistas profesionales y recuérdenselos según sea necesario.



Los sobrantes de pesticidas, fertilizantes y herbicidas contaminan los vertederos y deben ser desechados a través de Plantas de Tratamiento para Residuos Peligrosos.

\*GRATIS únicamente para los residentes del Condado de San Bernardino. Las empresas pueden llamar para indagación sobre los costos y procedimientos.

Para más información sobre el manejo adecuado de residuos peligrosos, llame a **(909) 382-5401 o 1-800-OILY CAT.**



Para denunciar el vertido ilegal de basura, llame al **(877) WASTE18** o visite **[sbcountystormwater.org](http://sbcountystormwater.org)**  
Para denunciar derrames tóxicos, llame al **1(800) 33 TOXIC**  
Para desechar residuos peligrosos, llame al **1(800) OILY CAT**

**[sbcountystormwater.org](http://sbcountystormwater.org)**

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# KEEP GUTTERS CLEAN FOR THOSE DOWNSTREAM



FOR MORE INFORMATION ON PREVENTING STORMWATER POLLUTION  
CALL 1(800) CLEANUP OR VISIT [WWW.SBCOUNTY.GOV/STORMWATER](http://WWW.SBCOUNTY.GOV/STORMWATER)

The San Bernardino County Stormwater Program is a cooperative effort including the Flood Control District, the County of San Bernardino, and the cities of Big Bear Lake, Chino, Chino Hills, Colton, Fontana, Grand Terrace, Highland, Loma Linda, Montclair, Ontario, Rancho Cucamonga, Redlands, Rialto, San Bernardino, Upland, and Yucaipa.

# Stormwater Pollution Prevention

*Best Management Practices for Homeowner's Associations,  
Property Managers and Property Owners*



*Your Guide To Maintaining Water  
Friendly Standards In Your Community*

[sbcountystormwater.org](http://sbcountystormwater.org)

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# COMMERCIAL TRASH ENCLOSURES

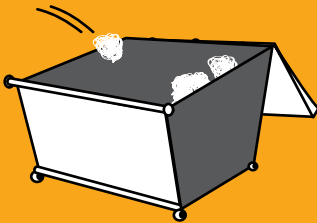
## FOLLOW THESE REQUIREMENTS TO KEEP OUR WATERWAYS CLEAN

Trash enclosures, such as those found in commercial and apartment complexes, typically contain materials that are intended to find their way to a landfill or a recycling facility.

**These materials are NOT meant to go into our local lakes and rivers.**

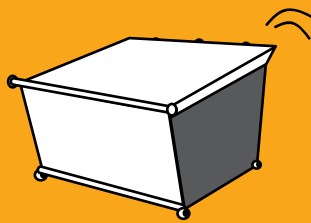
### PROTECT WATER QUALITY BY FOLLOWING THESE SIMPLE STEPS

#### PUT TRASH INSIDE



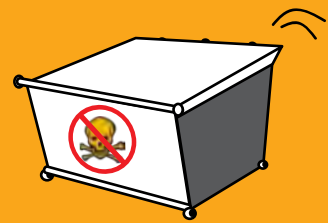
Place trash inside the bin  
(preferably in sealed bags)

#### CLOSE THE LID



Prevent rain from entering  
the bin in order to avoid  
leakage of polluted water  
runoff

#### KEEP TOXICS OUT



- Paint
- Grease, fats and used oils
- Batteries, electronics  
and fluorescent lights

### SOME ADDITIONAL GUIDELINES, INCLUDE

#### ✓ SWEEP FREQUENTLY

Sweep trash enclosure areas frequently, instead of hosing them down, to prevent polluted water from flowing into the streets and storm drains.

#### ✓ FIX LEAKS

Address trash bin leaks immediately by using dry clean up methods and report to your waste hauler to receive a replacement.

#### ✓ CONSTRUCT ROOF

Construct a solid cover roof over the existing trash enclosure structure to prevent rainwater from coming into contact with trash and garbage. Check with your local City/County for Building Codes.

In San Bernardino County, stormwater pollution is caused by food waste, landscape waste, chemicals and other debris that are washed into storm drains and end up in our waterways - untreated! You can be part of the solution by maintaining a water-friendly trash enclosure.

**THANK YOU FOR HELPING TO KEEP SAN BERNARDINO COUNTY CLEAN AND HEALTHY!**



In the event of a spill or discharge to a storm drain or waterway, contact San Bernardino County Stormwater immediately: (877) WASTE18 | [sbcountystormwater.org/report](http://sbcountystormwater.org/report)

[sbcountystormwater.org](http://sbcountystormwater.org)

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# HAZARDOUS WASTE

## CESQG PROGRAM

### Conditionally Exempt Small Quantity Generator

#### WHAT IS A CESQG?

Businesses that generate 27 gallons or 220 lbs. of hazardous waste, or 2.2 lbs. of extremely hazardous waste per month are called "Conditionally Exempt Small Quantity Generators," or CESQGs. San Bernardino County Household Hazardous Program provides waste management services to CESQG businesses. The most common CESQGs in San Bernardino County are painters, print shops, auto shops, builders, agricultural operators and property managers, but there are many others. When you call, be ready to describe the types and amounts of waste your business generates in a typical month. If you generate hazardous waste on a regular basis, you must:

- Register with San Bernardino County Fire Department (909) 386-8401 as a hazardous waste generator.
- To obtain an EPA ID# and application form from the State visit [www.dtsc.ca.gov](http://www.dtsc.ca.gov).
- Manage hazardous waste in accordance with all applicable local, state and federal laws and regulations.

#### HOW DO I GET SERVICE?

To arrange an appointment for the CESQG Program, call 1-800-OILY CAT or 909-382-5401. Be ready to describe the type and amount of hazardous waste your business is ready to dispose of, and the types and size(s) of containers that the waste is in.

#### Waste Type and Cost

There is a small handling fee involved in the collection of hazardous waste from your business. Disposal costs depend on the type of waste.

Aerosols	\$1.29/lb.
Automobile motor oil	\$.73/gal.
Anti-freeze	\$1.57/gal.
Contaminated oil	\$4.48/gal.
Car batteries	\$.62/ea.
Corrosive liquids, solids	\$2.80/lb.
Flammable solids, liquids	\$1.57/lb.
Latex Paint	\$.73/lb.
Mercury	\$10.08/lb.
NiCad/Alkaline Batteries	\$2.13/lb.
Oil Base Paints	\$1.00/lb.
Oil Filters	\$.56/ea.
Oxidizers	\$9.63/lb.
PCB Ballasts	\$5.94/lb.
Pesticides (most)	\$2.91/lb.
Photofixer, developer	\$4.31/gal.
Television & Monitors	\$11.20/ea.
Additional Handling	\$138.00/hr.

\*Rates subject to change without notice\*

#### WE CANNOT ACCEPT

- \* Radioactives
- \* Water reactives
- \* Explosives
- \* Compressed gas cylinders
- \* Medical or biohazardous waste
- \* Asbestos
- \* Remediation wastes



In the event of a spill or discharge to a storm drain or waterway, contact San Bernardino County Stormwater immediately: (877) WASTE18 | [sbcountystormwater.org/report](http://sbcountystormwater.org/report)

[sbcountystormwater.org](http://sbcountystormwater.org)

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# HAZARDOUS WASTE

## WHY IS THE FIRE DEPARTMENT COLLECTING HAZARDOUS WASTE?

Small Quantity Generators often have difficulty disposing of small quantities of hazardous waste. Hazardous waste companies usually have a minimum amount of waste that they will pick up, or charge a minimum fee for service. Typically, the minimum fee exceeds the cost of disposal for the hazardous waste. This leaves the small quantity generator in a difficult situation. Some respond by storing hazardous waste until it becomes economical for the hazardous waste transporter to pick it up, putting the business out of compliance by exceeding regulatory accumulation time limits. Other businesses simply store their hazardous wastes indefinitely, creating an unsafe work environment and exceeding accumulation time limits. Yet other businesses attempt to illegally dispose of their waste at household hazardous waste collection facilities. These facilities are not legally permitted to accept commercial wastes, nor are prepared to provide legal documentation for commercial hazardous waste disposal. In answer to the problems identified above, the San Bernardino County Fire Department Household Hazardous Program instituted the Conditionally Exempt Small Quantity Generator Program.

## PAYMENT FOR SERVICES

The CESQG Program will prepare an invoice for your business at the time of service. You can pay at the time of service with cash or a check, or you can mail your payment to the Fire Department within 30 days. Please note that we do not accept credit card payments. The preferred method of payment is to handle payment at time of service. Additional charges may apply for accounts not paid within 30 days.

## ARE THERE ANY OTHER WAYS THAT I CAN SAVE MONEY ON HAZARDOUS WASTE DISPOSAL?

Yes! First, start by reducing the amount of waste that you produce by changing processes or process chemicals, at your business. Next, examine if there is a way that you can recycle your waste back into your processes. Network with similar businesses or trade associations for waste minimization and pollution prevention solutions.

## WHAT IF YOUR BUSINESS DOES NOT QUALIFY?

Call the San Bernardino County Fire Department Field Services Division for assistance with hazardous waste management at 909-386-8401. If you reduce the amount of waste you generate each month to 27 gallons or less, you may qualify in the future.

## WHAT HAPPENS TO YOUR HAZARDOUS WASTE?

Hazardous waste collected by the CESQG Program is transported to a state permitted processing facility in San Bernardino. The waste is further processed at this point and packaged for off-site recycling (oil filters, oil, latex paint, antifreeze, and batteries) or destructive incineration (pesticides, corrosives, flammables, oil based paint).

San Bernardino County Fire Department  
CESQG Program  
2824 East "W" Street  
San Bernardino, CA 92415-0799  
Phone: 909-382-5401  
Fax: 909-382-5413  
[www.sbcfire.org/hazmat/hhw.asp](http://www.sbcfire.org/hazmat/hhw.asp)  
Email: [jschwab@sbcfire.org](mailto:jschwab@sbcfire.org)



In the event of a spill or discharge to a storm drain or waterway, contact San Bernardino County Stormwater immediately: (877) WASTE18 | [sbcountystormwater.org/report](http://sbcountystormwater.org/report)

[sbcountystormwater.org](http://sbcountystormwater.org)

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## WHEN WORKING OUTDOORS USE THE 3Cs

CUANDO TRABAJE AL AIRE LIBRE UTILICE LAS 3Cs

### CONTROL | CONTROL



Locate the nearest storm drain and ensure nothing can enter or be discharged into it.

*Ubique el desagüe de aguas pluviales más cercano y asegúrese de que nada pueda ingresar a éste ni descargarse en él.*

### CONTAIN | CONTENER



Isolate your area to prevent material from potentially flowing or being blown away.

*Aísle su área para evitar que el material pueda discurrirse o ser llevado por el viento.*

### CAPTURE | CAPTURAR



Sweep up debris and place it in the trash. Clean up spills with an absorbent material (e.g. kitty litter) or vacuum with a Wet-Vac and dispose of properly.

*Recoja los restos y colóquelos en la basura. Limpie los derrames con un material absorbente (como la arena para gatos) o aspírelos con una Wet-Vac (aspiradora de humedad) y deséchelos correctamente.*



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# COMMERCIAL LANDSCAPE

DISCHARGE TO THE STORM DRAIN, ACCIDENTAL OR NOT, COULD LEAD TO ENFORCEMENT ACTIONS, WHICH COULD INCLUDE FINES.

Follow the best practices below to **prevent water pollution from landscaping activities.**

## RECYCLE YARD WASTE



- ✓ Recycle leaves, grass clippings and other yard waste.
- ✓ Do not blow, sweep, rake or hose yard waste into the street or catch basin.
- ✓ **Try grasscycling:** the natural recycling of grass by leaving clippings on the lawn when mowing.

For more information, please visit:  
[www.calrecycle.ca.gov/organics/grasscycling](http://www.calrecycle.ca.gov/organics/grasscycling)

## USE FERTILIZERS, HERBICIDES AND PESTICIDES SAFELY



- ✓ Fertilizers, herbicides and pesticides are often carried into the storm drain system by sprinkler runoff. Use natural and non-toxic alternatives as often as possible.
- ✓ If you must use chemical fertilizers, herbicides or pesticides:
  - Spot apply, rather than blanketing entire areas.
  - Avoid applying near curbs and driveways, and **never** before a rain.
  - Apply fertilizers as needed: when plants could best use it and when the potential runoff would be low.
  - Follow the manufacturer's instructions carefully—this will not only give the best results, but will save money.

## USE WATER WISELY



- ✓ Control the amount of water and direction of sprinklers. Sprinklers should only be on long enough to allow water to soak into the ground, but not so long as to cause runoff.
- ✓ Periodically inspect, fix leaks and realign sprinkler heads.
- ✓ Plant native vegetation to reduce the need of water, fertilizers, herbicides and pesticides.

## ! HOMEOWNERS

KEEP THESE TIPS IN MIND WHEN HIRING PROFESSIONAL LANDSCAPERS AND REMIND AS NECESSARY.



Leftover pesticides, fertilizers, and herbicides contaminate landfills and should be disposed of through a Hazardous Waste Facility.

For more information on proper disposal call,

**(909) 382-5401 or 1-800-OILY CAT.**

\*FREE for San Bernardino County residents only. Businesses can call for cost inquiries and to schedule an appointment.



In the event of a spill or discharge to a storm drain or waterway, contact San Bernardino County Stormwater immediately: (877) WASTE18 | [sbcountystormwater.org/report](http://sbcountystormwater.org/report)

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# SIDEWALK, PLAZA, ENTRY MONUMENT & FOUNTAIN MAINTENANCE

**Pollutants on sidewalks and other pedestrian traffic areas and plazas are typically due to littering and vehicle use. Fountain water containing chlorine and copperbased algaecides is toxic to aquatic life. Proper inspection, cleaning, and repair of pedestrian areas and HOA owned surfaces and structures can reduce pollutant runoff from these areas. Maintaining these areas may involve one or more of the following activities:**

- 1. Surface Cleaning**
- 2. Graffiti Cleaning**
- 3. Sidewalk Repair**
- 4. Controlling Litter**
- 5. Fountain Maintenance**

## **POLLUTION PREVENTION:**

Pollution prevention measures have been considered and incorporated in the model procedures. Implementation of these measures may be more effective and reduce or eliminate the need to implement other more complicated or costly procedures. Possible pollution prevention measures for sidewalk, plaza, and fountain maintenance and cleaning include:

- Use dry cleaning methods whenever practical for surface cleaning activities.
- Use the least toxic materials available (e.g. water based paints, gels or sprays for graffiti removal).
- Once per year, educate HOA staff and tenants on pollution prevention measures.

## **MODEL PROCEDURES:**

### 1. Surface Cleaning

**Discharges of wash water to the storm water drainage system from cleaning or hosing of impervious surfaces is prohibited.**

#### **Sidewalks, Plazas**

- ✓ Use dry methods (e.g. sweeping, backpack blowers, vacuuming) whenever practical to clean sidewalks and plazas rather than hosing, pressure washing, or steam cleaning. **DO NOT** sweep or blow material into curb; use devices that contain the materials.
- ✓ If water must be used, block storm drain inlets and contain runoff. Discharge wash water to landscaping or contain and dispose of properly.



In the event of a spill or discharge to a storm drain or waterway, contact San Bernardino County Stormwater immediately: (877) WASTE18 | [sbcountystormwater.org/report](http://sbcountystormwater.org/report)

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# SIDEWALK, PLAZA, ENTRY MONUMENT & FOUNTAIN MAINTENANCE

## **Parking Areas, Driveways, Drive-thru**

- ✓ Parking facilities should be swept/vacuumed on a regular basis. Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- ✓ If water must be used, block storm drain inlets and contain runoff. Discharge wash water to landscaping or contain and dispose of properly.
- ✓ Sweep all parking lots at least once before the onset of the wet season.
- ✓ Use absorbents to pick up oil; then dry sweep.
- ✓ Appropriately dispose of spilled materials and absorbents.

### OPTIONAL:

- Consider increasing sweeping frequency based on factors such as traffic volume, land use, field observations of sediment and trash accumulation, proximity to water courses, etc.

## **Building Surfaces, Decks, etc., without loose paint**

- ✓ Use high-pressure water, no soap.
- ✓ If water must be used, block storm drain inlets and contain runoff. Discharge wash water to landscaping or contain and dispose of properly.

## **Unpainted Building Surfaces, Wood Decks, etc.**

- ✓ If water must be used, block storm drain inlets and contain runoff. Discharge wash water to landscaping or contain and dispose of properly.
- ✓ Use biodegradable cleaning agents to remove deposits.
- ✓ Make sure pH is between 6.5 and 8.5 THEN discharge to landscaping (if cold water without a cleaning agent) otherwise dispose of properly.

## 2. Graffiti Cleaning

### **Graffiti Removal**

- ✓ Avoid graffiti abatement activities during rain events.
- ✓ When graffiti is removed by painting over, implement the procedures under Painting and Paint Removal in the Roads, Streets, and Highway Operation and Maintenance procedure sheet.
- ✓ Protect nearby storm drain inlets prior to removing graffiti from walls, signs, sidewalks, or other structures needing graffiti abatement. Clean up afterwards by sweeping or vacuuming thoroughly, and/or by using absorbent and properly disposing of the absorbent.



In the event of a spill or discharge to a storm drain or waterway, contact San Bernardino County Stormwater immediately: (877) WASTE18 | [sbcountystormwater.org/report](http://sbcountystormwater.org/report)

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# SIDEWALK, PLAZA, ENTRY MONUMENT & FOUNTAIN MAINTENANCE

- ✓ Note that care should be taken when disposing of waste since it may need to be disposed of as hazardous waste.

## OPTIONAL:

- Consider using a waterless and non-toxic chemical cleaning method for graffiti removal (e.g. gels or spray compounds).

## 3. Sidewalk Repair

### Surface Removal and Repair

- ✓ Schedule surface removal activities for dry weather if possible.
- ✓ Avoid creating excess dust when breaking asphalt or concrete.
- ✓ Take measures to protect nearby storm drain inlets prior to breaking up asphalt or concrete (e.g. place hay bales or sand bags around inlets). Clean afterwards by sweeping up material.
- ✓ Designate an area for clean up and proper disposal of excess materials.
- ✓ Remove and recycle as much of the broken pavement as possible.
- ✓ When making saw cuts in pavement, use as little water as possible. Cover each storm drain inlet with filter fabric during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the inlets. After the liquid drains shovel or vacuum the slurry, remove from site and dispose of properly.
- ✓ Always dry sweep first to clean up tracked dirt. Use a street sweeper or vacuum truck. Do not dump vacuumed liquid in storm drains. Once dry sweeping is complete, the area may be hosed down if needed. Discharge wash water to landscaping, pump to the sanitary sewer if permitted to do so or contain and dispose of properly.

### Concrete Installation and Repair

- ✓ Avoid mixing excess amounts of fresh concrete or cement mortar on-site. Only mix what is needed for the job.
- ✓ Wash concrete trucks off-site or in designated areas on-site, such that there is no discharge of concrete wash water into storm drain inlets, open ditches, streets, or other storm water conveyance structures. (See Concrete Waste Management BMP WM – 8)



In the event of a spill or discharge to a storm drain or waterway, contact San Bernardino County Stormwater immediately: (877) WASTE18 | [sbcountystormwater.org/report](http://sbcountystormwater.org/report)

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# SIDEWALK, PLAZA, ENTRY MONUMENT & FOUNTAIN MAINTENANCE

- ✓ Store dry and wet concrete materials under cover, protected from rainfall and runoff and away from drainage areas. After job is complete remove temporary stockpiles (asphalt materials, sand, etc.) and other materials as soon as possible.
- ✓ Return leftover materials to the transit mixer. Dispose of small amounts of excess concrete, grout, and mortar in the trash.
- ✓ When washing concrete to remove fine particles and expose the aggregate, contain the wash water for proper disposal.
- ✓ Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stock pile, or dispose in the trash.
- ✓ Protect applications of fresh concrete from rainfall and runoff until the material has hardened.

## 4. Litter Control

- ✓ Enforce anti-litter laws.
- ✓ Provide litter receptacles in busy, high pedestrian traffic areas of the community, at recreational facilities, and at community events.
- ✓ Cover litter receptacles and clean out frequently to prevent leaking/spillage or overflow.

### OPTIONAL:

- Post "No Littering" signs.

## 5. Fountain Maintenance

- ✓ Do not use copper-based algaecides. Control algae with chlorine or other alternatives, such as sodium bromide.
- ✓ Allow chlorine to dissipate for a few days and then recycle/reuse water by draining it gradually onto a landscaped area. Water must be tested prior to discharge to ensure that chlorine is not present (concentration must be less than 0.1 ppm).
- ✓ Contact local agency for approval to drain into sewer or storm drain.
- ✓ Avoid mixing excess amounts of fresh concrete or cement mortar on-site. Only mix what is needed for the job.



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# EQUIPMENT MAINTENANCE & REPAIR

Vehicle or equipment maintenance has the potential to be a significant source of stormwater pollution. Engine repair and service (parts cleaning, spilled fuel, oil, etc.), replacement of fluids, and outdoor equipment storage and parking (dripping engines) can all contaminate stormwater. Conducting the following activities in a controlled manner will reduce the potential for stormwater contamination:

1. General Maintenance and Repair
2. Vehicle and Machine Repair
3. Waste Handling/Disposal

Related vehicle maintenance activities are covered under the following program headings in this manual: “Vehicle and Equipment Cleaning”, “Vehicle and Equipment Storage”, and “Vehicle Fueling”.

## POLLUTION PREVENTION:

Pollution prevention measures have been considered and incorporated in the model procedures. Implementation of these measures may be more effective and reduce or eliminate the need to implement other more complicated or costly procedures. Possible pollution prevention measures for equipment maintenance and repair include:

- Review maintenance activities to verify that they minimize the amount of pollutants discharged to receiving waters. Keep accurate maintenance logs to evaluate materials removed and improvements made.
- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Minimize use of solvents. Clean parts without using solvents whenever possible. Recycle used motor oil, diesel oil, and other vehicle fluids and parts whenever possible.
- Once per year, educate HOA staff and tenants on pollution prevention measures.



In the event of a spill or discharge to a storm drain or waterway, contact San Bernardino County Stormwater immediately: (877) WASTE18 | [sbcountystormwater.org/report](http://sbcountystormwater.org/report)

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# EQUIPMENT MAINTENANCE & REPAIR

## MODEL PROCEDURES:

### 1. General Maintenance and Repair

#### General Guidelines

→ *Note: Permission must be obtained for any discharge of wash water to the sanitary sewer from the local sewerage agency.*

- ✓ Review maintenance activities to verify that they minimize the amount of pollutants discharged to receiving waters. Keep accurate maintenance logs to evaluate materials removed and improvements made.
- ✓ Regularly inspect vehicles and equipment for leaks.
- ✓ Move activity indoors or cover repair area with a permanent roof if feasible.
- ✓ Minimize contact of stormwater with outside operations through berming the local sewerage and drainage routing.
- ✓ Place curbs around the immediate boundaries of the process equipment.
- ✓ Clean yard storm drain inlets regularly and stencil them.

#### Good Housekeeping

- ✓ Avoid hosing down work areas. If work areas are washed and if discharge to the sanitary sewer is allowed, treat water with an appropriate treatment device (e.g. clarifier) before discharging. If discharge to the sanitary sewer is not permitted, pump water to a tank and dispose of properly.
- ✓ Collect leaking or dripping fluids in drip pans or container. Fluids are easier to recycle or dispose of properly if kept separate.
- ✓ Keep a drip pan under the vehicle while you unclip hoses, unscrew filters, any discharge of or remove other parts. Place a drip pan under any vehicle that might leak while you work on it to keep splatters or drips off the shop floor.
- ✓ Educate employees on proper handling and disposal of engine fluids.
- ✓ Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- ✓ Do not pour liquid waste to floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.
- ✓ Post signs at sinks and stencil outdoor storm drain inlets.

### 2. Vehicle Repair

#### General Guidelines

- ✓ Perform vehicle fluid removal or changing inside of a building or in a contained covered area, where feasible, to prevent the run-on of stormwater and the runoff of spills.
- ✓ Regularly inspect vehicles and equipment for leaks, and repair as needed.



In the event of a spill or discharge to a storm drain or waterway, contact San Bernardino County Stormwater immediately: (877) WASTE18 | [sbcountystormwater.org/report](http://sbcountystormwater.org/report)

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# EQUIPMENT MAINTENANCE & REPAIR

- ✓ Use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- ✓ Immediately drain all fluids from wrecked vehicles. Ensure that the drain pan or drip pan is large enough to contain drained fluids (e.g. larger pans are needed to contain antifreeze, which may gush from some vehicles).
- ✓ Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- ✓ Recycle used motor oil, diesel oil, and other vehicle fluids and parts whenever possible.
- ✓ Oil filters disposed of in trash cans or dumpsters can leak oil. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.
- ✓ Store cracked batteries in a non-leaking secondary container and dispose of properly at recycling facilities or at County hazardous waste disposal site.

## Vehicle Leak and Spill Control

- ✓ Use absorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- ✓ Place a stockpile of spill cleanup materials where it will be readily accessible.
- ✓ Sweep floor using dry absorbent material.

## 3. Machine Repair

- ✓ Keep equipment clean; don't allow excessive build-up of oil or grease.
- ✓ Minimize use of solvents.
- ✓ Use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- ✓ Perform major equipment repairs at the corporation yard, when practical.
- ✓ Following good housekeeping measures in Vehicle Repair section.

## 4. Waste Handling/Disposal

### Waste Reduction

- ✓ Prevent spills and drips of solvents and cleansers to the shop floor.
- ✓ Do liquid cleaning at a centralized station so the solvents and residues stay in one area. Recycle liquid cleaners when feasible.



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# EQUIPMENT MAINTENANCE & REPAIR

- ✓ Locate drip pans, drain boards, and drying racks to direct drips back into a solvent sink or fluid holding tank for reuse.

## OPTIONAL:

- If possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous material:
  - Use non-caustic detergents instead of caustic cleaning for parts cleaning.
  - Use a water-based cleaning service and have tank cleaned. Use detergent-based or water-based cleaning systems in place of organic solvent degreasers.
  - Replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check list of active ingredients to see whether it contains chlorinated solvents.
  - Choose cleaning agents that can be recycled.

## Recycling

### OPTIONAL:

- Separate wastes for easier recycling. Keep hazardous and non-hazardous wastes separate, do not mix used oil and solvents, and keep chlorinated solvents separate from non-chlorinated solvents.
- Label and track the recycling of waste material (e.g. used oil, spent solvents, batteries).
- Purchase recycled products to support the market for recycled materials.

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## LIMITATIONS:

Space and time limitations may preclude all work being conducted indoors. It may not be possible to contain and clean up spills from vehicles/equipment brought on-site after working hours. Dry floor cleaning methods may not be sufficient for some spills – see spill prevention and control procedures sheet. Identification of engine leaks may require some use of solvents.



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# POOL MAINTENANCE

***Pool chemicals and filter solids, when discharged to the City streets, gutters or storm drains, DO NOT GET TREATED before reaching the Santa Ana River. Chlorine, acid cleaning chemicals and metal-based algaecides used in pools can kill beneficial organisms in the food chain and pollute our drinking water.***

**When emptying your swimming pool, spa or fountain, please use one of the following best management practices to prevent water pollution:**

- Reuse the water as landscape irrigation
- Empty the water into the sewer between midnight and 6:00 am
- Remove solids and floating debris and dispose of in the trash, de-chlorinate the water to a chlorine residual = 0, wait 24 hours, then discharge the water to the street or storm drain
- Try not to use metal-based algaecides (i.e. copper sulfate) in your pool or spa. If you have, empty your pool or spa into the sewer. Prior to discharging pool water into the sanitary sewer system, contact your local agency.
- If the pool contains algae and mosquito larvae, discharge the water to the sewer

**When acid cleaning or other chemical cleaning:**

- Neutralize the pool water to pH of 6.5 to 8.5, then discharge to the sewer

**For swimming pool and spa filter backwash:**

- Dispose of solids into trash bag, then wash filter into a landscape area
- Settle, dispose of solids in trash and discharge water to the sewer, never to the storm drain



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## » For Residents

The following is a preview of the information we have available to residents. For more fact sheets, visit [sbcountystormwater.org](http://sbcountystormwater.org)

### Household Hazardous Waste Center Locations

# TOO TOXIC TO TRASH

Dispose of your **HOUSEHOLD HAZARDOUS WASTE (HHW)** at a **FREE** HHW Center near you. Examples of items collected: pesticides, fertilizers, paints, cleaners, antifreeze, batteries, motor oil, oil filters, and electronic waste.

SERVICE AREA	LOCATION	DAYS OPEN	HOURS
<b>Big Bear Lake</b> <small>(does not accept E-waste)</small>	42040 Garstin Dr. (cross: Big Bear Blvd.)	Saturdays	9 a.m. - 2 p.m.
<b>Chino</b>	5050 Schaefer Ave. (cross: 4th St.)	2 <sup>nd</sup> & 4 <sup>th</sup> Sat.	8 a.m. - 1 p.m.
<b>Fontana</b> <small>(Fontana residents only)</small>	16454 Orange Way (cross: Cypress Ave.) <small>Note: Provide a trash bill and a driver's license as proof of residency.</small>	Saturdays	8 a.m. - 12 p.m.
<b>Ontario</b>	1430 S. Cucamonga Ave. (cross: Belmont St.)	Fri. & Sat.	9 a.m. - 2 p.m.
<b>Rancho Cucamonga</b>	8794 Lion Street. (Off 9th St, between Vineyard and Hellman)	Saturdays	8 a.m. - 12 p.m.
<b>Redlands</b>	500 Kansas St. (cross: Park Ave.)	Saturdays	9:30 a.m. - 12:30 p.m.
<b>Rialto</b> <small>(does not accept E-waste)</small>	246 Willow Ave. (cross: Rialto Ave.)	2 <sup>nd</sup> & 4 <sup>th</sup> Fri. & Sat.	8 a.m. - 12 p.m.
<b>San Bernardino</b>	2824 East 'W' St., 302 (cross: Victoria Ave.)	Mon. - Fri.	9 a.m. - 4 p.m.
<b>Upland</b>	1370 N. Benson Ave. (cross: 14th St.)	Saturdays	9 a.m. - 2 p.m.



To report illegal dumping, call **(877) WASTE18**  
or visit [sbcountystormwater.org](http://sbcountystormwater.org)

Artwork Courtesy of the City of Los Angeles Stormwater Program. Printed on recycled paper.

## TAKE ONE



## WE DID IT OURSELVES AND WE DID IT RIGHT



When painting your home,  
protect your family and community.

- **PAINTS** that are water-based are less toxic and should be used whenever possible.
- **BRUSHES** with water-based paint should be washed in the sink. Those with oil-based paint should be cleaned with paint thinner.
- **SAFELY** dispose of unwanted paint and paint thinner. The County of San Bernardino offers 9 HHW Centers that accept paint and other household hazardous waste from residents **FREE** of charge. For a list of acceptable materials, location information, and hours of operation call 1-800-OILY CAT.



In the event of a spill or discharge to a storm drain or waterway, contact San Bernardino County Stormwater immediately: (877) WASTE18 | [sbcountystormwater.org/report](http://sbcountystormwater.org/report)

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# VEHICLE MAINTENANCE

Oil, grease, anti-freeze and other toxic automotive fluids often make their way into the San Bernardino County storm drain system, and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.

## **Cleaning Auto Parts**

Scrape parts with a wire brush or use a bake oven rather than liquid cleaners. Arrange drip pans, drying racks and drain boards so that fluids are directed back into the parts washer or the fluid holding tank. Do not wash parts or equipment in a sink, parking lot, driveway or street.

## **Storing Hazardous Waste**

Keep your liquid waste segregated. Many fluids can be recycled via hazardous waste disposal companies if they are not mixed. Store all materials under cover with spill containment or inside to prevent contamination of rainwater runoff.

## **Preventing Leaks and Spills**

Conduct all vehicle maintenance inside of a garage. Place drip pans underneath vehicle to capture fluids. Use absorbent materials instead of water to clean work areas.

## **Cleaning Spills**

Use dry methods for spill cleanup (sweeping, absorbent materials). To report accidental spills into the street or storm drain call (877) WASTE18 or 911.

## **Proper Disposal of Hazardous Waste**

Dispose of household hazardous waste by taking it to your nearest household hazardous waste center. For more information, call 1-800-OILY CAT or check out [sbcountystormwater.org/Disposal.html](http://sbcountystormwater.org/Disposal.html)



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# PET WASTE DISPOSAL

## FREE DOGGIE WASTE BAGS

Remember to pick up after your pet **every time** to keep San Bernardino County clean and healthy!

To **RECEIVE** your  
**FREE CONTAINER**  
visit us online at  
[sbcountystormwater.org/dog](http://sbcountystormwater.org/dog)



In the event of a spill or discharge to a storm drain or waterway, contact San Bernardino County Stormwater immediately: (877) WASTE18 | [sbcountystormwater.org/report](http://sbcountystormwater.org/report)

[sbcountystormwater.org](http://sbcountystormwater.org)

Big Bear • Chino • Chino Hills • Colton • Fontana • Grand Terrace • Highland • Loma Linda • Montclair • Ontario • Rancho Cucamonga • Redlands • Rialto • San Bernadino • San Bernadino County • San Bernadino County Flood Control District • Upland • Yucaipa

## » Get In Touch With Us Online!

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» **Website**  
[sbcountystormwater.org](http://sbcountystormwater.org)

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» **eUpdates**  
[sbcountystormwater.org/newsletter](http://sbcountystormwater.org/newsletter)

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» **Facebook**  
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» **YouTube**  
[youtube.com/sbcountystormwater](https://youtube.com/sbcountystormwater)

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» **Report Pollution Violations**  
[sbcountystormwater.org/report](http://sbcountystormwater.org/report)

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» **Email**  
[info@sbcountystormwater.org](mailto:info@sbcountystormwater.org)

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# TOO TOXIC TO TRASH

Dispose of your **HOUSEHOLD HAZARDOUS WASTE** (HHW) at a **FREE** HHW Center near you. Examples of items collected: pesticides, fertilizers, paints, cleaners, antifreeze, batteries, motor oil, oil filters, and electronic waste.

SERVICE AREA	LOCATION	DAYS OPEN	HOURS
<b>Big Bear Lake</b> <small>(does not accept E-waste)</small>	42040 Garstin Dr. (cross: Big Bear Blvd.)	Saturdays	9 a.m. - 2 p.m.
<b>Chino</b>	5050 Schaefer Ave. (cross: 4th St.)	2 <sup>nd</sup> & 4 <sup>th</sup> Sat.	8 a.m. - 1 p.m.
<b>Fontana</b> (Fontana residents only)	16454 Orange Way (cross: Cypress Ave.) <small>Note: Provide a trash bill and a driver's license as proof of residency.</small>	Saturdays	8 a.m. - 12 p.m.
<b>Ontario</b>	1430 S. Cucamonga Ave. (cross: Belmont St.)	Fri. & Sat.	9 a.m. - 2 p.m.
<b>Rancho Cucamonga</b>	8794 Lion Street. (Off 9th St, between Vineyard and Hellman)	Saturdays	8 a.m. - 12 p.m.
<b>Redlands</b>	500 Kansas St. (cross: Park Ave.)	Saturdays	9:30 a.m. - 12:30 p.m.
<b>Rialto</b> <small>(does not accept E-waste)</small>	246 Willow Ave. (cross: Rialto Ave.)	2 <sup>nd</sup> & 4 <sup>th</sup> Fri. & Sat.	8 a.m. - 12 p.m.
<b>San Bernardino</b>	2824 East 'W' St., 302 (cross: Victoria Ave.)	Mon. - Fri.	9 a.m. - 4 p.m.
<b>Upland</b>	1370 N. Benson Ave. (cross: 14th St.)	Saturdays	9 a.m. - 2 p.m.



To report illegal dumping, call **(877) WASTE18**  
or visit [sbcountystormwater.org](http://sbcountystormwater.org)

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## TAKE ONE

# MUY TÓXICO PARA LA BASURA

Deshágase de sus **DESECHOS PELIGROSOS** gratuitamente en un centro de recolección cerca de usted. Ejemplos de artículos que se aceptan: pesticidas, fertilizantes, pinturas, limpiadores, anticongelante, baterías, aceite de motores y filtros, y aparatos electrónicos.

ÁREA DE SERVICIO	UBICACIÓN	ABIERTO	HORARIO
<b>Big Bear Lake</b> <small>(no se acepta materiales electronicas)</small>	42040 Garstin Dr. (Big Bear Blvd.)	Sábado	9 a.m. - 2 p.m.
<b>Chino</b>	5050 Schaefer Ave. (4th St.)	2 <sup>nd</sup> & 4 <sup>th</sup> Sábado	8 a.m. - 1 p.m.
<b>Fontana</b> <small>(residentes de Fontana solamente)</small>	16454 Orange Way (Cypress Ave.)	Sábado	8 a.m. - 12 p.m.
	<small>Nota: Presentar un recibo de basura y licencia de conducir como prueba de residencia.</small>		
<b>Ontario</b>	1430 S. Cucamonga Ave. (Belmont St.)	Viernes & Sábado	9 a.m. - 2 p.m.
<b>Rancho Cucamonga</b>	8794 Lion Street (Off 9th St, between Vineyard & Hellman)	Sábado	8 a.m. - 12 p.m.
<b>Redlands</b>	500 Kansas St. (Park Ave.)	Sábado	9:30 a.m. - 12:30 p.m.
<b>Rialto</b> <small>(no se acepta materiales electronicas)</small>	246 Willow Ave. (Rialto Ave.)	2 <sup>nd</sup> & 4 <sup>th</sup> Viernes & Sábado	8 a.m. - 12 p.m.
<b>San Bernardino</b>	2824 East 'W' St., 302 (Victoria Ave.)	Lunes - Viernes	9 a.m. - 4 p.m.
<b>Upland</b>	1370 N. Benson Ave. (14th St.)	Sábado	9 a.m. - 2 p.m.



Para reportar actividades ilegales llamar al **(877) WASTE18**  
o visite [sbcountystormwater.org](http://sbcountystormwater.org)

Arte Cortesía del Programa de Agua Pluvial de la Ciudad de Los Angeles. Impreso en papel reciclado.

# TOME UNO

# A SAFE GARDEN: A LOT DEPENDS ON IT.



Protect your family and community when using pesticides and fertilizers.

- ❖ **STRATEGICALLY** apply products on your lawn when rain is not expected. Rain can wash toxic chemicals from your lawn into local waterways.
- ❖ **SPOT-APPLY** products directly on the problem instead of the whole area. Use less chemicals, and conserve the supply of your product.
- ❖ **SAFELY** dispose of unwanted products. The County of San Bernardino offers 9 HHW Centers that accept pesticides, fertilizers and other toxic waste FREE of charge.

To report illegal dumping, call  
**(877) WASTE18** or visit  
[sbcountystormwater.org](http://sbcountystormwater.org)



# UN JARDÍN SANO: MUCHO DEPENDE DE ÉL.



**Proteja a su familia y a su comunidad cuando utilice pesticidas y fertilizantes.**

- ❖ **ESTRATÉGICAMENTE** aplique productos en su césped solamente cuando no se espera lluvia. La lluvia puede llevarse químicos tóxicos de su césped hacia los canales pluviales en su área.
- ❖ **ESCASAMENTE** aplique los productos directamente en el área en donde exista el problema en lugar de distribuirlo en todo el jardín. Así, utilizará menos productos químicos y le rendirá más.
- ❖ **ELIMINE** productos tóxicos sanamente. El Condado de San Bernardino ofrece 9 centros de recolección que aceptan pesticidas, fertilizantes y otros desechos tóxicos **GRATUITAMENTE**.

Para reportar actividades ilegales llamar al  
**(877) WASTE18** o visite  
[sbcountystormwater.org](http://sbcountystormwater.org)






# A SAFE GARDEN: A LOT DEPENDS ON IT.



Protect your family and community  
when using pesticides and fertilizers.

- **STRATEGICALLY** apply products on your lawn only when rain is not expected.
  - **SPOT-APPLY** directly on the problem instead of the whole area.
  - **SAFELY** dispose of unwanted products. The County of San Bernardino offers 9 HHW Centers that accept pesticides, fertilizers and other toxic waste **FREE** of charge.
- 

To report illegal dumping, call  
**(877) WASTE18** or visit  
**[sbcountystormwater.org](http://sbcountystormwater.org)**






# UN JARDÍN SANO: MUCHO DEPENDE DE ÉL.



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- 

Para reportar actividades ilegales llamar al  
**(877) WASTE18** o visite  
[sbcountystormwater.org](http://sbcountystormwater.org)



# SPOT-APPLY

pesticides directly on the problem rather than blanketing the whole area.



[sbcountystormwater.org](http://sbcountystormwater.org)

**A SAFE GARDEN:  
A LOT DEPENDS ON IT.**



**(877) WASTE18**

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# ESCASAMENTE

aplique pesticidas directamente  
en el problema en lugar de  
distribuirlo en todo el jardín.



[sbcountystormwater.org](http://sbcountystormwater.org)

UN JARDÍN SANO:  
MUCHO DEPENDE DE EL.



(877) WASTE18

# GARDEN SMART: Use Pesticides and Fertilizers Sparingly



[sbcounty.gov/stormwater](http://sbcounty.gov/stormwater)



Artwork Courtesy of the City of Los Angeles Stormwater Program



# Managing **FATS, OIL** and **GREASE** “It’s Easier than YOU Think!”

## THE **WRONG WAY** La Forma Incorrecta



**1**

Do not pour cooking residue directly into the drain.

No vierta residuos de cocinar directamente en el desague.



**2**

Do not dispose of food waste into the garbage disposal.

No ponga desperdicios de comida en el triturador de comida.



**3**

Do not pour waste oil directly into the drain.

No ponga desperdicio de aceite directamente en el desague.



**4**

Do not wash floor mats where water will run off directly into the storm drain.

No lave tapetes de piso en un lugar donde el agua corra hacia el desague.

## THE **RIGHT WAY** La Forma Correcta



**1**

Wipe pots, pans, and work areas prior to washing.

Limpie con una toallita las ollas, cazuelas, y areas de trabajo antes de lavarlos.



**2**

Dispose of food waste directly into the trash.

Deseche los desperdicios de comida en el bote de basura.



**3**

Collect waste oil and store for recycling.

Junte el desperdicio de aceite y guardelo para que sea reciclado.



**4**

Clean mats inside over a utility sink.

Limpie los tapetes de piso dentro de un lavabo o fregadero.



# POLLUTION STORMWATER Prevention

## ROADWORK AND PAVING

Asphalt, saw-cut slurry and excavated materials from road paving, surfacing and pavement removal often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.



### Preventing Erosion

Schedule excavation and grading work during dry weather. Develop and implement erosion and sediment control plans for excavated embankments. Cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.



### During Construction

Cover catch basins and maintenance holes when applying seal coat, slurry seal or fog seal. Use check dams, ditches or berms around excavations, and avoid over applying water for dust control. Never wash excess materials from exposed aggregate or concrete into the street, gutter or a storm drain.



### Maintaining Vehicles & Equipment

Maintain and refuel vehicles and equipment at a single location on-site, away from the street, gutter and storm drains. Perform major equipment repairs and washings off-site. Inspect vehicles and equipment frequently for leaks, and prevent leaks from stored vehicles by draining gas, hydraulic oil, transmission, brake and radiator fluids.

### Asphalt & Concrete Removal

Barricade storm drain openings during saw-cutting, and recycle broken up pavement at a crushing company. For recycling information, call (909) 386-8401.



### Cleaning & Preventing Spills

Be ready for spills by preparing and using spill containment and cleanup kits that include safety equipment and dry cleanup materials such as kitty litter or sawdust. Sweep up dry spills, instead of hosing. Prevent spills from paver machines by using drip pans, or by placing absorbent materials like cloths or rags under the machines when not in use. To report serious spills, call 911.

To report illegal dumping call

**(877) WASTE18**

[sbcountystormwater.org](http://sbcountystormwater.org)



# Prevención de Contaminación del Desagüe

## TRABAJO DE CARRETERAS & PAVIMENTO

Asfalto, mezcla y materiales de excavaciones del pavimento acaban por llegar a los drenajes del Condado de San Bernardino y terminando en el Rio de Santa Ana. Esto contamina el agua que tomamos, haciendola peligrosa para la gente y la vida salvaje. Sigue estas practicas para prevenir la contaminación y proteger la salud publica.



### Previendo Erosiones

Planea las excavaciones trabajo de jardineria durante el clima seco. Desarrolla e implementa planes de embancamientos de control de sedimento y excavaciones. Cubre montones de tierra, grava y otros materiales con un plastico para protegerlos de la lluvia, aire y desagüe.



### Durante Construcción

Cubre los lavados y da mantenimiento a los hoyos al aplicar selladura o mezcla. Revisa las areas de excavaciones, y evita pasarte de agua para preveenir polvadura. Nunca laves los materiales llenos de concreto en la calle, drenajes o en el desagüe.



### Mantenimiento de Vehiculos & Herramientas

Has el mantenimiento y carga de vehiculos en el mismo lugar, lejos de la calle, las alcantarillas y los drenajes. Inspecciona los vehiculos y el equipo de cualquier goteadura y evita goteaduras de autos que no se usan vasiandoles la gasolina, aceite de transmision, frenos y liquidos del radiador.

### Removiendo Asfalto & Concreto

Bloquea alrededor de los drenajes cuando estes usando las maquinas de sierra, tambien recicla todo el pavimento roto en la compañia demolidora. Para más informacion llama al (909) 386-8401.



### Limpiando & Previendo Derrames

Mantente siempre preparado para cualquier derrame, usa siempre las herramientas de seguridad al igual que materiales como, tierra para desechos de gato o aserrin Barre los derrames en ves de lavarlos con la manguera. Previene los derrames de las maquinas usando embudos o colocanto garras para absorver cualquier liquido. Para reportar derrames llama al 911.

Para reportar actividades ilegales llamar al:

**(877) WASTE18**

[sbcountystormwater.org](http://sbcountystormwater.org)



# POLLUTION STORMWATER Prevention

## HOME & GARDEN

Yard waste and household toxics like paints and pesticides often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these simple tips to prevent pollution and protect your health.



### Recycle Household Hazardous Waste

Household products like paint, pesticides, solvents and cleaners are too dangerous to dump and too toxic to trash. Take them to be recycled at a convenient household hazardous waste collection facility. Call (800) CLEANUP for the facility in your area.



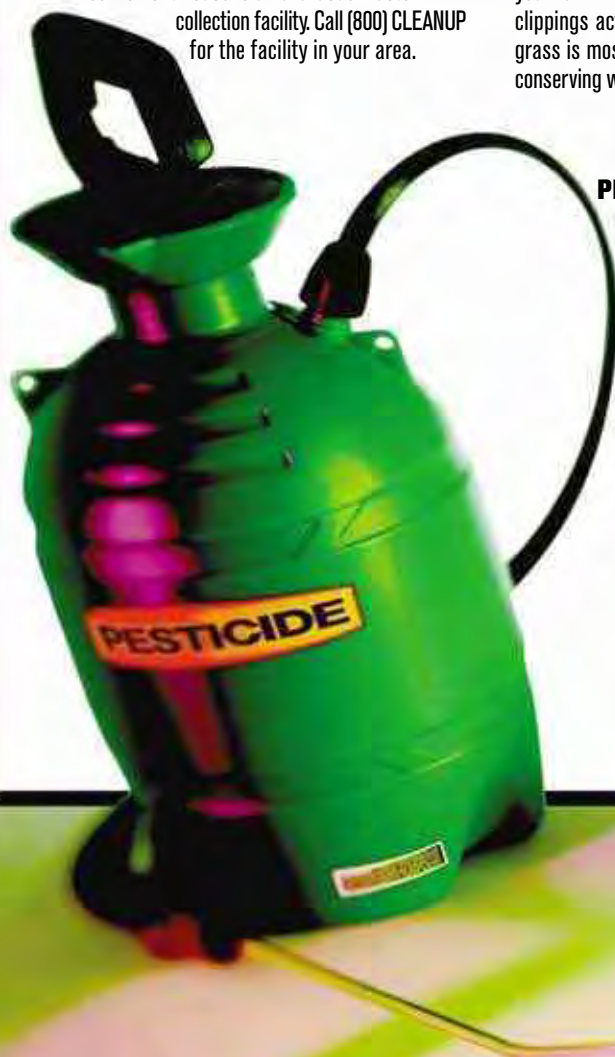
### Disposing of Yard Waste

Recycle leaves, grass clippings and other yard waste, instead of blowing, sweeping or hosing into the street. Try grasscycling, leaving grass clippings on your lawn instead of using a grass catcher. The clippings act as a natural fertilizer, and because grass is mostly water, it also irrigates your lawn, conserving water.



### Use Fertilizers & Pesticides Safely

Fertilizers and pesticides are often carried into the storm drain system by sprinkler runoff. Try using organic or non-toxic alternatives. If you use chemical fertilizers or pesticides, avoid applying near curbs and driveways and never apply before a rain.



### Planting in the Yard

Produce less yard waste and save water by planting low maintenance, drought-tolerant trees and shrubs. Using drip irrigation, soaker hoses or micro-spray systems for flower beds and vegetation can also help reduce your water bill and prevent runoff.



### Use Water Wisely

Cut your water costs and prevent runoff by controlling the amount of water and direction of sprinklers. The average lawn needs about an inch of water a week, including rainfall, or 10 to 20 minutes of watering. A half-inch per week is enough for fall and spring. Sprinklers should be on long enough to allow water to soak into the ground but not so long as to cause runoff.

To report illegal dumping call  
**(877) WASTE18**  
[sbcountystormwater.org](http://sbcountystormwater.org)



# Prevención de Contaminación del Desagüe

## JARDIN

Basura del jardín y otros tóxicos caseros como pintura, pesticidas y otros más acaban por llegar a los drenajes del Condado de San Bernardino y terminando en el Río de Santa Ana. Esto contamina el agua que tomamos, haciéndola peligrosa para la gente y la vida salvaje. Sigue estas prácticas para prevenir la contaminación y proteger la salud pública.



### Disponiendo Desechos del Jardín

Recicla hojas, pasto y otras basuras del jardín en ves de soplarlas, barrerlas hacia la calle. El pasto sirve como fertilizante, y como el pasto es la mayoría agua también riega tu jardín, ahorrándote agua.



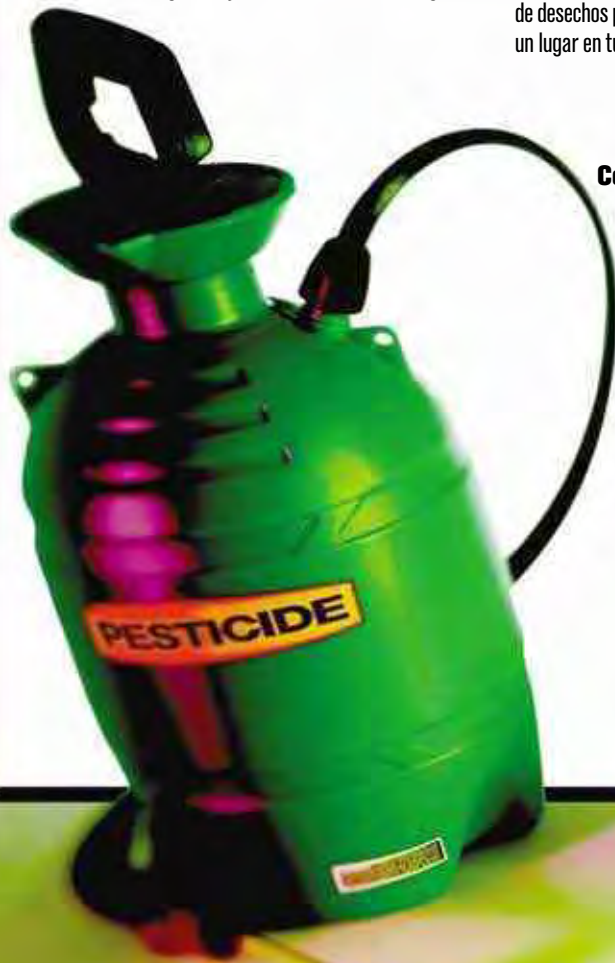
### Reciclando Materiales del Hogar Peligrosos

Limpiadores del hogar como pintura, pesticidas, solventes y limpiadores son demasiado tóxicos para tirarlos en la basura. Desechalos en un lugar de colección de desechos peligrosos. Llama al (800) CLEANUP para un lugar en tu área.



### Usando Fertilizantes & Pesticidas Adecuadamente

Fertilizantes y pesticidas muchas veces terminan en los drenajes. Usa alternativas que no sean tóxicas. Si tu usas fertilizantes y pesticidas con químicos, no los uses cerca de las banquetas y cocheras y nunca los uses en tiempos de lluvia.



### Cembrando en el Jardín

Reduce la basura del jardín y ahorra agua plantando árboles y plantas de bajo mantenimiento. Riega moderadamente con mangueras u otros métodos para las flores o vegetación así reducirás tu pago del mes y previenes el desagüe.



### Usando el Agua Adecuadamente

Reduce el pago del agua y previene el desagüe controlando la cantidad y dirección de tus regaderas para el jardín. Solo necesitas regar de 10 a 20 minutos a la semana. Durante la primavera y otoño es la mitad. Las regaderas del jardín deberían estar ajustadas a que rieguen lo suficiente y evitar el desagüe.

Para reportar actividades ilegales llamar al:

**(877) WASTE18**

**[sbcountystormwater.org](http://sbcountystormwater.org)**



# POLLUTION STORMWATER Prevention

## EXCAVATION AND GRADING

Sediment, cement wash, asphalt and vehicle fluids from soil excavation and grading often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.



### Recycling Waste

Recycle broken asphalt, concrete, wood, and cleared vegetation whenever possible. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste. For recycling and disposal information, call (909) 386-8401.



### Maintaining Vehicles & Equipment

Maintain and refuel vehicles and equipment at a single location on-site, away from the street, gutters and storm drains. Perform major equipment repairs and washings off-site. Inspect vehicles and equipment frequently for leaks. Use gravel approaches where truck traffic is heavy to reduce soil compaction and limit the tracking of sediment into the street.



### Cleaning & Preventing Spills

Use a drip pan and funnel when draining or pouring fluids. Sweep up dry spills, instead of hosing. Be ready for spills by preparing and using spill containment and cleanup kits that include safety equipment and dry cleanup materials such as kitty litter or sawdust. Prevent leaks from stored vehicles by draining gas, hydraulic oil, transmission, brake and radiator fluids. To report serious spills, call 911.



### Storing Materials

Keep construction materials and debris away from the street, gutter and storm drains. Cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.



### Preventing Erosion

Avoid excavation or grading during wet weather. Plant temporary vegetation on slopes where construction is not immediately planned, and permanent vegetation once excavation and grading are complete. Construct diversion dikes to channel runoff. Channels can be lined with grass or roughened pavement to reduce runoff velocity.

To report illegal dumping call

**(877) WASTE18**

[sbcountystormwater.org](http://sbcountystormwater.org)



# Prevención de Contaminación del Desagüe

## EXCAVACIONES

Sedimento, cemento, asfalto y líquidos de auto, tierra y residuos peligrosos de lugares de construcción acaban por llegar a los drenajes del Condado de San Bernardino y terminando en el Río de Santa Ana. Esto contamina el agua que tomamos, haciendola peligrorsa para la gente y la vida salvaje. Sigue estas practicas para prevenir la contaminación y proteger la salud publica.



### Reciclando Desechos

Recicla el asfalto, concreto, madera y la vegetacion cuando sea posible. Materiales no reciclados se deberian llevar a lugares de desechos peligrosos. Para más informacion llama al (909) 386-8401.



### Manteniendo Vehiculos & Herramientas

Has el mantenimiento y carga de vehiculos en el mismo lugar, lejos de la calle, las alcantarillas y los drenajes. Inspecciona los vehiculos y el equipo de cualquier goteadura. Usa grava donde mayormente se concentra el trafico de camiones para y reducir el sedimento en las calles.



### Limpiando & Previendo Derrames

Usa siempre un embudo al vaciar líquidos. Barre los derrames en ves de lavarlos con la manguera. Mantente siempre preparado para cualquier derrame, usa siempre las herramientas de seguridad al igual que materiales como, tierra para desechos de gato o aserrin. Preveen goteaduras de autos que no se usan vasiandoles la gasolina, aceite de transmision, frenos y líquidos del radiador. Para reportar derrames llama al 911.



### Almacenando Materiales

Manten materiales de construccion y residuos lejos de las calles, coladeras y desagües. Mantén tapados los bultos de arena, grava y herramientas para excavar cubiertos con algun plastico para protegerlos de la lluvia, el aire y el desagüe.



### Previendo Erosiones

Evita las excavaciones durante lluvia. Planta vegetacion temporal en colinas donde aun no hay planes de construccion y planta vegetacion permanente al terminar las excavaciones. Construye algunos canales para el desagüe. Estos pueden ser creados con pasto y cemento para reducir la velocidad del desagüe.

Para reportar actividades ilegales llamar al:

**(877) WASTE18**

**[sbcountystormwater.org](http://sbcountystormwater.org)**



# POLLUTION <sup>STORMWATER</sup> Prevention

## CONSTRUCTION

Cement wash, sediment, vehicle fluids, dust and hazardous debris from construction sites often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.



### Store Materials Safely

Keep construction materials and debris away from the street, gutter and storm drains. Cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.



### Ordering Materials & Recycling Waste

Reduce waste by ordering only the amounts of materials needed for the job. Use recycled or recyclable materials whenever possible. You can recycle broken asphalt, concrete, wood, and cleared vegetation. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste. For recycling and disposal information, call (909) 386-8401.



### Cleaning & Preventing Spills

Use a drip pan and funnel when draining or pouring fluids. Sweep up dry spills, instead of hosing. Be ready for spills by preparing and using spill containment and cleanup kits that include safety equipment and dry cleanup materials such as kitty litter or sawdust. To report serious spills, call 911.



### Preventing Erosion

Avoid excavation or grading during wet weather. Plant temporary vegetation or add hydromulch on slopes where construction is not immediately planned, and permanent vegetation once excavation and grading are complete. Construct diversion dikes to channel runoff to a detention basin and around the construction site. Channels can be lined with grass or roughened pavement to reduce runoff velocity.



### Maintaining Vehicles & Equipment

Maintain and refuel vehicles and equipment at a single location on-site, away from the street, gutter and storm drains. Perform major equipment repairs and washings off-site. Inspect vehicles and equipment frequently for leaks, and prevent leaks from stored vehicles by draining gas, hydraulic oil, transmission, brake and radiator fluids.

To report illegal dumping call

**(877) WASTE18**

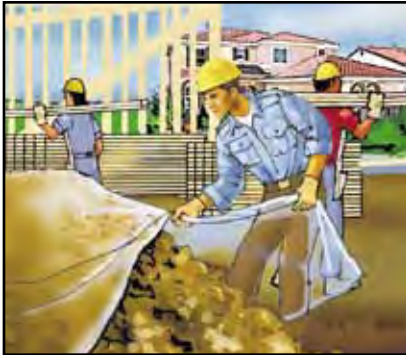
[sbcounystormwater.org](http://sbcounystormwater.org)



# Prevención de Contaminación del Desagüe

## CONSTRUCCIÓN

Cemento, sedimentos, líquidos de auto, polvos y residuos peligrosos acaban por llegar a los drenajes del Condado de San Bernardino y terminando en el Río de Santa Ana. Esto contamina el agua que tomamos, haciendola peligrosa para la gente y la vida salvaje. Sigue estas practicas para prevenir la contaminación y proteger la salud publica.



### Almacenando Materiales Cuidadosamente

Manten materiales de construcción y residuos lejos de las calles, coladeras y desagües. Mantén tapados los bultos de arena, grava y herramientas para excavar cubiertos con algún plástico para protegerlos de la lluvia, el aire y el desagüe.



### Ordenando Materiales & Reciclando Desechos

Reduce la cantidad al ordenar el material, solo ordena lo necesario. Usa materiales que se puedan reciclar cuando sea posible. Se puede reciclar el asfalto, concreto, madera y la vegetación. Materiales no reciclados se deben llevar a lugares de desechos peligrosos. Para más información llama al (909) 386-8401.



### Limpiando & Previniendo Derrames

Usa siempre un embudo al vaciar líquidos. Barre los derrames en ves de lavarlos con la manguera. Mantente siempre preparado para cualquier derrame, usa siempre las herramientas de seguridad al igual que materiales como, tierra para desechos de gato o aserrín. Para reportar derrames llama al 911.



### Previniendo Erosiones

Evita las excavaciones durante lluvia. Planta vegetación temporal en colinas donde aun no hay planes de construcción y planta vegetación permanente al terminar las excavaciones. Construye algunos canales para el desagüe. Estos pueden ser creados con pasto y cemento para reducir la velocidad del desagüe.



### Mantenimiento de Vehículos & Herramientas

Has el mantenimiento y carga de vehículos en el mismo lugar, lejos de la calle, las alcantarillas y los drenajes. Inspecciona los vehículos y el equipo de cualquier goteadura y preven goteaduras de autos que no se usan vasiandoles la gasolina, aceite de transmisión, frenos y líquidos del radiador.

Para reportar actividades ilegales llamar al:

**(877) WASTE18**

**sbcountystormwater.org**



# POLLUTION STORMWATER Prevention

## FRESH CONCRETE & MORTAR APPLICATION

Cement wash, sediment, vehicle fluids, dust and hazardous debris from construction sites often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.



### Storing Materials

Keep construction materials and debris away from the street, gutter and storm drains. Secure open bags of cement and cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.



### Ordering Materials & Recycling Waste

Reduce waste by ordering only the amounts of materials needed for the job. Use recycled or recyclable materials whenever possible. When breaking up paving, recycle the pieces at a crushing company. You can also recycle broken asphalt, concrete, wood, and cleared vegetation. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste. Call (909) 386-8401 for recycling and disposal information.



### During Construction

Schedule excavation and grading during dry weather. Prevent mortar and cement from entering the street and storm drains by placing erosion controls. Setup small mixers on tarps or drop cloths, for easy cleanup of debris. Never bury waste material. Recycle or dispose of it as hazardous waste.

### Cleaning Up

Wash concrete dust onto designated dirt areas, not down driveways or into the street or storm drains. Wash out concrete mixers and equipment in specified washout areas, where water can flow into a containment pond. Cement washwater can be recycled by pumping it back into cement mixers for reuse. Never dispose of cement washout into driveways, streets, gutters, storm drains or drainage ditches.



To report illegal dumping call  
**(877) WASTE18**  
[sbcountystormwater.org](http://sbcountystormwater.org)



# Prevención de Contaminación del Desagüe

## APLICANDO CONCRETO FRESCO

Cemento, grava, asfalto y líquidos de auto, tierra y residuos peligrosos de lugares de concreto fresco por llegar a los drenajes del Condado de San Bernardino y terminando en el Río de Santa Ana. Esto contamina el agua que tomamos, haciéndola peligrosa para la gente y la vida salvaje. Sigue estas prácticas para prevenir la contaminación y proteger la salud pública.



### Almacenando Materiales

Mantén materiales de construcción y residuos lejos de las calles, coladeras y desagües. Mantén tapados los bultos de arena, grava y herramientas para excavar cubiertos con algún plástico para protegerlos de la lluvia, el aire y el desagüe.



### Ordenando Materiales & Reciclando

Reduce la cantidad al ordenar el material, solo ordena lo necesario. Usa materiales reciclables cuando sea posible. Cuando estes rompiendo el pavimento, recicla los pedasos en la compañía demolidora. Se puede reciclar el asfalto, concreto, madera y la vegetación. Materiales no reciclados se deberían llevar a lugares de desechos peligrosos. Llama al (909) 386-8401 para más información.



### Durante Construcción

Planea las excavaciones durante clima seco. No dejes que el cemento o la cal lleguen hasta las calles o drenajes, evita esto con plantas temporales para detener el desagüe. Cubre las maquinas de mezclar con alguna garra para que se facilite la limpieza de residuos. Nunca entierres los desechos. Recicla todos los desechos peligrosos.

### Limpiando

Lava la cal en un area designada, no la eches hacia la cochera o en la calle. Lava las mezcladoras y las herramientas en un lugar especifico, donde el agua llegue a un contenedor. El agua de cemento se puede reciclar volviendola a usar en las mezcladoras. Nunca dejes el agua de cemento que corra hacia las calles, alcantarillas o drenajes.



Para reportar actividades ilegales llamar al:

**(877) WASTE18**

**[sbcountystormwater.org](http://sbcountystormwater.org)**

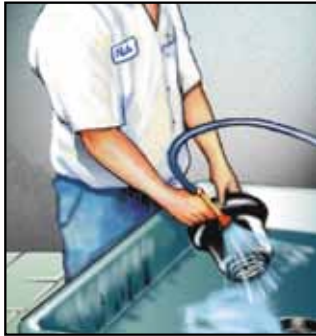


# Pollution Prevention

## STORMWATER

### AUTO MAINTENANCE

Oil, grease, anti-freeze and other toxic automotive fluids often make their way into the San Bernardino County storm drain system, and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.



#### Cleaning Auto Parts

Scrape parts with a wire brush or use a bake oven rather than liquid cleaners. Arrange drip pans, drying racks and drain boards so that fluids are directed back into the parts washer or the fluid holding tank. Do not wash parts or equipment in a shop sink, parking lot, driveway or street.



#### Storing Hazardous Waste

Keep your liquid waste segregated. Many fluids can be recycled via hazardous waste disposal companies if they are not mixed. Store all materials under cover with spill containment or inside to prevent contamination of rainwater runoff.



#### Metal Grinding and Polishing

Keep a bin under your lathe or grinder to capture metal filings. Send uncontaminated filings to a scrap metal recycler for reclamation. Store metal filings in a covered container or indoors.



#### Preventing Leaks and Spills

Place drip pans underneath to capture fluids. Use absorbent cleaning agents instead of water to clean work areas.



#### Cleaning Spills

Use dry methods for spill cleanup (sweeping, absorbent materials). Follow your hazardous materials response plan, as filed with your local fire department or other hazardous materials authority. Be sure that all employees are aware of the plan and are capable of implementing each phase. To report serious toxic spills, call 911.



#### Proper Disposal of Hazardous Waste

Recycle used motor oil and oil filters, anti-freeze and other hazardous automotive fluids, batteries, tires and metal filings collected from grinding or polishing auto parts. Contact a licensed hazardous waste hauler. For more recycling information, call (909) 386-8401.



To report illegal dumping call

**(877) WASTE18**

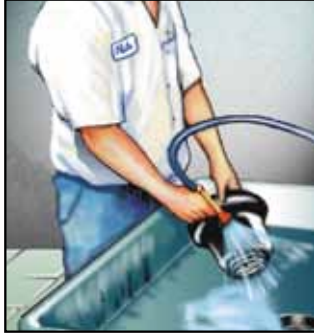
[sbcountystormwater.org](http://sbcountystormwater.org)



# Prevención de Contaminación del Desagüe

## MANTENIMIENTO DE AUTO

Aceite, grasa, anti-congelantes y otros líquidos tóxicos para el auto acaban por llegar a los drenajes del Condado de San Bernardino y terminando en el Río de Santa Ana. Esto contamina el agua que tomamos, haciéndola peligrosa para la gente y la vida salvaje. Sigue estas prácticas para prevenir la contaminación y proteger la salud pública.



### Limpiar Partes De Autos

Limpia las partes de auto con un cepillo de alambres o usa un limpiador de hornos en vez de usar limpiadores líquidos. Arregla las graseras, perchas para secar y tablas de escurrir para que los líquidos sean dirigidos al lavadero o recipientes para guardar líquidos. No laves las partes de auto o herramientas en el estacionamiento, la cochera o la calle.



### Almacenando Desechos Peligrosos

Mantén los desechos líquidos separados. Varios líquidos pueden ser reciclados por compañías que se especializan en desechos tóxicos si aún no están mezclados. Guarda y cubre todos los materiales dentro de un lugar para prevenir la contaminación del desagüe.



### Desechos de Metal & Pulidos

Mantén un recipiente debajo de las máquinas de tornos o amoladoras para coleccionar desechos de metal. Manda los desechos de metal a un centro de reciclaje de metales. Guarda los desechos de metal en un recipiente cubierto o dentro del local.



### Prevenir Goteaduras & Derrames

Utiliza caserolas para el goteo de líquidos. Use limpiadores absorbentes en lugar de agua para limpiar el área de trabajo.



### Limpiando Derrames

Sigue tu plan de como actuar sobre los materiales tóxicos, como está indicado en el departamento de bomberos local u otras autoridades de materiales tóxicos. Asegurate que todos los empleados estén informados y capaz de aplicar cada fase del plan. Usa métodos secos para limpiar derramamientos (barriendo, materiales absorbentes, etc.).



### Manera Correcta de Depositar los Desechos Peligrosos

Recicla el aceite de motor y filtros de aceite usados, anti-congelante, baterías, lubricantes, y desechos de metal y partes de auto pulidas. Llama a un colector de desechos tóxicos para disponer de absorbentes saturados. Mas información sobre reciclaje, llama al (909) 386-8401.



Para reportar actividades ilegales llamar al:

**(877) WASTE18**  
**sbcountystormwater.org**





## SAN BERNARDINO COUNTY STORMWATER POLLUTION PREVENTION

### ■ Construction & development:

Soil, cement wash, asphalt, oil and other hazardous debris from construction sites often make their way into the San Bernardino County storm drain system, and flow untreated into local waterways. Follow these best management practices to prevent pollution, protect public health and avoid fines or legal action.

- **Store Materials Safely:** Keep construction materials and debris away from the street, gutter and storm drains. Cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.
- **Preventing Erosion:** Avoid excavation or grading during wet weather. Plant temporary vegetation or add hydro mulch on slopes where construction is not immediately planned, and permanent vegetation once excavation and grading are complete. Construct diversion dikes to channel runoff to a detention basin and around the construction site. Use gravel approaches where truck traffic is frequent to reduce soil compaction and limit the tracking of sediment into the streets. For more information on erosion control, call (909) 799-7407.
- **Cleaning & Preventing Spills:** Use a drip pan and funnel when draining or pouring fluids. Sweep up dry spills, instead of hosing. Be ready for spills by preparing and using spill containment and cleanup kits that include safety equipment and dry cleanup materials such as kitty litter or sawdust. To report serious spills, call 911.
- **Maintaining Vehicles & Equipment:** Maintain and refuel vehicles and equipment at a single location on-site, away from the street, gutter and storm drains. Perform major equipment repairs and washings off-site. Inspect vehicles and equipment frequently for leaks, and prevent leaks from stored vehicles by draining gas, hydraulic oil, transmission, and brake and radiator fluids.
- **Ordering Materials & Recycling Waste:** Reduce waste by ordering only the amounts of materials needed for the job. Use recycled or recyclable materials whenever possible. You can recycle broken asphalt, concrete, wood, and cleared vegetation. Dispose of hazardous materials through a hazardous waste hauler or other means in accordance with the construction permit. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste. For recycling and disposal information, call (909) 386-8401.
- **Concrete and mortar application:** Never dispose of cement washout into driveways, streets, gutters or drainage ditches. Wash concrete mixers and equipment only in specified washout areas, where the water flows into lined containment ponds. Cement wash water can be recycled by pumping it back into cement mixers for reuse.



For more information about how you can prevent stormwater pollution:

[www.sbcountystormwater.org](http://www.sbcountystormwater.org)

# NOTICE

**!** DISCHARGE INTO OUR WATERWAYS, ACCIDENTAL OR NOT, CAN LEAD TO ENFORCEMENT ACTIONS, WHICH CAN INCLUDE FINES.

## WHEN WORKING WITH CONCRETE **USE THE 3Cs**

### CONTROL



Locate the nearest storm drain and ensure nothing can enter or be discharged into it. Use plastic covers and sandbags when working within 50' of a storm drain or catch basin.

### CONTAIN



Isolate area and secure bags of cement after they are open. Keep cement, sand and aggregate (wet/dry) and slurries from saw cutting, from flowing into the streets, gutter and storm drains or being blown away. Cover bags of cement in case of rain.

### CAPTURE



Sweep dry residue or vacuum wet concrete residue and dispose of properly. Create a designated washout area for equipment and tools and place away from driveways and storm drains. Dispose of concrete/plaster waste and rinsewater by hauling off to an approved disposal site.



To report illegal dumping, call (877) WASTE18 or visit [sbcountystormwater.org](http://sbcountystormwater.org)  
**SAN BERNARDINO COUNTY STORMWATER POLLUTION PREVENTION**

Big Bear • Chino • Chino Hills • Colton • Fontana • Grand Terrace • Highland • Loma Linda • Montclair • Ontario • Rancho Cucamonga  
Redlands • Rialto • San Bernardino • San Bernardino County • San Bernardino County Flood Control District • Upland • Yucaipa

# AVISO

**!** LA DESCARGA EN NUESTRAS VÍAS FLUVIALES, DE FORMA ACCIDENTAL O NO, PUEDE LLEVAR A TOMAR MEDIDAS PARA CUMPLIR CON LA LEY QUE PUEDEN INCLUIR MULTAS.

## APLIQUE LAS 3 C

### CONTROL



Ubique el desagüe pluvial más cercano y asegúrese de que nada pueda entrar en él o que pueda descargarse allí. Use cubiertas de plástico y bolsas de arena cuando trabaje a una distancia de 50' de un desagüe pluvial o sumidero.

### CONTENCIÓN



Aísle el área y asegure las bolsas de cemento una vez que las haya abierto. Impida que el cemento, la arena y los componentes del concreto (secos y húmedos) y los residuos acuosos resultantes después de cortar con sierra, fluyan hacia la calle, la alcantarilla y los desagües o que se vuelen con el viento. Cubra las bolsas de cemento en caso de lluvia.

### CAPTURA



Barra los residuos secos o limpie con una aspiradora los residuos de concreto húmedo y elimínelos en forma apropiada. Cree un área específica para enjuagar equipos y herramientas, y colóquela lejos de las entradas de automóviles y de los desagües pluviales. Desheche los residuos de concreto o yeso y el agua de enjuague, llevándolos a un sitio aprobado para su eliminación.



#### PREVENCIÓN DE CONTAMINACIÓN DE AGUAS PLUVIALES EN EL CONDADO DE SAN BERNARDINO

Big Bear • Chino • Chino Hills • Colton • Fontana • Grand Terrace • Highland • Loma Linda • Montclair • Ontario • Rancho Cucamonga • Redlands  
Rialto • San Bernardino • Condado de San Bernardino • Distrito de Control de Inundaciones del Condado de San Bernardino • Upland • Yucaipa



## SAN BERNARDINO COUNTY STORMWATER POLLUTION PREVENTION

### ■ Commercial landscape maintenance:

Yard waste, sediments and toxic lawn and garden chemicals used in commercial landscape maintenance often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates local waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution, protect public health and avoid fines or legal action.

- **Recycle Yard Waste:** Recycle leaves, grass clippings and other yard waste. Do not blow, sweep, rake or hose yard waste into the street. Let your customers know about grass cycling --the natural recycling of grass by leaving clippings on the lawn when mowing instead of using a grass catcher. Grass clippings will quickly decompose, returning valuable nutrients to the soil. You can get more information at [www.ciwmb.ca.gov/Organics](http://www.ciwmb.ca.gov/Organics).
- **Use Fertilizers, Herbicides & Pesticides Safely:** Fertilizers, herbicides and pesticides are often carried into the storm drain system by sprinkler runoff. Use natural, non-toxic alternatives to traditional garden chemicals. If you must use chemical fertilizers, herbicides, or pesticides spot apply rather than blanketing entire areas, avoid applying near curbs and driveways and never apply before a rain.
- **Recycle Hazardous Waste:** Pesticides, fertilizers, herbicides and motor oil contaminate landfills and should be disposed of through a Hazardous Waste Facility. For information on proper disposal, call (909) 386-8401.
- **Use Water Wisely:** Conserve water and prevent runoff by controlling the amount of water and direction of sprinklers. Sprinklers should be on long enough to allow water to soak into the ground but not so long as to cause runoff. Periodically inspect, fix leaks and realign sprinkler heads.
- **Planting:** Plant native vegetation to reduce the need of water, fertilizers, herbicides and pesticides.
- **Prevent Erosion:** Erosion washes sediments, debris and toxic runoff into the storm drain system, polluting waterways. Prevent erosion and sediment runoff by using ground cover, berms and vegetation down-slope to capture runoff. Avoid excavation or grading during wet weather.
- **Store Materials Safely:** Keep landscaping materials and debris away from the street, gutter and storm drains. On-site stockpiles of materials should be covered with plastic sheeting to protect from rain, wind and runoff.



For more information about how you can prevent stormwater pollution:  
[www.sbcounystormwater.org](http://www.sbcounystormwater.org)



## SAN BERNARDINO COUNTY STORMWATER POLLUTION PREVENTION

### ■ Carpet cleaning:

Toxic chemicals and discharged waste water from carpet, drapery, furniture and window cleaning often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates local waterways, making them unsafe for people and wildlife. Following these best management practices will prevent pollution, comply with regulations and protect public health.

These guidelines apply even if the cleaning products are labeled “nontoxic” or “biodegradable”. Although these products may be less harmful to the environment, they can still have harmful effects if they enter the storm drain untreated.

- **Dispose of wastewater properly:** Wastewater from cleaning equipment must be discharged into a sink, toilet, or other drain connected to the sanitary sewer system within sanitary sewer discharge limits, or hauled off and disposed of properly. Wastewater should never be discharged into a street, gutter, parking lot or storm drain.
- **Filter wastewater:** Carpet cleaning wastewater should be filtered before discharging it to the sanitary sewer since fibers and other debris in the wastewater can clog pipes. The filtered material can be disposed of in the garbage, as long as the waste is not contaminated with hazardous pollutants.

For more information about how you can prevent stormwater pollution:  
[www.sbcountystormwater.org](http://www.sbcountystormwater.org)

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**San Bernardino County Stormwater Program**

825 East Third Street • Room 127

San Bernardino, CA 94215-0835



**STORMWATER**  
**Pollution**  
**Prevention**

**LANDSCAPE MAINTENANCE**



# Pollution <sup>STORMWATER</sup> Prevention

## Stormwater Management Practices for Commercial Landscape Maintenance

Yard waste, sediments, and toxic lawn/garden chemicals used in commercial landscape maintenance often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates local waterways, making them unsafe for people and wildlife. Following these best management practices will prevent pollution, comply with regulations and protect public health.

### Recycle Yard Waste

Recycle leaves, grass clippings and other yard waste. Do not blow, sweep, rake or hose yard waste into the street. Try grasscycling - the natural recycling of grass by leaving clippings on the lawn when mowing. Grass clippings will quickly decompose, returning valuable nutrients to the soil. Further information can be obtained at [www.ciwmb.ca.gov/Organics](http://www.ciwmb.ca.gov/Organics).

### Use Fertilizers, Herbicides and Pesticides Safely

Fertilizers, herbicides and pesticides are often carried into the storm drain system by sprinkler runoff. Use of natural, non-toxic alternatives to the traditional fertilizers, herbicides and pesticides is highly recommended. If you must use chemical fertilizers, herbicides, or pesticides:

- Spot apply pesticides and herbicides, rather than blanketing entire areas.
- Avoid applying near curbs and driveways, and never apply before a rain.
- Apply fertilizers as needed, when plants can best use it, and when the potential for it being carried away by runoff is low.

### Recycle Hazardous Waste

Pesticides, fertilizers, herbicides and motor oil contaminate landfills and should be disposed of through a Hazardous Waste Facility, which accepts these types of materials. For information on proper disposal call, (909) 386-8401.

### Use Water Wisely

Conserve water and prevent runoff by controlling the amount of water and direction of sprinklers. Sprinklers should be on long enough to allow water to soak into the ground but not so long as to cause runoff. Periodically inspect, fix leaks and realign sprinkler heads. Plant native vegetation to reduce the need of water, fertilizers, herbicides, and pesticides.

### Prevent Erosion

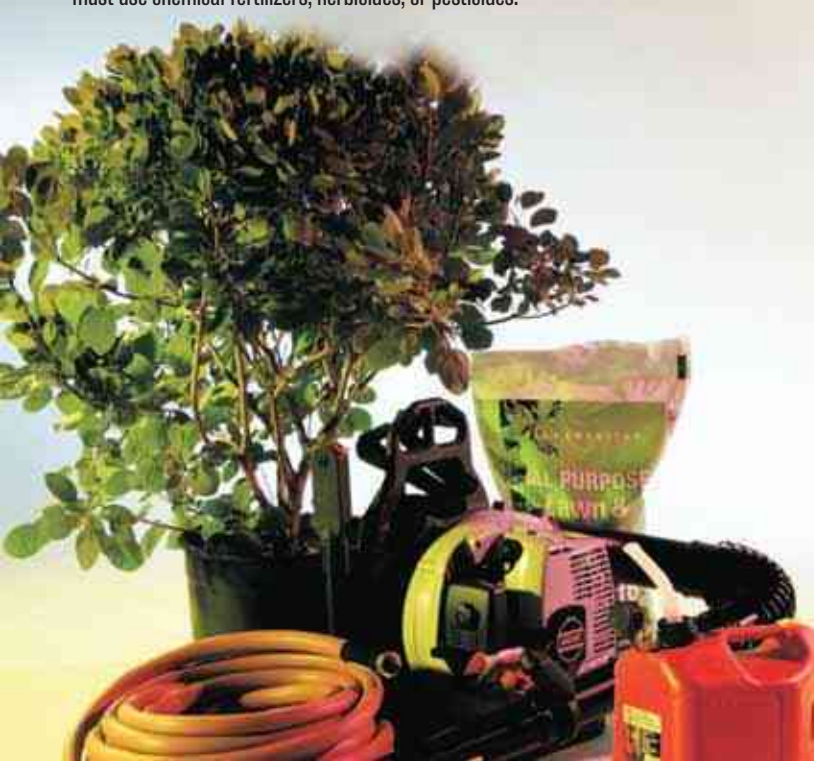
Erosion washes sediments, debris and toxic runoff into the storm drain system, polluting waterways.

- Prevent erosion and sediment runoff by using ground cover, berms and vegetation down-slope to capture runoff.
- Avoid excavation or grading during wet weather.

### Store Materials Safely

Keep landscaping materials and debris away from the street, gutter and storm drains. On-site stockpiles of materials must be covered with plastic sheeting to protect from rain, wind and runoff.

To report illegal dumping call  
**(877) WASTE18**  
or visit our website:  
**[sbcountystormwater.org](http://sbcountystormwater.org)**



**Worksheet H: Factor of Safety and Design Infiltration Rate and Worksheet**

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) $p = w \times v$
A	Suitability Assessment	Soil assessment methods	0.25	1	.25
		Predominant soil texture	0.25	2	.50
		Site soil variability	0.25	1	.25
		Depth to groundwater / impervious layer	0.25	1	.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			
B	Design	Tributary area size	0.25	3	.75
		Level of pretreatment/ expected sediment loads	0.25	1	.25
		Redundancy	0.25	3	.75
		Compaction during construction	0.25	2	.50
		Design Safety Factor, $S_B = \Sigma p$			
Combined Safety Factor, $S_{TOT} = S_A \times S_B$				2.81	
Measured Infiltration Rate, inch/hr, $K_M$ (corrected for test-specific bias)				2.56	
Design Infiltration Rate, in/hr, $K_{DESIGN} = S_{TOT} / K_M$				0.91	
<b>Supporting Data</b>					
Briefly describe infiltration test and provide reference to test forms:					
<p style="color: red; font-weight: bold;">PLEASE SEE ATTACHED INFILTRATION TESTING UNDER TAB 6.4E MISC. DATA.</p>					

**Note:** The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.0.

**DCV Analysis (DA-1)**

**PIONEER PARK**

**Tr. 20797**

<b>Design Capture Volume Calculation</b>	<b>Template Item</b>	<b>Value</b>	<b>Comment</b>
Project Area (ft <sup>2</sup> )	1	1,102,794	
Impervious Area (ft <sup>2</sup> )		703,045	
Imperviousness (Imp %)	2	63.75%	Imperviousness after applying preventative site design practices
Runoff Coefficient (Rc)	3	0.44	$Rc=0.858(\text{Imp}\%)^3-0.78(\text{Imp}\%)^2+0.774(\text{Imp}\%)+0.04$
P <sub>2yr-1hr</sub> (in)	4	0.480	Determine 1-hour rainfall depth for a 2-year return period from NOAA
C <sub>1</sub>		1.4807	Climatic region Valley=1.4807, Mountain=1.909, Desert=1.2371
P <sub>6</sub> (in)	5	0.71	Mean 6-hr precipitation = P <sub>2yr-1hr</sub> (in)*C <sub>1</sub>
C <sub>2</sub>	6	1.963	24 hrs = 1.582, 48 hrs = 1.963 Drawdown Rate
DCV (ft <sup>3</sup> )	7	<b>56,252</b>	Design Capture Volume
<b>Flow Based BMP Calculation (Qbmp)</b>			
Regression Coefficient for Intensity (I R <sub>C</sub> )		0.2787	Valley=0.2787 Mountain=0.3614 Desert=0.3250
Qbmp(ft <sup>3</sup> /sec)		<b>1.49</b>	$Q=(Rc)(P \times I R_c)(\text{Area}(\text{ac}))$

**WQMP Infiltration Basin 'A' Sizing (DA-1)**

**PIONEER PARK**

**Tr. 20797**

<b>Infiltration</b>			
Remaining DCV	1	56,252	ft <sup>3</sup>
Infiltration Rate	2	2.56	in/hr
Safety Factor	3	2.81	
P <sub>design</sub>	4	0.91	in/hr
Max Drawdown Time	5	48	hrs
Max Pond Depth to Drain in 48 hrs	6	3.64	ft
Max Pond Depth (Basin Max. Depth)	6	7.00	ft
Pond Depth	7	3.00	ft
Infiltrating Surface Area	8	22,090	ft <sup>2</sup>
Amended Soil Depth d <sub>media</sub>	9	0	ft
Amended Soil Porosity	10	0.3	
Gravel Depth d <sub>media</sub>	11	0	ft
Gravel Porosity	12	0.4	
Storm Duration	13	3	hrs
V <sub>ret</sub> =	14	71,301	ft <sup>3</sup>
Manufacturer's Retention	15	0	ft <sup>3</sup>
Total Retention Volume	16	71,301	ft <sup>3</sup>
Fraction of DCV Achieved	17	126.75%	
Full DCV Achieved	18	No	
Actual		39.52	hrs

**DCV Analysis (DA-2)**

**PIONEER PARK**

**Tr. 20797**

<b>Design Capture Volume Calculation</b>	<b>Template Item</b>	<b>Value</b>	<b>Comment</b>
Project Area (ft <sup>2</sup> )	1	329,345	
Impervious Area (ft <sup>2</sup> )		192,451	
Imperviousness (Imp %)	2	58.43%	Imperviousness after applying preventative site design practices
Runoff Coefficient (Rc)	3	0.40	$Rc=0.858(\text{Imp}\%)^3-0.78(\text{Imp}\%)^2+0.774(\text{Imp}\%)+0.04$
P <sub>2yr-1hr</sub> (in)	4	0.480	Determine 1-hour rainfall depth for a 2-year return period from NOAA
C <sub>1</sub>		1.4807	Climatic region Valley=1.4807, Mountain=1.909, Desert=1.2371
P <sub>6</sub> (in)	5	0.71	Mean 6-hr precipitation = P <sub>2yr-1hr</sub> (in)*C <sub>1</sub>
C <sub>2</sub>	6	1.963	24 hrs = 1.582, 48 hrs = 1.963 Drawdown Rate
DCV (ft <sup>3</sup> )	7	<b>15,207</b>	Design Capture Volume
<b>Flow Based BMP Calculation (Qbmp)</b>			
Regression Coefficient for Intensity (I Rc)		0.2787	Valley=0.2787 Mountain=0.3614 Desert=0.3250
Qbmp(ft <sup>3</sup> /sec)		<b>0.40</b>	$Q=(Rc)(P \times I Rc)(\text{Area}(\text{ac}))$

**WQMP Infiltration Basin 'B' Sizing (DA-2)**

**PIONEER PARK**

**Tr. 20797**

<b>Infiltration</b>			
Remaining DCV	1	15,207	ft <sup>3</sup>
Infiltration Rate	2	2.56	in/hr
Safety Factor	3	2.81	
P <sub>design</sub>	4	0.91	in/hr
Max Drawdown Time	5	48	hrs
Max Pond Depth to Drain in 48 hrs	6	3.64	ft
Max Pond Depth (Basin Max. Depth)	6	7.50	ft
Pond Depth	7	3.50	ft
Infiltrating Surface Area	8	8,735	ft <sup>2</sup>
Amended Soil Depth d <sub>media</sub>	9	0	ft
Amended Soil Porosity	10	0.3	
Gravel Depth d <sub>media</sub>	11	0	ft
Gravel Porosity	12	0.4	
Storm Duration	13	3	hrs
V <sub>ret</sub> =	14	32,562	ft <sup>3</sup>
Manufacturer's Retention	15	0	ft <sup>3</sup>
Total Retention Volume	16	32,562	ft <sup>3</sup>
Fraction of DCV Achieved	17	214.12%	
Full DCV Achieved	18	Yes	
Actual		46.10	hrs



# WQMP Project Report - San Bernardino Co. Stormwater Program

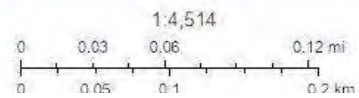
## Area of Interest (AOI) Information

Area : 1,383,758.08 ft<sup>2</sup>

May 26 2025 12:21:10 Pacific Daylight Time



 Parcels



## Project Site Parcel Numbers

#	ParcelNumber	Acreage	Area(ft <sup>2</sup> )
1	016709110	6.21	265,111.41
2	016709112	8.38	371,992.25
3	016709111	8.59	372,839.61
4	016709109	8.51	373,814.80

## HCOE Exempt Area

#	Type	Status	Area(ft <sup>2</sup> )
1	HCOE Exempt Areas	Yes	1,383,758.08

## Drainage Segment Details

#	System Number	Facility Name	Closest channel segment's susceptibility to Hydromodification	Highest downstream hydromodification susceptibility	Is this drainage segment subject to TMDLs?
1	3-101-1C	Santa Ana River	EHM	High	No

#	Are there downstream drainage segments subject to TMDLs?	Is this drainage segment a 303d listed stream?	Are there 303d listed streams downstream?	Area(ft <sup>2</sup> )
1	No	No	Yes	1,383,758.20

## Onsite Soil Groups

#	Onsite Soils Group	Soil Type	Soil Type Abbreviation	Area(ft <sup>2</sup> )
1	Soils - Hydro Group B	HbA HANFORD SANDY LOAM, 0 TO 2 PERCENT SLOPES B	HANFORD SANDY LOAM	586,898.47
2	Soils - Hydro Group A	TuB TUJUNGA LOAMY SAND, 0 TO 5 PERCENT SLOPES A	TUJUNGA LOAMY SAND	796,859.73

## Known Groundwater Contamination Plumes Within 1,000'

#	Name	Contaminant	Major Contaminant	Area(ft <sup>2</sup> )
1	Redlands-Lockhead	TCE Plume (5ug/L; August 2006 Interpretation)	TCE	725,020.30
2	Redlands-Lockhead	Perchlorate Plume (6ug/L; August 2006 Interpretation)	Perchlorate	1,383,758.08

## Studies and Reports Related to Project Site

#	Report Link	Source	Date	Area(ft <sup>2</sup> )
1	<a href="#">SBVMWD High Groundwater / Pressure Zone Area</a>	USGS & San Bern Valley Municipal Water District	2005	1,383,758.08
2	<a href="#">CSDP No. 7 Storm Drain Systems</a>	CM Engineering Associates	December 1982	1,139,065.26
3	<a href="#">CSDP No. 7 Storm Drain Systems</a>	CM Engineering Associates	December 1982	1,139,065.26
4	<a href="#">CSDP No. 7 Storm Drain Systems</a>	CM Engineering Associates	December 1982	1,139,065.26
5	<a href="#">CSDP No. 7 Storm Drain Hydraulic Design Data</a>	CM Engineering	December 1982	1,139,065.26
6	<a href="#">CSDP 4 CALC SHEET FOR HYDRO</a>	San Bernardino County Flood Control District	February 1975	1,383,758.08
7	<a href="#">CSDP 4 Hydrological Design Criteria</a>	Omer H. Brodie & Associates	May 1975	1,383,758.08

Note: The information provided in this report and on the Stormwater Geodatabase for the County of San Bernardino Stormwater Program is intended to provide basic guidance in the preparation of the applicant's Water Quality Management Plan (WQMP) and should not be relied upon without independent verification. without independent verification.



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF\\_tabular](#) | [PF\\_graphical](#) | [Maps\\_&\\_aerials](#)

PF tabular

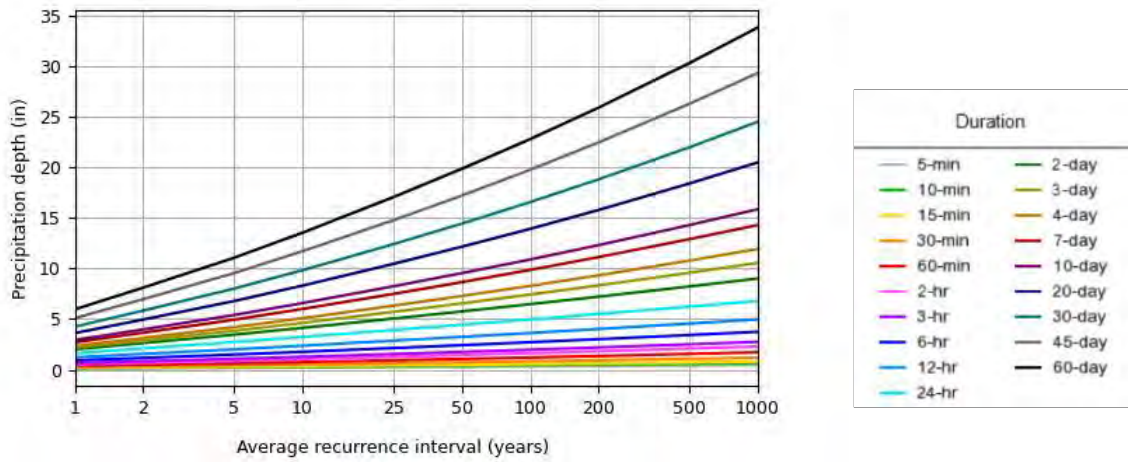
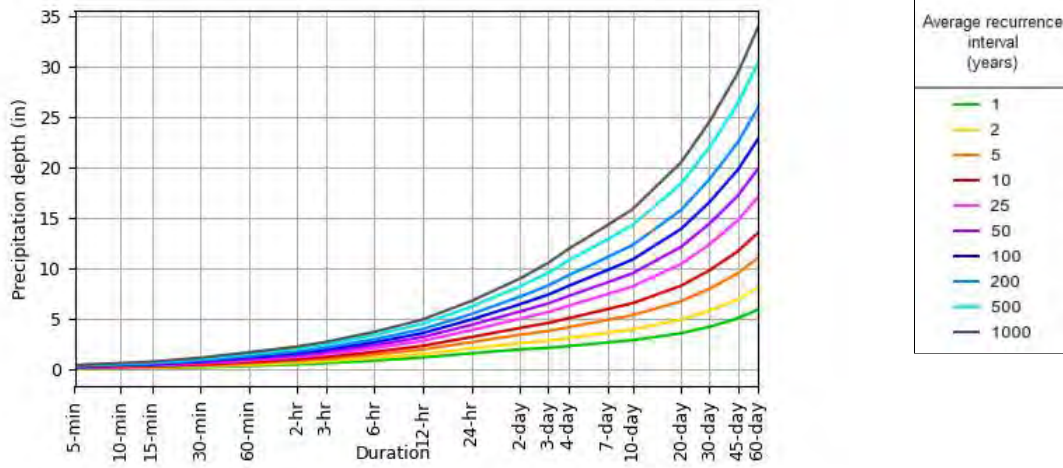
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup>										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.099 (0.082-0.120)	0.128 (0.106-0.156)	0.167 (0.139-0.204)	0.200 (0.164-0.246)	0.246 (0.195-0.313)	0.282 (0.219-0.367)	0.320 (0.242-0.426)	0.360 (0.265-0.493)	0.415 (0.293-0.594)	0.460 (0.313-0.682)
10-min	0.141 (0.118-0.172)	0.183 (0.152-0.223)	0.240 (0.199-0.292)	0.287 (0.236-0.353)	0.352 (0.280-0.448)	0.404 (0.314-0.525)	0.458 (0.347-0.611)	0.515 (0.380-0.707)	0.595 (0.420-0.852)	0.659 (0.449-0.977)
15-min	0.171 (0.142-0.208)	0.222 (0.184-0.270)	0.290 (0.240-0.353)	0.347 (0.285-0.426)	0.426 (0.338-0.542)	0.489 (0.380-0.635)	0.554 (0.420-0.739)	0.623 (0.459-0.855)	0.720 (0.508-1.03)	0.797 (0.543-1.18)
30-min	0.255 (0.212-0.309)	0.330 (0.274-0.401)	0.432 (0.358-0.526)	0.516 (0.424-0.635)	0.635 (0.504-0.807)	0.728 (0.566-0.946)	0.826 (0.626-1.10)	0.928 (0.684-1.27)	1.07 (0.757-1.53)	1.19 (0.809-1.76)
60-min	0.370 (0.308-0.449)	0.480 (0.399-0.583)	0.627 (0.520-0.765)	0.750 (0.616-0.922)	0.922 (0.732-1.17)	1.06 (0.822-1.38)	1.20 (0.909-1.60)	1.35 (0.993-1.85)	1.56 (1.10-2.23)	1.72 (1.18-2.56)
2-hr	0.528 (0.439-0.641)	0.677 (0.563-0.823)	0.877 (0.726-1.07)	1.04 (0.856-1.28)	1.27 (1.01-1.61)	1.45 (1.12-1.88)	1.63 (1.24-2.17)	1.82 (1.34-2.50)	2.09 (1.47-2.99)	2.30 (1.56-3.40)
3-hr	0.650 (0.541-0.789)	0.831 (0.690-1.01)	1.07 (0.887-1.30)	1.27 (1.04-1.56)	1.54 (1.22-1.96)	1.75 (1.36-2.28)	1.97 (1.49-2.62)	2.20 (1.62-3.01)	2.51 (1.77-3.59)	2.75 (1.87-4.08)
6-hr	0.910 (0.757-1.10)	1.16 (0.965-1.41)	1.49 (1.24-1.82)	1.76 (1.45-2.17)	2.13 (1.69-2.71)	2.42 (1.88-3.14)	2.71 (2.06-3.61)	3.01 (2.22-4.13)	3.42 (2.42-4.90)	3.74 (2.55-5.55)
12-hr	1.21 (1.01-1.47)	1.56 (1.29-1.89)	2.00 (1.66-2.44)	2.37 (1.94-2.91)	2.86 (2.27-3.64)	3.24 (2.52-4.21)	3.63 (2.75-4.83)	4.02 (2.96-5.52)	4.56 (3.22-6.52)	4.97 (3.39-7.37)
24-hr	1.63 (1.44-1.87)	2.10 (1.86-2.43)	2.73 (2.41-3.16)	3.23 (2.83-3.77)	3.92 (3.32-4.72)	4.44 (3.68-5.46)	4.97 (4.02-6.26)	5.51 (4.34-7.13)	6.24 (4.72-8.41)	6.80 (4.98-9.48)
2-day	2.01 (1.78-2.31)	2.63 (2.33-3.04)	3.46 (3.05-4.00)	4.13 (3.62-4.82)	5.05 (4.28-6.08)	5.76 (4.78-7.08)	6.48 (5.25-8.16)	7.22 (5.69-9.35)	8.23 (6.23-11.1)	9.02 (6.60-12.6)
3-day	2.17 (1.92-2.50)	2.89 (2.55-3.33)	3.84 (3.39-4.44)	4.63 (4.05-5.39)	5.71 (4.84-6.88)	6.56 (5.44-8.06)	7.43 (6.02-9.36)	8.34 (6.57-10.8)	9.58 (7.25-12.9)	10.6 (7.73-14.7)
4-day	2.34 (2.07-2.70)	3.14 (2.77-3.62)	4.20 (3.71-4.86)	5.09 (4.45-5.94)	6.32 (5.35-7.61)	7.29 (6.05-8.96)	8.29 (6.71-10.4)	9.34 (7.36-12.1)	10.8 (8.16-14.5)	11.9 (8.74-16.7)
7-day	2.70 (2.39-3.11)	3.66 (3.23-4.22)	4.94 (4.35-5.71)	6.00 (5.25-7.00)	7.48 (6.34-9.02)	8.65 (7.18-10.6)	9.87 (7.99-12.4)	11.1 (8.78-14.4)	12.9 (9.77-17.4)	14.3 (10.5-20.0)
10-day	2.92 (2.59-3.37)	3.98 (3.52-4.59)	5.40 (4.76-6.24)	6.58 (5.76-7.68)	8.24 (6.98-9.92)	9.54 (7.92-11.7)	10.9 (8.83-13.7)	12.3 (9.71-16.0)	14.3 (10.8-19.3)	15.9 (11.6-22.1)
20-day	3.61 (3.20-4.16)	4.96 (4.38-5.72)	6.78 (5.98-7.84)	8.31 (7.27-9.69)	10.5 (8.86-12.6)	12.2 (10.1-14.9)	13.9 (11.3-17.5)	15.8 (12.5-20.5)	18.4 (13.9-24.8)	20.5 (15.0-28.6)
30-day	4.25 (3.76-4.90)	5.84 (5.17-6.74)	8.01 (7.07-9.27)	9.84 (8.61-11.5)	12.4 (10.5-14.9)	14.4 (12.0-17.8)	16.6 (13.4-20.9)	18.8 (14.8-24.4)	22.0 (16.6-29.7)	24.5 (17.9-34.2)
45-day	5.08 (4.50-5.86)	6.97 (6.17-8.04)	9.54 (8.42-11.0)	11.7 (10.2-13.7)	14.8 (12.5-17.8)	17.2 (14.3-21.2)	19.8 (16.0-24.9)	22.5 (17.7-29.1)	26.3 (19.9-35.5)	29.4 (21.5-40.9)
60-day	5.96 (5.27-6.86)	8.11 (7.18-9.36)	11.1 (9.75-12.8)	13.5 (11.9-15.8)	17.1 (14.4-20.5)	19.9 (16.5-24.4)	22.8 (18.5-28.7)	25.9 (20.4-33.6)	30.3 (23.0-40.9)	33.9 (24.8-47.2)

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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PF graphical

PDS-based depth-duration-frequency (DDF) curves  
 Latitude: 34.0792°, Longitude: -117.1983°



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**Maps & aerals**

**Small scale terrain**



**Large scale terrain**



Large scale map



Large scale aerial



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Silver Spring, MD 20910  
Questions?: [HDSC.Questions@noaa.gov](mailto:HDSC.Questions@noaa.gov)

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**GEOTECHNICAL AND INFILTRATION EVALUATION  
PROPOSED RESIDENTIAL DEVELOPMENT  
ASSESSOR'S PARCEL NUMBERS (APNs) 167-091-09 THROUGH -12  
NORTHEAST OF THE 210 FREEWAY AND WEST SAN BERNARDINO AVENUE  
REDLANDS, SAN BERNARDINO COUNTY, CALIFORNIA**

**PREPARED FOR**

**REDLANDS PIONEER PARTNERS, LLC  
c/o CITIVEST  
4350 VON KARMAN AVENUE, SUITE 200  
NEWPORT BEACH, CALIFORNIA 92660**

**PREPARED BY**

**GEOTEK, INC.  
1548 NORTH MAPLE STREET  
CORONA, CALIFORNIA 92878**





**GeoTek, Inc.**  
1548 North Maple Street, Corona, California 92878  
(951) 710-1160 Office (951) 710-1167 Fax [www.geotekusa.com](http://www.geotekusa.com)

April 8, 2025  
Project No. 4212-CR

**Redlands Pioneer Partners, LLC**  
**c/o Citivest**  
4350 Von Karman Avenue, Suite 200  
Newport Beach, California 92660

Attention: Mr. Quantas Corman and Mr. Michael Mossman

Subject: **Geotechnical and Infiltration Evaluation**  
Proposed Residential Development  
Assessor's Parcel Numbers (APNs): 167-091-09 through -12  
Northeast of the 210 Freeway and West San Bernardino Avenue  
Redlands, San Bernardino County, California

Dear Mr. Quantas Corman and Mr. Michael Mossman:

GeoTek, Inc. (GeoTek) is pleased to provide the results of this Geotechnical and Infiltration Evaluation for a proposed residential development that will be constructed at the northeast intersection of the 210 Freeway and West San Bernardino Avenue, in the City of Redlands, San Bernardino County, California. This report presents a discussion of GeoTek's evaluation and provides preliminary geotechnical recommendations for site preparation, foundation design, preliminary infiltration rates and construction of the proposed site improvements.

Based upon review and evaluation, site development appears feasible from a geotechnical viewpoint provided that the recommendations included in this report are incorporated into the design and construction phases of site development.

The opportunity to be of service is sincerely appreciated. If you have any questions, please do not hesitate to contact GeoTek.

Respectfully submitted,  
**GeoTek, Inc.**



Bruce A. Hick  
GE 2284, Exp. 12/31/26  
Geotechnical Engineer

Edward H. LaMont  
CEG 1892, Exp. 07/31/26  
Principal Geologist



Michael A. Lucas  
PE 95468, Exp 12/31/25  
Project Engineer

Distribution: (1) Addressee via email (one PDF file)

[https://geotekusa.sharepoint.com/teams/Corona\\_Branch/Shared Documents/Projects/GeoTek Inc/4200/4212/GEO/Working Files/4212CR GEO INFILT Redlands 03-3-2025.docx](https://geotekusa.sharepoint.com/teams/Corona_Branch/Shared Documents/Projects/GeoTek Inc/4200/4212/GEO/Working Files/4212CR GEO INFILT Redlands 03-3-2025.docx)

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