MAJOR STORMWATER MANAGEMENT PLAN

BRIGHTWATER RANCH TM# 5306-PL2

PROJECT NO. PDS2003-3100-5306

APRIL 20, 2015

County of San Diego

Prepared For:

Pulte Homes
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Prepared By:

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PDC Job No. 2862.02

The selection, sizing, and preliminary design of stormwater treatment and other control measures in this plan have been prepared under the direction of the following Registered Civil Engineer and meet the requirements of Regional Water Quality Control Board Order R9-2007-0001 and subsequent amendments.

Prepared by: C. Szczublewski, P.E.
Updated & Reviewed by: C. Pack, P.E.

Under the supervision of

Debby Reece, PE RCE 56148
Registration Expires 12/31/16

Major Stormwater Management Plan
For Priority Projects

The Major Stormwater Management Plan (Major SWMP) must be completed in its entirety and accompany applications to the County for a permit or approval associated with certain types of development projects. To determine whether your project is required to submit a Major or Minor SWMP, please reference the County's Stormwater Intake Form for Development Projects.

INTRODUCTION

Project Name:	Brightwater Ranch
Permit Number (Land Development Projects):	PDS2003-3100-5306
Work Authorization Number (CIP only):	N/A
Applicant:	Pulte Homes
Applicant's Address:	27101 Puerta Real, Suite 300 Mission Viejo, CA 92691
Plan Prepared By (*Leave blank if same as applicant*):	Project Design Consultants 701 B Street, Suite 800, San Diego, CA 92101
Date:	April 20, 2015
Revision Date (If applicable):	

The County of San Diego Watershed Protection, Stormwater Management, and Discharge Control Ordinance (WPO) (Ordinance No. 9926) requires all applications for a permit or approval associated with a development project must be accompanied by a stormwater management plan (SWMP) (section 67.806.b). The purpose of the SWMP is to describe how the project will minimize the short and long-term impacts on receiving water quality through the implementation of best management practices (BMPs). Projects that meet the criteria for a priority project are required to prepare a Major SWMP.

Since the SWMP is a living document, revisions may be necessary during various stages of approval by the County. Please provide the approval information requested below.

Project Review Stage	Does the SWMP need revisions?		If YES, Provide Revision Date
	YES	NO	
Tentative Map			

Instructions for a Major SWMP can be downloaded at
http://www.sdcounty.ca.gov/dpw/watersheds/susmp/susmp.html.

Completion of the following checklist and attachments will fulfill the requirements of a Major SWMP for the project listed above.

STEP 1

PRIORITY DEVELOPMENT PROJECT DETERMINATION

TABLE 1: IS THE PROJECT IN ANY OF THESE CATEGORIES?

Yes ✓	No ☐	A	Housing subdivisions of 10 or more dwelling units. Examples: single-family homes, multi-family homes, condominiums, and apartments.
Yes ☐	No ✓	B	Commercial—greater than one acre. Any development other than heavy industry or residential. Examples: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; municipal facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; airfields; and other light industrial facilities.
Yes ☐	No ✓	C	Heavy industry—greater than one acre. Examples: manufacturing plants, food processing plants, metal working facilities, printing plants, and fleet storage areas (bus, truck, etc.).
Yes ☐	No ✓	D	Automotive repair shops. A facility categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539.
Yes ☐	No ✓	E	Restaurants. Any facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet shall meet all SUSMP requirements except for structural treatment BMP and numeric sizing criteria requirements and hydromodification requirements.
Yes ✓	No ☐	F	Hillside development greater than 5,000 square feet. Any development that creates 5,000 square feet of impervious surface and is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.
Yes ✓	No ☐	G	Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.
Yes ☐	No ✓	H	Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to urban runoff.
Yes ✓	No ☐	I	Street, roads, highways, and freeways. Any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.
Yes ☐	No ✓	J	Retail Gasoline Outlets (RGOs) that are: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

To use the table, review each definition A through K. If any of the definitions match, the project is a Priority Development Project. Note some thresholds are defined by square footage of impervious area created; others by the total area of the development. Please see special requirements for previously developed sites and project exemptions on page 6 of the County Standard Urban Stormwater Mitigation Plan (SUSMP).

STEP 2

PROJECT STORMWATER QUALITY DETERMINATION

Total Project Site Area: 76.23 acres (total project ownership)

Estimated amount of disturbed acreage: 26.25 acres
(If >1 acre, you must also provide a WDID number from the SWRCB) WDID: TBD during final engineering

Complete A through C and the calculations below to determine the amount of impervious surface on your project before and after construction.

A. Total size of project site: 76.23 acres (total project ownership)
B. Total impervious area (including roof tops) before construction: approximately 0.27 acres
C. Total impervious area (including roof tops) after construction: approximately 10.77 acres

Calculate percent impervious before construction: B/A = 0.35% (onsite)

Calculate percent impervious after construction: C/A = 14.1% (onsite)

Please provide detailed descriptions regarding the following questions:

TABLE 2: PROJECT SPECIFIC STORMWATER ANALYSIS

1.	Please provide a brief description of the project.
	The Brightwater Ranch project (project) covers approximately 76 acres. The project's name was formerly known as Los Coches during previous entitlement work. The project is located in the unincorporated area of the County of San Diego (County) and is approximately 0.3 miles west of Business Route 8, and 0.4 mile south of Los Coches Road. The project is bounded by 1) undeveloped area to the northwest, 2) an existing subdivision to the north, 3) a mobile home park to the south, and 4) a future development named Jackson Ridge to the east. Refer to the Vicinity Map in Attachment A. The proposed development consists of subdividing the site into 66 lots. The site will be developed into single family homes (66 lots of 10,000 to 36,000 square feet). The lots will be clustered in the least environmentally sensitive portions of the site (~9.4 acres in the northern corner and 16 acres in the eastern corner of the site) and will include associated hardscape, landscaping, and utilities (an additional 0.9 acres along the southern perimeter is designated as a water easement). The remainder of the site (~50 acres consisting of the steep hillsides) will be preserved as open space (Lot A). The existing 30 foot road, which provides access to an existing water tank within Lot A (conveyed to Helix Water District per Doc.#90-160944) will remain. The 0.57 acres surrounding the water tank is not included in the acreage of the site, but the 0.27 acres associated with the access road is included as the only existing area of imperviousness currently onsite.
2.	Describe the current and proposed zoning and land use designation.
	The current and proposed zoning for the project area is "RS4." The site is currently vacant except for the water tank at the top of the hill and its access road.
3.	Describe the pre-project and post-project topography of the project. (Show on Plan)
	Under existing conditions, the project area currently consists of unimproved natural terrain, covered with annual grasses and some brush (Coastal Sage Scrub). Slopes vary from a very steep (40%) to moderate (8%). Natural drainage channels collect and convey flows onsite generally from southwest to northeast. Runoff discharges from the site at two main concentration points at the northeast edge of the project. There is a small amount of run-on at the eastern corner of the site; however, the area of significant run-on is from the south. A portion of the existing trailer park discharges onto the project area. The only impervious area currently onsite is the access road to the existing water tank at the top of the hill. Under proposed conditions, approximately 25.3 acres shall be mass graded and subdivided into single family lots. The estimated imperviousness of this portion of the site is approximately 40%, which includes associated hardscape consistent with such a development (access streets, driveways, patios, and rooftops). In addition, a water easement is proposed along the southern perimeter of the site. Approximately 50 acres shall be preserved as open space, consisting of steep to moderate hillsides with annual grasses and brush typical of the region, making the proposed overall imperviousness of the site approximately 14.1%, including the existing access road to the existing water tank.
4.	Describe the soil classification, permeability, erodibility, and depth to groundwater for Low Impact Development (LID) and Treatment BMP consideration. (Show on Plan) If

	infiltration BMPs are proposed, a Geotechnical Engineer must certify infiltration BMPs in Attachment E.
	The site was assessed using the USDA NRCS Web Soil Survey and the associated maps are included in Attachment A. Hydrologic Soil Groups B and C are the predominant soil type. The erosivity map shows an average K factor rating of 0.25, which indicates a relatively low susceptibility of soil particles to detach and be transported by rainfall and runoff. Medium textured soils, such as the silt loam soils, have a moderate K values, about 0.25 to 0.4. The project site is primarily made up of sandy loams. USDA Soil Survey described the water table depth for the site as greater than 200 centimeters from the surface.
5.	Describe if contaminated or hazardous soils are within the project area. (Show on Plan)
	According to the Regional Board, Case # 9 000521N03 was filed against Wildfire Burn San Dieguito, which had a temporary disposal site for solid waste from the 2003 wildfires on this property. The contaminated soil was excavated and cleanup was completed on September 30, 2005 in accordance with Addendum No. 1 to Resolution No. R9-2003-0391. The case is closed. No other contaminated or hazardous soils are known to exist within the project area at this time. Refer to Exhibit A in Attachment A for location.

6.	Describe the existing site drainage and natural hydrologic features. (Show on Plan)
	The project is located within the San Diego River watershed (Hydrologic Unit 907), occupying less than 0.03% of the 440 square mile drainage area. HU 907 is the second largest watershed in San Diego County. Important hydrologic resources in the watershed include five water storage reservoirs, a large groundwater aquifer, extensive riparian habitat, and coastal wetlands. Approximately 58.4% of the watershed is currently undeveloped. The majority of this undeveloped land is in the upper, eastern portion of the watershed, while the lower reaches are more highly urbanized. The river flood plain near Lakeside represents an important undeveloped area that hosts a wide variety of intact habitats and endangered species. The project site is not within the flood plain; refer to the FIRMette in Attachment A. Under existing conditions, runoff from the western side of the hill discharges to the El Cajon Hydrologic Sub-area (HSA 907.13), while runoff from the remainder of the site discharges to the Coches HSA (907.14). Approximately 16% of the site discharges to HSA 907.13 and 84% drains into HSA 907.14; refer to the Basin Plan Map in Attachment A. No major drainage structures are located on the property. Runoff flows overland down the hillsides. There is a concrete brow ditch that runs along the western perimeter of the site, discharging into a natural drainage basin approximately 350 feet north of the termination point of Jackson Hill Drive. Any flow reaching the offsite County storm drain systems west of the site (in HSA 907.13) would discharge to Forrester Creek prior to entering the San Diego River. The mouth of the San Diego River empties into the Pacific Ocean at the community of Ocean Beach. Runoff from the remainder of the site discharges at two main concentration points at the northeast edge of the project. There is a concrete brow ditch that runs along the eastern perimeter of the property. Flows discharging to the east are collected by two existing offsite culverts, which convey flows to and within the existing Foxborough Lane and Wellington Hill Drive storm drain systems. The offsite existing County improvements consist of street curb and gutter system, curb inlets, a 30-inch cast-in-place concrete pipe (CIPCP) on Foxborough Lane, and two CIPCPs on Wellington Hill Drive (one 30" and one 36"). Runoff from HSA 907.14 discharges to Los Coches Creek prior to entering the San Diego River, which ultimately empties into the Pacific Ocean. There is a small amount of run-on at the eastern corner of the site; however, the area of significant run-on is from the south. A portion of the existing trailer park discharges onto the project area. All of the applicable drainage area is included in the hydrology and drainage study. For more information on the existing and proposed drainage conditions, refer to the Drainage Report prepared by Project Design Consultants (PDC) under a separate cover. Under proposed conditions, approximately 25.3 acres shall be mass graded and subdivided into single family lots. Proposed grading shall mimic existing drainage patterns. The onsite drainage improvements consist of streets, curbs and gutters, curb inlets, catch basins, detention basins for hydromodification and water quality purposes, other water quality BMPs, and underground pipe storm drain systems. Flow will be conveyed by the street curb and gutter systems to the proposed curb inlets. The onsite storm drain systems will connect to the existing County storm drain systems on Foxborough Lane and Wellington Hill Drive. The detention facilities shall be used to allow for sedimentation of onsite runoff prior to offsite discharge. Post-project discharge rates and durations shall not deviate above

	the pre-project rates and durations by more than 10% for the range of flows regulated by the final hydromodification requirements.
7.	Describe site features and conditions that constrain, or provide opportunities for stormwater control, such as LID features.
	The proposed land plan clusters the development, limiting its footprint to the least environmentally sensitive areas (ESAs) of the site, the northern and the eastern corners. The low density residential development minimizes imperviousness and directly connected impervious areas and maximizes infiltration. Hardscape throughout the site is designed to the minimum widths necessary. Pipes, curb inlets, catch basins, and curb-and-gutter systems will be designed to convey the runoff away from the proposed building pads and to the proposed project outlet locations. Garages provide indoor parking, reducing the potential for transport of stormwater pollutants from exposed parking areas. Under proposed conditions, the existing drainage patterns shall be maintained. To the maximum extent practicable, onsite runoff shall be directed into the proposed extended detention facility, allowing for sedimentation of onsite runoff prior to offsite discharge. Offsite discharge shall be in compliance with peak flow and duration requirements as stated in the County SUSMP Manual. Approximately 50 acres have been set aside as open space with five self-treating areas (STAs), which drain directly offsite. The current site plan includes one graded open detention basin, which will fulfill the dual purpose of achieving the flow-duration requirements set forth in the County hydromodification management plan (HMP) as well as addressing the stormwater quality treatment criteria set forth in the Municipal Separate Storm Sewer System (MS4) Permit. The basin will serve as the post-construction treatment BMP for the developed areas. Therefore, this detention system will be designed to capture and retain runoff temporarily, releasing it to receiving waters in compliance with the flow-duration requirements of the HMP. In addition, since the basin will not be lined, it will be vegetated and some infiltration will be allowed, although a permanent pool of water will not be held between storm events. Therefore, as an ecological structural control, it will provide LID benefits.
8.	Is this project within the environmentally sensitive areas (ESAs) as defined on the maps in Appendix A of the *County of San Diego Standard Urban Stormwater Mitigation Plan for Land Development and Public Improvement Projects?*
	Yes, there are ESAs identified onsite; refer to County ESA Map in Attachment A. The environmental factor associated with the site ESA status are slopes of greater than 25%. These steep hillsides will not be disturbed during the development of the less sensitive portions of the site.
9.	Is this an emergency project?
	No

CHANNELS & DRAINAGES

Complete the following checklist to determine if the project includes work in channels.

TABLE 3: CHANNEL & DRAINAGE ANALYSIS

No.	CRITERIA	YES	NO	N/A	COMMENTS
1.	Will the project include work in channels?		√		If YES, go to 2. If NO, go to 13.
2.	Will the project increase velocity or volume of downstream flow?				If YES go to 6.
3.	Will the project discharge to unlined channels?				If YES go to 6.
4.	Will the project increase potential sediment load of downstream flow?				If YES go to 6.
5.	Will the project encroach, cross, realign, or cause other hydraulic changes to a stream that may affect downstream channel stability?				If YES go to 8.
6.	Review channel lining materials and design for stream bank erosion.				Continue to 7.
7.	Consider channel erosion control measures within the project limits as well as downstream. Consider scour velocity.				Continue to 8.
8.	Include, where appropriate, energy dissipation devices at culverts.				Continue to 9.
9.	Ensure all transitions between culvert outlets/headwalls/wingwalls and channels are smooth to reduce turbulence and scour.				Continue to 10.
10.	Include, if appropriate, detention facilities to reduce peak discharges.				
11.	"Hardening" natural downstream areas to prevent erosion is not an acceptable technique for protecting channel slopes, unless pre-development conditions are determined to be so erosive that hardening would be required even in the absence of the proposed development.				Continue to 12.
12.	Provide other design principles that are comparable and equally effective.				Continue to 13.
13.	End			√	

TEMPORARY CONSTRUCTION BMPs

Please check the construction BMPs that may be implemented during construction of the project. The applicant is responsible for the placement and maintenance of the BMPs incorporated into the final project design.

☒ Silt Fence
☒ Fiber Rolls
☒ Street Sweeping and Vacuuming
☒ Storm Drain Inlet Protection
☒ Stockpile Management
☒ Solid Waste Management
☒ Stabilized Construction Entrance/Exit
☒ Dewatering Operations
☒ Vehicle and Equipment Maintenance
☒ Desilting Basin
☒ Gravel Bag Berm
☐ Sandbag Barrier
☒ Material Delivery and Storage
☒ Spill Prevention and Control
☒ Concrete Waste Management
☒ Water Conservation Practices
☒ Paving and Grinding Operations
☒ Any minor slopes created incidental to construction and not subject to a major or minor grading permit shall be protected by covering with plastic or tarp prior to a rain event, and shall have vegetative cover reestablished within 180 days of completion of the slope and prior to final building approval.

EXCEPTIONAL THREAT TO WATER QUALITY DETERMINATION

Complete the checklist below to determine if a proposed project will pose an "exceptional threat to water quality," and therefore require Advanced Treatment Best Management Practices during the construction phase.

TABLE 4: EXCEPTIONAL THREAT TO WATER QUALITY DETERMINATION

No.	CRITERIA	YES	NO	INFORMATION
1.	Is all or part of the proposed project site within 200 feet of waters named on the Clean Water Act (CWA) Section 303(d) list of Water Quality Limited Segments as impaired for sedimentation and/or turbidity? Current 303(d) list may be obtained from the following site: http://www.waterboards.ca.gov/water_issues/programs/2010state_ir_reports/category5_report.shtml		√	If YES, continue to 2. If NO, go to 5.
2.	Will the project disturb more than 5 acres, including all phases of the development?			If YES, continue to 3. If NO, go to 5.
3.	Will the project disturb slopes that are steeper than 4:1 (horizontal:vertical) with at least 10 feet of relief, and that drain toward the 303(d) listed receiving water for sedimentation and/or turbidity?			If YES, continue to 4. If NO, go to 5.
4.	Will the project disturb soils with a predominance of USDA-NRCS Erosion factors k_f greater than or equal to 0.4? http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm			If YES, continue to 6. If NO, go to 5.

No.	CRITERIA	YES	NO	INFORMATION
5.	Project is not required to use Advanced Treatment BMPs.	√		Document for Project Files by referencing this checklist.
6.	Project poses an "exceptional threat to water quality" and is required to use Advanced Treatment BMPs.			Advanced Treatment BMPs must be consistent with WPO section 67.811(b)(20)(D) performance criteria.

Exemption potentially available for projects that require advanced treatment: Project proponent may perform a Revised Universal Soil Loss Equation, Version 2 (RUSLE 2), Modified Universal Soil Loss Equation (MUSLE), or similar analysis that shows to the County official's satisfaction that advanced treatment is not required.

STEP 3

HYDROMODIFICATION DETERMINATION

The following questions provide a guide to collecting information relevant to HMP issues. If the project is exempt from the HMP criteria, please provide the supporting documentation in Attachment H. Please reference the full descriptions of the HMP exemptions located in Figure 1-1 of the County SUSMP.

TABLE 5: HYDROMODIFICATION DETERMINATION

No.	QUESTIONS	YES	NO	INFORMATION
1.	Will the project reduce the pre-project impervious area and are the unmitigated post-project outflows (outflows without detention routing) to each outlet location less as compared to the pre-project condition?		√	If NO, continue to 2. If YES, go to 7.
2.	Would the project site discharge runoff directly to an exempt receiving water, such as the Pacific Ocean, San Diego Bay, an exempt reservoir, or a tidally-influenced area?		√	If NO, continue to 3. If YES, go to 7.
3.	Would the project site discharge to a stabilized conveyance system, which has the capacity for the ultimate Q_{10}, and extends to the Pacific Ocean, San Diego Bay, a tidally influenced area, an exempt river reach or reservoir?		√	If NO, continue to 4. If YES, go to 7.

No.	QUESTIONS	YES	NO	INFORMATION
4.	Does the contributing watershed area to which the project discharges have an impervious area percentage greater than 70 percent?		√	If NO, continue to 5. If YES, go to 7.
5.	Is this an urban infill project which discharges to an existing hardened or rehabilitated conveyance system that extends beyond the "domain of analysis," where the potential for cumulative impacts in the watershed are low, and the ultimate receiving channel has a "Low" susceptibility to erosion as defined in the SCCWRP channel assessment tool?		√	If NO, continue to 6. If YES, go to 7.
6.	Project is required to manage hydromodification impacts.	√		Reference Appendix G "Hydromodification Management Plan" of the County SUSMP.
7.	Project is not required to manage hydromodification impacts.			Hydromodification Exempt. Keep on file.

For more information regarding how the project complies with the hydromodification requirements, refer to the Hydromodification Management Study prepared by PDC under separate cover.

STEP 4

POLLUTANTS OF CONCERN DETERMINATION

WATERSHED

Please check the watershed(s) for the project.

☐ San Juan 901	☐ Santa Margarita 902	☐ San Luis Rey 903	☐ Carlsbad 904
☐ San Dieguito 905	☐ Penasquitos 906	☒ **San Diego 907**	☐ Sweetwater 909
☐ Otay 910	☐ Tijuana 911	☐ Whitewater 719*	☐ Clark 720*
☐ West Salton 721*	☐ Anza Borrego 722*	☐ Imperial 723*	

http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/index.shtml
*Projects located fully within these watersheds require only a Minor SWMP.

HYDROLOGIC SUB-AREA NAME AND BASIN NUMBER(S)

Basin Number	Sub-Area Name
907.13	Lower San Diego HA, El Cajon HSA

Basin Number	Sub-Area Name
907.14	Lower San Diego HA, Coches HSA

http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/index.shtml

RECEIVING WATERS that each project discharge point proposes to discharge to.

Receiving Waters (River, creek, stream, etc.)	**HU Basin Number**	**Impairment List** [303(d) listed waters or waters with established TMDLs from **Table 7**]	**Distance to Project**
Los Coches Creek	907.14	Selenium (source unknown); currently no TMDLs established (~2019)	~ 2000 feet north of site
San Diego River (Lower)	907.11	Enterococcus, low dissolved oxygen, nitrogen, phosphorus, and toxicity (all from point/nonpoint sources and urban runoff/storm sewers), fecal coliform (from point/nonpoint sources, urban runoff/storm sewers, and wastewater), manganese (source unknown), and TDS (from flow regulation/modification, natural sources, point/nonpoint sources, and urban runoff/storm sewers); TMDL for bacteria established.	~ 1.7 miles downstream from Los Coches Creek and 3.4 miles downstream from Forrester Creek
Forester Creek	907.12	Fecal coliform (from spills, point/nonpoint sources, and urban runoff/storm sewers), selenium (source unknown), total dissolved solids (TDS, from agriculture return flows, flow regulation/modification, point/nonpoint sources, and urban runoff/storm sewers), pH (from spills, point/nonpoint sources, habitat modification, and industrial point sources); TMDL for bacteria established.	~ 3.3 miles southwest of site
Pacific Ocean Shoreline, San Diego HU, at the San Diego River outlet, at Dog Beach	907.11	Enterococcus (source unknown) and total coliform (from point/nonpoint sources and urban runoff/storm sewers); TMDL for bacteria established.	~ 16.25 miles downstream from the Forrester Creek confluence

http://www.waterboards.ca.gov/water_issues/programs/2010state_ir_reports/category5_report.shtml

According to the San Diego River Watershed Urban Runoff Management Program (WURMP) Annual Report, the high priority pollutants for the watershed continue to be bacteria indicators, phosphorus, TDS (including chloride), low dissolved oxygen, and turbidity. For residential land use, the study identified waste and landscape management, especially over-irrigation, debris in catch basins and outdoor grease management as particular sources of concern in the watershed.

The mouth of the San Diego River discharges into the Pacific Ocean at the community of Ocean

Beach. Beach postings and closures from elevated levels of coliform bacteria more than doubled between 1996 and 1999 due to urban runoff and sewage spills. Discharge from the San Diego River outlet may also influence water quality in other nearby coastal areas including Sunset Cliffs, Pacific Beach, and Mission Beach.

GROUND WATERS

Ground Waters	HU Basin Number	MUN	AGR	IND	PROC	FRSH	GWR
El Cajon HSA	907.13	●	●	○	○		
Coches HSA	907.14	●	●	●	○		

http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/index.shtml

+ Excepted from Municipal ● Existing Beneficial Use ○ Potential Beneficial Use

The extensive groundwater resources beneath the San Diego River provide a cost effective and reliable water supply to four local water districts and the City of San Diego. Excessive extraction, increasing total suspended solids and MTBE contamination now threatens this resource.

PROJECT ANTICIPATED AND POTENTIAL POLLUTANTS

Using Table 6, identify pollutants that are anticipated to be generated from the proposed priority project categories. Pollutants associated with any hazardous material sites that have been remediated or are not threatened by the proposed project are not considered a pollutant of concern.

TABLE 6: ANTICIPATED AND POTENTIAL POLLUTANTS GENERATED BY LAND USE TYPE

PDP Categories	*General Pollutant Categories*								
	Sediment	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Detached Residential Development	X	X			X	X	X	X	X
Hillside Development > 5000 ft²	X	X			X	X	X		X
Streets, Highways & Freeways	X	P(1)	X	X(4)	X	P(5)	X		
X = anticipated P = potential	(1) A potential pollutant if landscaping exists onsite. (2) A potential pollutant if the project includes uncovered parking areas. (3) A potential pollutant if land use involves food or animal waste products. (4) Including petroleum hydrocarbons (5) Including solvents								

PROJECT POLLUTANTS OF CONCERN SUMMARY TABLE

Please summarize the identified project pollutant of concern by checking the appropriate boxes in the table below and list any surface water impairments identified. Pollutants anticipated to be generated by the project, which are also causing impairment of receiving waters, shall be considered the primary pollutants of concern (POCs). For projects where no primary POCs exist, those pollutants identified as anticipated shall be considered secondary POCs.

TABLE 7: PROJECT POLLUTANTS OF CONCERN

Pollutant Category	Anticipated (X)	Potential (P)	Surface Water Impairments (determined by the receiving water impairments on page 11)
Sediments	X		None
Nutrients	X	P	Impairments in the San Diego River (low dissolved oxygen, phosphorus, nitrogen, and TDS) ~ 2 miles downstream
Heavy Metals	X		Impairments in San Diego River (manganese, TDS, and toxicity) ~ 2 miles downstream
Organic Compounds	X		None
Trash & Debris	X		None
Oxygen Demanding Substances	X	P	Impairments in San Diego River (low dissolved oxygen) ~ 2 miles downstream
Oil & Grease	X		Impairments in Forester and Los Coches Creeks (selenium) ~ 3.3 and 0.4 miles downstream
Bacteria & Viruses	X		Impairments in Forester Creek, the Pacific Ocean Shoreline, and the San Diego River (enterococcus, fecal coliform, and total coliform) ~ 2 to 20 miles downstream
Pesticides	X		None

According to the 2010 303(d) list: Forrester Creek is 303(d) listed for fecal coliform, selenium TDS, and pH; Los Coches Creek is listed for selenium; the Pacific Ocean Shoreline at the mouth of the San Diego River is 303(d) listed for enterococcus and total coliform; and the Lower San Diego River is listed for enterococcus, low dissolved oxygen, nitrogen, phosphorus, toxicity, fecal coliform, manganese, and TDS.

The closest impaired waterbody is approximately 2000 feet north of the northernmost discharge point from the site (the offsite culvert that connects to the existing Foxborough Lane storm drain system. Based on the watershed POCs and the potential pollutants from the proposed

development, the primary target pollutants for this project are nutrients, heavy metals, oxygen demanding substances, oil and grease, and bacteria and viruses. The remainder of the pollutant categories in Table 7 shall be identified as secondary POCs (sediment, trash and debris, and pesticides).

According to the San Diego River FY 2009-2010 WURMP Annual Report, the following activities have been identified as sources of some of the primary POCs. These activities shall be addressed in the following sections.

- Bacteria from waste management/dumpsters, grease management, catch basin cleanout, animals/pets, food and waste management, and soil management/erosion control.
- Nutrients from general landscaping, soil and mulch management/erosion control, animal waste management, and vegetative litter.
- TDS from excessive potable water use (over-irrigation).
- Low dissolved oxygen from sources of nutrients, sediment and organic matter, such as the intentional application to soil of organic compounds or the decomposition of vegetative litter.
- Turbidity from sources of sediment, organic matter and nutrients, or resulting from poor general housekeeping and human litter.

In addition, BMPs are required to remove pollutants contained in stormwater runoff. Therefore, the BMPs to be implemented onsite shall be explained in the following sections.

STEP 5

LID AND SITE DESIGN STRATEGIES

Each numbered item below is a Low Impact Development (LID) requirement of the WPO. Please check the box(s) under each number that best describes the LID BMP(s) and Site Design Strategies selected for this project. LID BMPs selected on this table will be typically represented as a self-retaining area, self-treating area, pervious pavement and green roof, which are delineated on the Post Project Drainage Management Area (DMA) Exhibit in Attachment C.

TABLE 8: LID AND SITE DESIGN

1. Conserve Natural Areas, Soils, and Vegetation - County LID Handbook 2.2.1
☒ Preserve well-draining soils (Type A or B)
☐ Preserve Significant Trees
☒ Preserve critical (or problematic) areas such as floodplains, steep slopes, wetlands, and areas with erosive or unstable soil conditions
☐ Other. Description:
☐ 1. Not feasible. State Reason:
2. Minimize Disturbance to Natural Drainages - County LID Handbook 2.2.2
☒ Set-back development envelope from drainages
☒ Restrict heavy construction equipment access to planned green/open space areas
☐ Other. Description:
☐ 2. Not feasible. State Reason:
3. Minimize and Disconnect Impervious Surfaces - County LID Handbook 2.2.3
☒ Clustered Lot Design
☐ Items checked in 5

☒ Other. Description: Hardscape designed to the minimum widths necessary.
☐ 3. Not feasible. State Reason:
4. Minimize Soil Compaction - County LID Handbook 2.2.4
☒ Restrict heavy construction equipment access to planned green/open space areas
☒ Re-till soils compacted by construction vehicles/equipment
☐ Collect & re-use upper soil layers of development site containing organic materials
☐ Other. Description:
☐ 4. Not feasible. State Reason:
5. Drain Runoff from Impervious Surfaces to Pervious Areas - County LID Handbook 2.2.5
LID Street & Road Design
☐ Curb-cuts to landscaping
☐ Rural Swales
☐ Concave Median
☐ Cul-de-sac Landscaping Design
☒ Other. Description: All options are not applicable to project. Project will allow for runoff from impervious surfaces to pervious areas through the use of other BMPs.
LID Parking Lot Design
☐ Permeable Pavements
☐ Curb-cuts to landscaping
☒ Other. Description: Parking lots are not applicable to the project. There will only be individual parking driveways per each unit.
LID Driveway, Sidewalk, Bike-path Design
☒ Permeable Pavements (**Proposed decomposed granite trail through development**).
☒ Pitch pavements toward landscaping
☐ Other. Description:
LID Building Design
☐ Cisterns & Rain Barrels
☒ Downspout to swale or landscaping
☐ Vegetated Roofs
☐ Other. Description:
LID Landscaping Design
☒ Soil Amendments
☒ Reuse of Native Soils
☒ Smart Irrigation Systems
☒ Street Trees
☐ Other. Description:
☐ 5. Not feasible. State Reason:
6. Minimize erosion from slopes
☒ Disturb existing slopes only when necessary
☒ Minimize cut and fill areas to reduce slope lengths
☐ Incorporate retaining walls to reduce steepness of slopes or to shorten slopes
☐ Provide benches or terraces on high cut and fill slopes to reduce concentration of flows
☒ Rounding and shaping slopes to reduce concentrated flow
☒ Collect concentrated flows in stabilized drains and channels
☐ Other. Description:

☐ 6. Not feasible. State Reason:

STEP 6

SOURCE CONTROL

Please complete the checklist on the following pages to determine Source Control BMPs. Below is instruction on how to use the checklist (also see instructions on page 60 of the SUSMP).

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies and list in Table 9.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your Source Control Exhibit in Attachment B.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs into Table 9.
4. Use the format in Table 9 below to summarize the project Source Control BMPs. Incorporate all identified Source Control BMPs in your Source Control Exhibit in Attachment B.

TABLE 9: PROJECT SOURCE CONTROL BMPS

Potential source of runoff pollutants	Permanent source control BMPs	Operational source control BMPs
A. Onsite storm drain inlets	Stenciling and signage; no dumping allowed.	Maintained by County Public Roads CASQA information on "Drainage System Maintenance" made available.
D1. Indoor pest control	Screens and seals	Maintained by individual homeowners and HOA; IPM educational materials on how to control pests using non-toxic methods and CASQA information on "Building and Grounds Maintenance" made available/ promoted.
D2. Outdoor pesticide use	Preserve existing ground cover and use of efficient landscape design and irrigation methods.	
E. Pools and other water features	If pools and other water features are added by individual homeowners, water must be dechlorinated prior to discharge to the storm drain system.	Maintained by individual homeowners; source control BMPs for pools included in the HOA Covenants, Conditions, and Restrictions (CC&Rs); and CASQA information on "Fountain and Pool Maintenance" made available/promoted.
G. Refuse areas	Trash receptacles shall be located in a covered area or affixed with lids.	Maintained by individual homeowners; source control BMPs for trash management included in the HOA CC&Rs; and CASQA information on "Waste Handling and Disposal" made available/promoted.
I. Outdoor storage of equipment or materials	If outdoor storage is added by individual homeowners, it shall be designed to protect water quality as required by the County SUSMP for Land Development.	Maintained by individual homeowners; source control BMPs for outdoor storage of equipment or materials included in the HOA CC&Rs

Potential source of runoff pollutants	Permanent source control BMPs	Operational source control BMPs
K. Vehicle/Equipment Repair and Maintenance	If repairs and/or maintenance is performed by HOA maintenance personnel or individual homeowners, it shall not be done outdoors without secondary containment. No discharge to the storm drain system shall be allowed.	Maintained and operated HOA or individual homeowners; source control BMPs for onsite vehicle and equipment maintenance included in the HOA CC&Rs; and CASQA information on "Vehicle and Equipment Cleaning" made available/promoted.
O. Miscellaneous Drain or Wash Water	Miscellaneous water shall not be allowed to enter the storm drain system; it shall be discharged to landscaping or the sanitary sewer system as appropriate. Building materials shall be selected for water quality protection.	Maintained by individual homeowners; source control BMPs for wash water and building material selection requirements included in the HOA CC&Rs.
P. Plazas, sidewalks, and parking lots	Hardscape shall be cleaned/swept periodically to prevent the accumulation of debris, litter and sediment.	Maintained by County for public sidewalks and individual homeowners for private hardscape.

Describe your specific Source Control BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting Source Control BMPs or substituting alternatives.

All slopes disturbed by construction activities shall be revegetated and stabilized as soon as possible. The permanent vegetation should be drought tolerant with variable root depths, requiring minimal irrigation, selected for erosion control and compatibility with the surrounding ecosystem. In addition, all disturbed slopes shall be stabilized with temporary erosion control measures as soon as possible to allow the permanent vegetation time to get established. Concentrated runoff shall be directed away from slopes.

It is unknown at this time if there will be pools, spas, ponds, decorative fountains, or outdoor storage incorporated into the design of the residential lots; therefore, should a homeowner require one of these components, they shall be held responsible for complying with the stormwater standards as set forth in this report. It will be the responsibility of the HOA to properly educate the residents, so that sources of stormwater pollution are controlled, keeping pollutants from entering the storm drain system, especially primary POCs. Source control BMPs shall consist of measures to prevent stormwater from contacting pollutants. This educational component shall be directed at each homeowner. They shall receive a set of brochures developed by the County's Environmental Health Department. The sets shall include the following:

<u>For Homeowners</u>

- Clean Water Toolbox Information Sheets - Clean Up Regularly Using Dry Clean Methods; Protect Storm Drain Inlets; Proper Disposal of Household Hazardous Waste;
- Integrated Pest Management (IPM) education materials;
- Pollutant Impacts on Water Quality;
- Properly Collect and Dispose of Water; and

- Stormwater Pollution Prevention Pet Waste.

For HOA

- Applicable CASQA BMP Fact Sheets;
- Clean Water Toolbox Information Sheets - Develop a Stormwater Pollution Prevention Plan; Train Employees; Properly Handle Solid Waste; Use Non-Toxic Products; Label Storm Drain Inlets; Street and Parking Lot Sweeping; Contain and Clean Up Spills; Properly Collect and Dispose of Wash Water (Power Washing and Fire Sprinkler Testing);
- General Stormwater BMP Brochure;
- IPM education materials;
- Pollutant Impacts on Water Quality; and
- The Green Wrench Guide.

It is recommended that:

- the need for pesticide and fertilizers should be reduced to the maximum extent practicable by including pest-resistant or well-adapted native plant varieties;
- pesticides be used as a last resort and application of pesticides within HOA maintained areas should only be done by professional pest controllers; and
- pet waste bags be provided at access points to open space.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants – List in Table 9**	**2** **Permanent Controls—Show on Source Control Exhibit, Attachment B**	**3** **Permanent Controls—List in Table 9 and Narrative**	**4** **Operational BMPs—Include in Table 9 and Narrative**
☒ **A.** Onsite storm drain inlets	☒ Locations of inlets.	☒ Mark all inlets with the words "No Dumping! Flows to Bay" or similar where feasible.	☒ Maintain and periodically repaint or replace inlet markings. ☒ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ☒ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ☒ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
☐ **B.** Interior floor drains and elevator shaft sump pumps		☐ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	☐ Inspect and maintain drains to prevent blockages and overflow.
☐ **C.** Interior parking garages		☐ State that parking garage floor drains will be plumbed to the sanitary sewer.	☐ Inspect and maintain drains to prevent blockages and overflow.
☒ **D1.** Need for future indoor & structural pest control		☒ Note building design features that discourage entry of pests.	☒ Provide Integrated Pest Management information to owners, lessees, and operators.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants – List in Table 9**	**2** **Permanent Controls—Show on Source Control Exhibit, Attachment B**	**3** **Permanent Controls—List in Table 9 and Narrative**	**4** **Operational BMPs—Include in Table 9 and Narrative**
☒ **D2.** Landscape/ Outdoor Pesticide Use Note: Should be consistent with project landscape plan (if applicable).	☒ Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ☒ Show self-retaining landscape areas, if any. ☒ Show stormwater treatment facilities.	State that final landscape plans will accomplish all of the following: ☒ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ☒ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. ☒ Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. ☒ Consider using pest-resistant plants, especially adjacent to hardscape. ☒ To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	☒ Maintain landscaping using minimum or no pesticides. ☒ See applicable operational BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ☒ Provide IPM information to new owners, lessees and operators.
☐ **E.** Pools, spas, ponds, decorative fountains, and other water features.	☐ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet.	☐ If the local municipality requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	☐ See applicable operational BMPs in Fact Sheet SC-72, "Fountain and Pool Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants – List in Table 9**	**2** **Permanent Controls—Show on Source Control Exhibit, Attachment B**	**3** **Permanent Controls—List in Table 9 and Narrative**	**4** **Operational BMPs—Include in Table 9 and Narrative**
☐ **F.** Food service	☐ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ☐ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	☐ Describe the location and features of the designated cleaning area. ☐ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	
☐ **G.** Refuse areas	☐ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ☐ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. ☐ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	☐ State how site refuse will be handled and provide supporting detail to what is shown on plans. ☐ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	☐ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available onsite. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants – List in Table 9**	**2** **Permanent Controls—Show on Source Control Exhibit, Attachment B**	**3** **Permanent Controls—List in Table 9 and Narrative**	**4** **Operational BMPs—Include in Table 9 and Narrative**
❑ **H.** Industrial processes.	❑ Show process area.	❑ If industrial processes are to be located onsite, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."	❑ See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
❑ **I.** Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	❑ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. ❑ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ❑ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	❑ Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of local Hazardous Materials Programs for: ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release (CalARP) ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank	❑ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants – List in Table 9**	**2** **Permanent Controls—Show on Source Control Exhibit, Attachment B**	**3** **Permanent Controls—List in Table 9 and Narrative**	**4** **Operational BMPs—Include in Table 9 and Narrative**
❑ **J.** Vehicle and Equipment Cleaning	❑ Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle /equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited onsite and hoses are provided with an automatic shut-off to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.	❑ If a car wash area is not provided, describe measures taken to discourage onsite car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): ❑ Wash water from vehicle and equipment washing operations shall not be discharged to the storm drain system. ❑ Car dealerships and similar may rinse cars with water only. ❑ See Fact Sheet SC-21, "Vehicle and Equipment Cleaning," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants – List in Table 9**	**2** **Permanent Controls—Show on Source Control Exhibit, Attachment B**	**3** **Permanent Controls—List in Table 9 and Narrative**	**4** **Operational BMPs—Include in Table 9 and Narrative**
❑ **K.** Vehicle/Equipment Repair and Maintenance	❑ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater. ❑ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas. ❑ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	❑ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ❑ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ❑ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the SUSMP report, note that all of the following restrictions apply to use the site: ❑ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinse water from parts cleaning into storm drains. ❑ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. ❑ No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants – List in Table 9**	**2** **Permanent Controls—Show on Source Control Exhibit, Attachment B**	**3** **Permanent Controls—List in Table 9 and Narrative**	**4** **Operational BMPs—Include in Table 9 and Narrative**
❑ **L.** Fuel Dispensing Areas	❑ Fueling areas[1] shall have impermeable floors (i.e., Portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. ❑ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.		❑ The property owner shall dry sweep the fueling area routinely. ❑ See the Business Guide Sheet, "Automotive Service—Service Stations" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

[1] The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants – List in Table 9**	2 **Permanent Controls—Show on Source Control Exhibit, Attachment B**	3 **Permanent Controls—List in Table 9 and Narrative**	4 **Operational BMPs—Include in Table 9 and Narrative**
☐ **M.** Loading Docks	☐ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas should be drained to the sanitary sewer where feasible. Direct connections to storm drains from depressed loading docks are prohibited. ☐ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ☐ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		☐ Move loaded and unloaded items indoors as soon as possible. ☐ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
☐ **N.** Fire Sprinkler Test Water		☐ Provide a means to drain fire sprinkler test water to the sanitary sewer.	☐ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants – List in Table 9**	**2** **Permanent Controls—Show on Source Control Exhibit, Attachment B**	**3** **Permanent Controls—List in Table 9 and Narrative**	**4** **Operational BMPs—Include in Table 9 and Narrative**
O. Miscellaneous Drain or Wash Water ☐ Boiler drain lines ☒ Condensate drain lines ☒ Rooftop equipment ☐ Drainage sumps ☒ Roofing, gutters, and trim.		☐ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. ☒ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ☒ Rooftop mounted equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ☐ Any drainage sumps onsite shall feature a sediment sump to reduce the quantity of sediment in pumped water. ☒ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	
☒ **P.** Plazas, sidewalks, and parking lots.			☒ Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing shall be collected to prevent entry into the storm drain system. Wash water containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain.

STEP 7

LID AND TREATMENT CONTROL SELECTION

A treatment control BMP (TC-BMP) and/or LID facility must be selected to treat the project POCs identified in Table 7 "Project Pollutants of Concern." A treatment control facility with a high or medium pollutant removal efficiency for the project's most significant pollutant of concern shall be selected. It is recommended to use the design procedure in Chapter 4 of the SUSMP to meet NPDES permit LID requirements, treatment requirements, and flow control requirements. If your project does not utilize this approach, the project shall need to demonstrate compliance with LID, treatment and flow control requirements. Review Chapter 2 "Selection of Stormwater Treatment Facilities" in the SUSMP to assist in determining the appropriate treatment facility for your project.

Will this project be utilizing the unified LID design procedure as described in Chapter 4 of the Local SUSMP? *(If yes, please document in Attachment D following the steps in Chapter 4 of the County SUSMP)*	
Yes X	No
If this project is not utilizing the unified LID design procedure, please describe how the alternative treatment facilities shall comply with applicable LID criteria, stormwater treatment criteria, and hydromodification management criteria.	
N/A	

➢ Indicate the project POCs from Table 7 in Column 2 below.

TABLE 10: GROUPING OF POTENTIAL POLLUTANTS OF CONCERN (Grouping determined based on characteristics of POCs)

Pollutant	Check Project Specific POCs	Coarse Sediment and Trash	Pollutants that tend to associate with fine particles during treatment	Pollutants that tend to be dissolved following treatment
Sediment	X	X	X	
Nutrients	X		X	X
Heavy Metals	X		X	
Organic Compounds	X		X	
Trash & Debris	X	X		
Oxygen Demanding	X		X	
Bacteria	X		X	
Oil & Grease	X		X	
Pesticides	X		X	

➢ Indicate the treatment facility(s) chosen for this project in the following table.

TABLE 11. GROUPS OF POLLUTANTS AND RELATIVE EFFECTIVENESS OF TREATMENT FACILITIES

Pollutants of Concern	Bioretention Facilities (LID)	Settling Basins (Dry Ponds)	Wet Ponds and Wetlands	Infiltration Facilities or Practices (LID)	Media Filters	High-rate Biofilters	High-rate Media Filters	Trash Racks & Hydro-dynamic Devices
Coarse Sediment and Trash	**High**	**High**	High	High	**High**	High	High	High
Pollutants that tend to associate with fine particles during treatment	**High**	**High**	High	High	**High**	Medium	Medium	Low
Pollutants that tend to be dissolved following treatment	**Medium**	**Low**	Medium	High	**Low**	Low	Low	Low

➢ Please check the box(s) that best describes the Treatment Control BMP(s) and/or LID IMP selected for this project. Please check if the treatment facility is designed for water quality or hydromodification flow control.

TABLE 12: PROJECT LID AND TREATMENT CONTROL BMPS

LID and TC-BMP Type	Water Quality Treatment	Hydromodification Flow Control
Bioretention Facilities (LID)		
☒ Bioretention area/Swale	Yes	Yes
☐ Flow-through Planter		
☐ Cistern with Bioretention		

LID and TC-BMP Type	Water Quality Treatment	Hydromodification Flow Control
Settling Basins (Dry Ponds)		
☒ Extended/dry detention basin with grass/vegetated lining*	Yes	Yes
☐ Extended/dry detention basin with impervious lining		
Infiltration Devices (LID)		
☐ Infiltration basin		
☐ Infiltration trench		
☐ Other_____		
Wet Ponds and Constructed Wetlands		
☐ Wet pond/basin (permanent pool)		
☐ Constructed wetland		
Vegetated Swales (LID(1))		
☐ Vegetated Swale		
Media Filters		
☐ Austin Sand Filter		
☐ Delaware Sand Filter		
☐ Multi-Chambered Treatment Train (MCTT)		
Higher-rate Biofilters		
☐ Tree-pit-style unit		
☐ Other_____		
Higher-rate Media Filters		
☐ Vault-based filtration unit with replaceable cartridges		
☐ Other_____		
Hydrodynamic Separator Systems		
☐ Swirl Concentrator		
☐ Cyclone Separator		
☐ Baffle Separator		

LID and TC-BMP Type	Water Quality Treatment	Hydromodification Flow Control
Trash Racks		
☐Catch Basin Insert		
☐ Catch Basin Insert w/Hydrocarbon boom		
☒ Other: Catch Basin Insert w/filter medium	Yes	No

* Must be designed per SUSMP Extended ("Dry") Detention Basins design criteria for LID credit (p. 102-103) and to ensure compliance with hydromodification criteria.

Under existing conditions, the site is undeveloped and runoff discharges directly offsite to the Foxborough Lane and Wellington Hill Drive storm drain systems. Under proposed conditions, most of the site will remain undeveloped. Flow from the natural landscaped STAs will continue to discharge directly offsite as in existing conditions. Refer to the Post Project Drainage Management Area Exhibit in Attachment C for the location of the STAs.

Runoff from the developed areas shall be collected by the onsite storm drain system. The TC-BMPs selected in the table above represents the BMPs identified in the preliminary design for the development for treatment of runoff prior to offsite discharge. The bioretention area is the TC-BMP selected to treat a small southern portion of the project site's runoff, which will discharge into an existing concrete brow ditch. The water quality/hydromodification (WQ/Hydromod) basin is the TC-BMP selected to treat the majority of the site's runoff, which discharges to the Wellington Hill Drive storm drain system. Since existing drainage patterns are being maintained, Bio Clean Grate Inlet Skimmer Box (GISB) catch basin inlet inserts with filter medium will be used to treat runoff from the northern portion of the developed area, which discharges to the Foxborough Lane storm drain system.

For design guidelines and calculations refer to Chapter 4 "Low Impact Development Design Guide" in the SUSMP. Please show all calculations and design sheets for all treatment facilities proposed in Attachment D.

➢ Create a Construction Plan SWMP Checklist for your project.

Instructions on how to fill out table below:

1. Number and list each measure or BMP you have specified in your SWMP in Columns 1 and Maintenance Category in Column 3 of the table. Leave Column 2 blank.
2. When you submit construction plans, duplicate the table (by photocopy or electronically). Now fill in Column 2, identifying the plan sheets where the BMPs are shown. List all plan sheets on which the BMP appears. **This table must be shown on the front sheet of the grading and improvement plans.**

Treatment Control BMPs*			
Description / Type	**Sheet**	**Maintenance Category**	**Revisions**
Bioretention Area		2 – HOA to be given primary responsibility for maintenance, on a perpetual basis. HOA must provide annual documentation to the County verifying that the TC-BMP is maintained and functioning properly. If HOA fails to perform maintenance, the County (in a "backup" role) may step in; therefore, security funding is required. If after five years, "backup" maintenance has not been required, then security funding will no longer be required; however, HOA maintenance responsibilities would remain.	
Extended/Dry Detention Basin with Grass		2 – HOA to be given primary responsibility for maintenance, on a perpetual basis. HOA must provide annual documentation to the County verifying that the TC-BMP is maintained and functioning properly. If HOA fails to perform maintenance, the County (in a "backup" role) may step in; therefore, security funding is required. If after five years, "backup" maintenance has not been required, then security funding will no longer be required; however, HOA maintenance responsibilities would remain.	
Bio Clean (GISB) catch basin inlet inserts with filter medium		4 – County of San Diego to be given primary responsibility for maintenance, on a perpetual basis.	

* BMPs approved as part of SWMP dated xx/xx/xx on file with DPW. Any changes to the above BMPs will require SWMP revision and Plan Change approvals.

- Please describe why the chosen treatment BMP(s) was selected for this project. For projects utilizing a low performing BMP, please provide a feasibility analysis that demonstrates utilization of a treatment facility with a high or medium removal efficiency ranking is infeasible.

The primary target pollutants for this project have been identified as nutrients, heavy metals, oxygen demanding substances, oil and grease, and bacteria and viruses. Secondary POCs include sediment, trash and debris, and pesticides. Therefore, project POCs fall into all three categories/groupings as shown in Table 10.

An extended/dry detention basin has been selected for pollutant removal for the development. This WQ/Hydromod basin shall be used to treat runoff prior to discharge to

the offsite storm drain system. Table 11 recognizes the high relative effectiveness that settling basins have in removing all of the primary and secondary POCs except for nutrients. However, this basin will have vegetation in it and allow for some infiltration, thereby providing LID benefits. In addition, strict source control BMPs shall be implemented as part of the HOA CC&Rs to protect against excess nutrient discharge from the developed areas. The need for fertilizers shall be reduced to the maximum extent practicable by landscaping with well-adapted native plant varieties. Fertilizing shall not be allowed within two days of a forecasted rain event, and educational material shall be provided to homeowners and maintenance personnel with regard to the detrimental effects of fertilizers on downstream waterbodies.

A bioretention area has been selected for the pollutant removal for a small portion on the south corner of the development. This bioretention area shall be used to treat runoff prior to discharge to an existing concrete brow ditch. It has a high effectiveness for removing all of the primary and secondary POCs and a medium effectiveness in removing nutrients as recognized in Table 11.

Bio Clean (GISB) has multi-stage filtration, which provides three different sieve size filtration screens to optimize filtration and water flow. The Bio Clean GISB handles a wide array of pollutants, including trash and debris, sediments, total suspended solids, oxygen demanding substances, nutrients, metals, bacteria, and hydrocarbons, which are all potential pollutants originating from roofs and streets. Table 11 recognizes the high relative effectiveness that filter media has in removing all of the primary and secondary POCs except for nutrients.

Please provide the sizing design calculations for each DMA in Attachment D. Guidelines for design calculations are located in Chapter 4 of the County SUSMP. To assist in these calculations a BMP sizing calculator is available for use at the following location: http://www.projectcleanwater.org/html/wg_susmp.html

STEP 8

OPERATION AND MAINTENANCE

- Please check the box that best describes the maintenance mechanism(s) for this project.

TABLE 13: PROJECT BMP CATEGORY

CATEGORY	SELECTED		BMP DESCRIPTION
	YES	NO	
First [1]			
Second [2]	√		1 Extended/Dry Detention Basin with Grass, 1 Bioretention Area Basin
Third [3]			
Fourth [4]	√		2 Catch Basin Inlet inserts with filter medium

Notes:

1. A maintenance notification will be required.
2. A recorded maintenance agreement and access easement will be required.
3. The project will be required to establish or be included in a watershed specific Community Facility District (CFD) for long-term maintenance.
4. The developer would be required to dedicate the BMP (and the property on which it is located and any necessary access) to the County.

The County of San Diego identifies settling basins (dry ponds) and bioretention areas as second category improvements; therefore, on-going maintenance needs to be assured. Accordingly, monitoring/maintenance for the WQ/Hydromod basin and bioretention area shall be implemented by entering into a BMP Maintenance Agreement with the County. This agreement will: commit the areas associated with the basin and bioretention area to be used only for the designated purpose; require the property owner(s) to accept responsibility for BMP maintenance; grant an access easement to the County; and provide monitoring/maintenance funding through a security such as a cash deposit, letter of credit, or other form acceptable to the County, which shall remain in place for an interim period of five years. The amount of the security will equal the estimated cost of two years of maintenance activities.

The two inlet inserts will be maintained by the County as public facilities.

- Please list all individual LID and TC-BMPs incorporated into the project. Please ensure the "BMP Identifier" is consistent with the legend in Attachment B "LID and/or TC-BMP Exhibit." Please attach the record plan sheets upon completion of the project and amend the Major SWMP where appropriate. For each type of LID or TC-BMP provide an inspection sheet in the Attachment F "Maintenance Plan."

TABLE 14: PROJECT SPECIFIC LID AND TC-BMPS

BMP Identifier*	Type **	Record Plan for TC-BMP	BMP Pollutant of Concern Efficiency (H,M,L)
Bioretention Facility	Bioretention area basin		H for everything except nutrient (M)
Settling Basins (Dry Ponds)	Extended/dry detention basin with grass		H for everything except nutrients (L)
Media Filters	Bio Clean GISB catch basin inlet inserts with filter medium		H for everything except nutrients (L)

* Identifier to match TC-BMPs on TC-BMP Table.

** All PDPs require a TC-BMP. BMPs designed to treat stormwater (e.g., LID and Hydromodification) shall be considered TC-BMPs. For location of BMPs, see approved Record Plan dated xx/xx/xx, plan (type), sheet (#).

- Responsible Party for Construction Maintenance:

Identify the parties responsible for maintenance during the construction phase of the BMPs identified above and source control BMPs specified in Attachment B.

Developer's Name: Pulte Homes
Contact: Sohail Bokhari
Address: 27101 Puerta Real, Suite 300
City/State/Zip: Mission Viejo, CA 92691
Email Address: sohail.bokhari@pultegroup.com
Phone Number: (949) 330-8537
Civil Engineer of Work: Project Design Consultants
Engineer's Phone Number: (619) 235-6471

- Responsible Party for Long-term Maintenance:

Identify the parties responsible for long-term maintenance of the BMPs identified above and source control BMPs specified in Attachment B. Include the appropriate written agreement with the entities responsible for operation and maintenance in Attachment F. Please see Chapter 5 "Stormwater Facility Maintenance" of the County SUSMP for appropriate maintenance mechanisms.

Owner's Name: Brightwater Ranch Home Owner's Association
Board:
Street Address:

City/State/Zip:
Email Address:
Phone Number:

➢ Funding Source:

Provide the funding source or sources for long-term operation and maintenance of each BMP identified above. By certifying the Major SWMP, the applicant is certifying that the funding responsibilities have been addressed and shall be transferred to future owners.

The applicant (Pulte Homes) will provide verification of maintenance by the subsequent owner(s) with an acknowledgement of responsibility to the BMP maintenance agreement with easement and covenant. The hydromod basin will be located on private property and will be privately maintained, while the inlet inserts will be maintained by the County of San Diego. The Brightwater Ranch HOA will be responsible for the perpetual maintenance, repair, and/or replacement of their onsite post-construction BMPs in accordance with the County of San Diego Watershed Protection, Stormwater Management, and Discharge Control Ordinance.

Security funding (cash deposit, letter of credit, or other acceptable to the County) to cover two years of maintenance will be provided for the interim period, which will be released or refunded to the HOA after five years if not used.

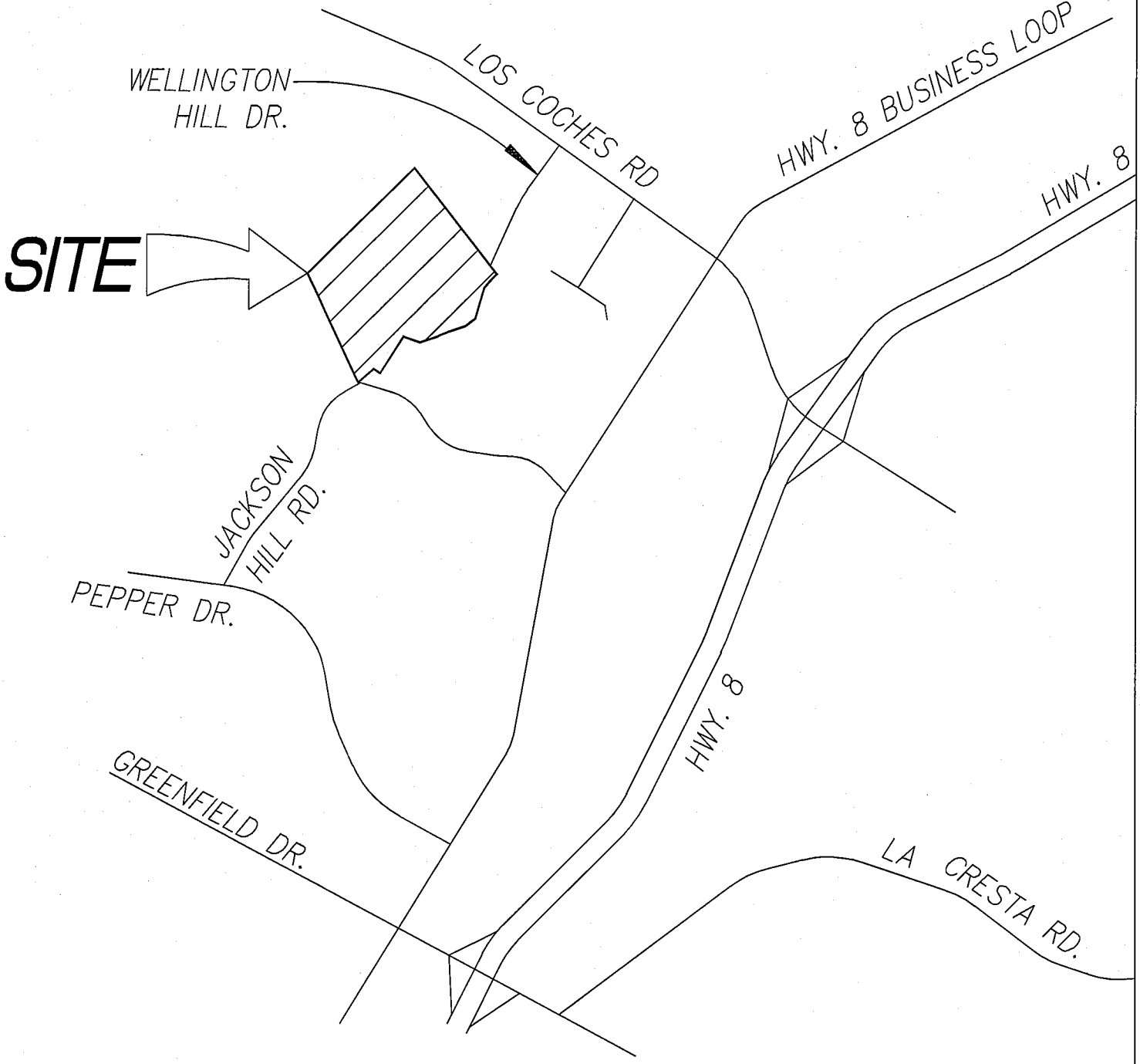
ATTACHMENTS

Please include the following attachments.

	ATTACHMENT	COMPLETED	N/A
A	Project Maps	√	
B	Source Control, LID, & TC-BMP Exhibit	√	
C	Drainage Management Area Exhibit	√	
D	Sizing Design Calculations and TC-BMP/LID Design Details	√	
E	Geotechnical Certification Sheet		√
F	Maintenance Plan	√	
G	Treatment Control BMP Certification		√
H	HMP Study	√	
I	Geomorphic Assessment	√	
J	HMP Exemption Documentation		√
K	Addendum		√

ATTACHMENT A

PROJECT MAPS

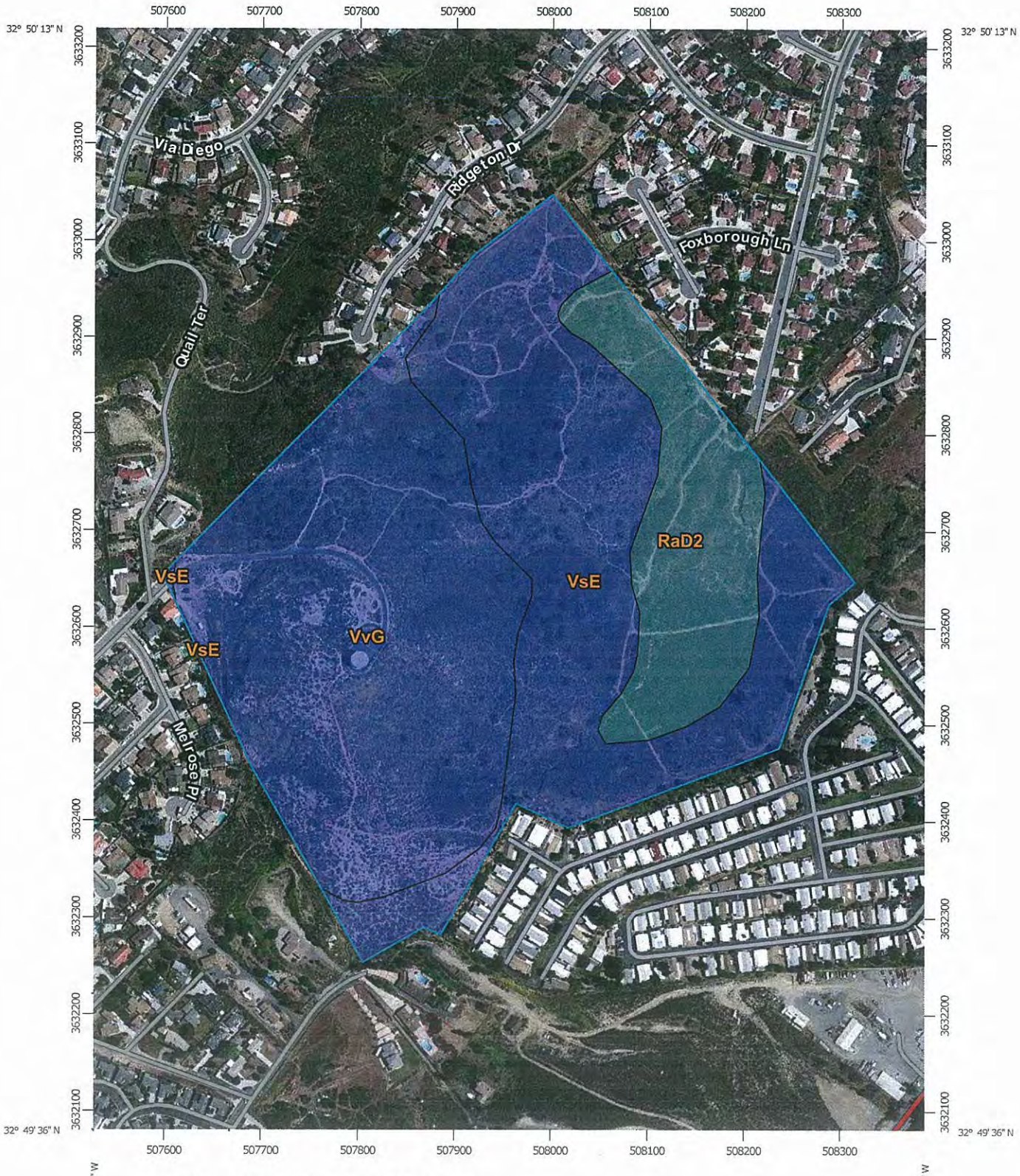


VICINITY MAP

BRIGHTWATER RANCH

NOT TO SCALE

Hydrologic Soil Group—San Diego County Area, California
(Brightwater Ranch Project Site)



Map Scale: 1:5,560 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 7, Nov 15, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 2, 2010—May 6, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
RaD2	Ramona sandy loam, 9 to 15 percent slopes, eroded	C	12.1	15.8%
VsE	Vista coarse sandy loam, 15 to 30 percent slopes	B	30.7	40.1%
VvG	Vista rocky coarse sandy loam, 30 to 65 percent slopes	B	33.7	44.1%
Totals for Area of Interest			**76.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

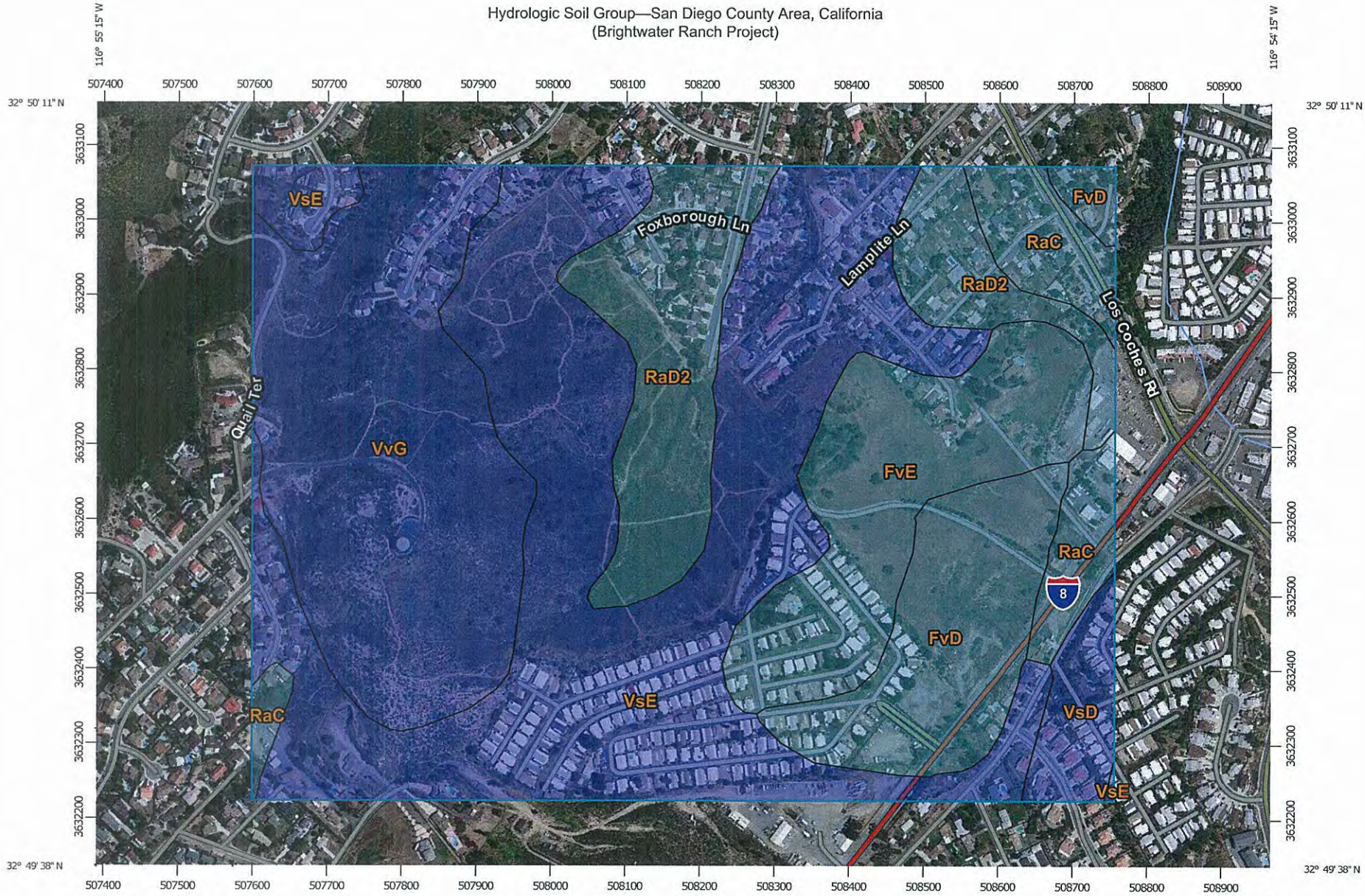
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Hydrologic Soil Group—San Diego County Area, California
(Brightwater Ranch Project)



Map Scale: 1:7,210 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
FvD	Fallbrook-Vista sandy loams, 9 to 15 percent slopes	C	22.4	9.2%
FvE	Fallbrook-Vista sandy loams, 15 to 30 percent slopes	C	27.6	11.3%
RaC	Ramona sandy loam, 5 to 9 percent slopes	C	12.7	5.2%
RaD2	Ramona sandy loam, 9 to 15 percent slopes, eroded	C	29.4	12.1%
VsD	Vista coarse sandy loam, 9 to 15 percent slopes	B	6.0	2.5%
VsE	Vista coarse sandy loam, 15 to 30 percent slopes	B	94.4	38.7%
VvG	Vista rocky coarse sandy loam, 30 to 65 percent slopes	B	51.3	21.0%
Totals for Area of Interest			**243.8**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

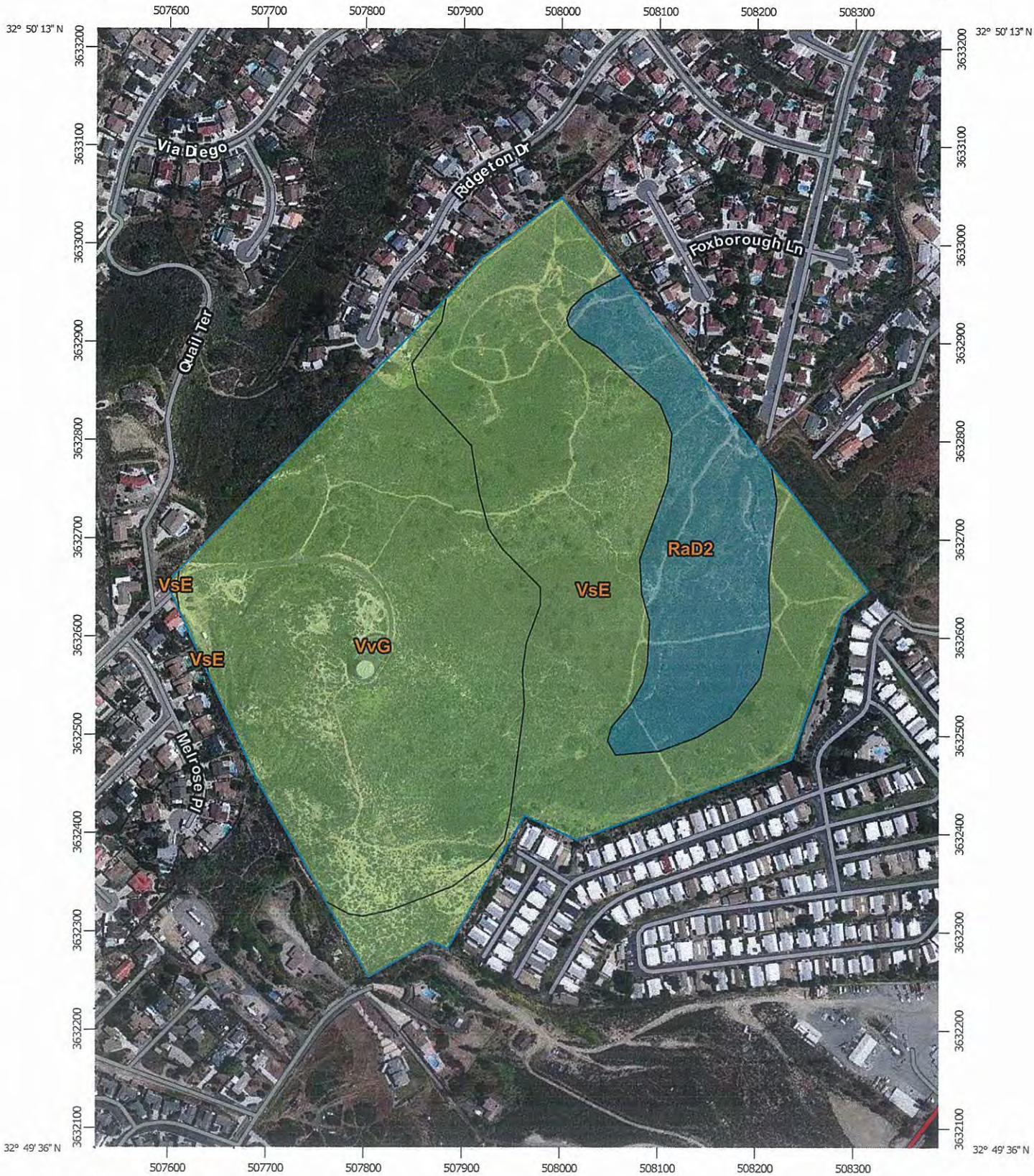
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

K Factor, Whole Soil—San Diego County Area, California
(Brightwater Ranch Project Site)



Map Scale: 1:5,560 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Soil Rating Lines
- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Soil Rating Points
- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 7, Nov 15, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 2, 2010—May 6, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

K Factor, Whole Soil

K Factor, Whole Soil— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
RaD2	Ramona sandy loam, 9 to 15 percent slopes, eroded	.32	12.1	15.8%
VsE	Vista coarse sandy loam, 15 to 30 percent slopes	.24	30.7	40.1%
VvG	Vista rocky coarse sandy loam, 30 to 65 percent slopes	.24	33.7	44.1%
Totals for Area of Interest			**76.4**	**100.0%**

Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

MAP SCALE 1" = 1000'

500 0 500 1,000 1,500 2,000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1660G

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 1660 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

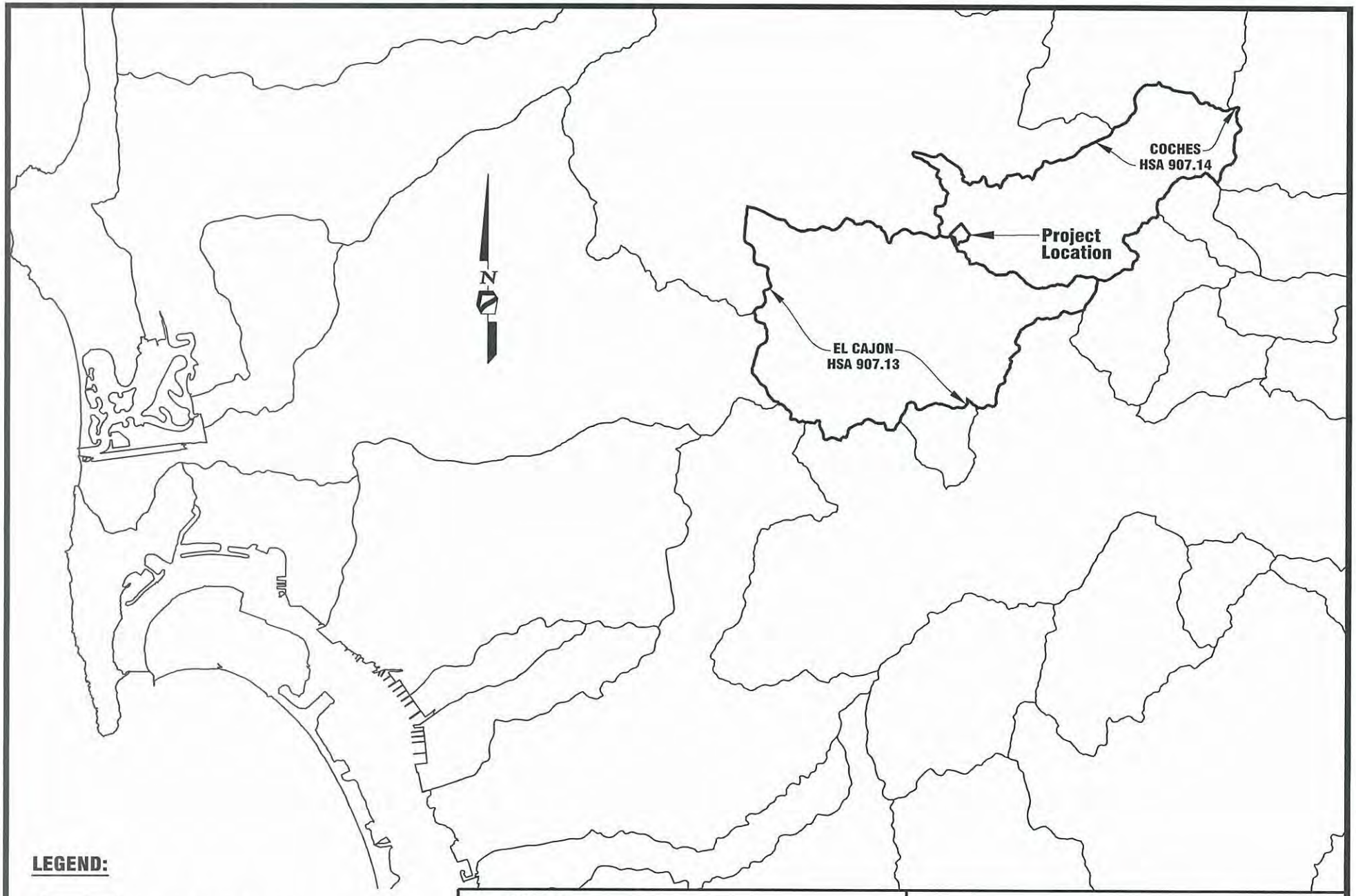
COMMUNITY	NUMBER	PANEL	SUFFIX
EL CAJON, CITY OF	060289	1660	G
SAN DIEGO COUNTY	060284	1660	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06073C1660G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency



PREPARED BY:

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Engineering | Survey

701 B Street, Suite 800
San Diego, CA 92101
619.235.6471 Tel
619.234.0349 Fax

BRIGHTWATER RANCH
WATERSHED BASIN PLAN MAP

P:\2862.02\ENGR\REPORTS\SWMP-TM\Appendices\Exhibits & Maps\Basin Plan Map.dwg

Legend

- Community Points
- Freeways and Highways
- Major Roads
- Environmentally Sensitive Areas (11/2007)
- Watershed Boundaries
- Water Bodies
- Perennial Streams
- Intermittent Streams
- Out of County Jurisdiction

0 1 2 4 6 8 Miles

1:148,973

PROJECT LOCATION

Pueblo San Diego 908

Sweetwater 909

Otay 910

Lakeside
Blossom Valley
Alpine
Dehesa
Jamacha
Spring Valley
Jamul
Sunnyside
Bonita
Dulzura

Estados Unidos M E

Clerk of the Board Document Number: 0768628

Printed: 11/27/2007
update 6
K:\20041007_stormwater\arcmap\standard_maps\Stormwater_AppendixD_200711.mxd

Appendix A - Environmentally Sensitive Areas

ATTACHMENT B

Source Control, LID, & TC-BMP Exhibit

Fact Sheet 5. Vegetated Filter Strips

A filter strip (or "buffer strip") is an area of either planted or native vegetation, situated between a potential, pollutant-source area and a surface-water body that receives runoff. Vegetated filter strips are broad sloped open vegetated areas that accept shallow runoff from surrounding areas as distributed sheet flow.

CHARACTERISICS

- Can serve to remove sediments by filtration through the vegetation, reducing runoff volumes, and delaying runoff peaks by reducing flow velocities.
- A properly designed and operating filter strip provides water-quality protection by reducing the amount of sediment, organic matter, nutrients and pesticides in the runoff at the edge of the field, and before the runoff enters the surface-water body.
- Filter strips also provide localized erosion protection since the vegetation covers an area of soil that otherwise might have a high erosion potential.
- Often constructed along road, parking-lot, stream, lake, pond or sinkhole boundaries, filter strips installed on cropland not only help remove pollutants from runoff, but also serve as habitat for wildlife.

APPLICATION

- Most effective in removing coarse to medium sediments and attached pollutants (such as nutrients, free oils/grease and metals).
- Typically used in conjunction with swales as an alternative to curb and gutter and can form part of a multi-use corridor.
- Typically used as a pre-treatment for other stormwater treatment devices (treatment train).

DESIGN

- The proper application of a filter strip should consider the type and quantity of the potential pollutant (sediment, nutrient, pesticide, organic matter, etc.), soil characteristics (clay and organic matter content, infiltration rate, permeability, etc.), slope steepness, shape and area of the field draining into the filter.
- Can be designed with natural or amended soils, depending on the infiltration rate provided by the natural condition versus the rate needed to reduce surface runoff.
- Most effective when used on gradually sloping areas
- The type of vegetation most suitable for the site should be decided based on soil type, potential pollutant sources/types, infiltration needs, etc.
- Once the type of vegetation is selected, soil fertility should be evaluated, and the seeding method selected.

MAINTENANCE

- Filter strips must be inspected after intense rainfall events and runoff events of long duration because small breaks in the sod and small erosion channels quickly become large problems.

- Minimize the development of erosion channels within the filter. Even small channels may allow much of the runoff from the field to bypass the filter. These areas should be repaired and reseeded immediately to help ensure proper flow of runoff through the filter.
- Periodic soil testing should occur and soil amendments should be applied as needed.
- Weeding may be necessary to reduce or eliminate weeds that could compromise the filter strip's effectiveness.

LIMITATIONS

- "Turf" buffer strips will commonly require irrigation and may not meet State water conservation goals.
- Irrigated vegetation may not be appropriate in certain sites. Xeriscape techniques, natural stone and rock linings can be used as an alternative to turf.
- Requires adequate sunlight for plant growth
- Effectiveness is dependant on soil characteristics, slope steepness, landscape shape, the ratio of the filter area to the area generating the runoff, filter width, and the type and quality of the vegetation in the filter.
- Regular inspections and maintenance is required, particularly during the establishment period.
- Requires sufficient space and designed large enough to meet the stormwater management objective given the amount of flow that will be produced.

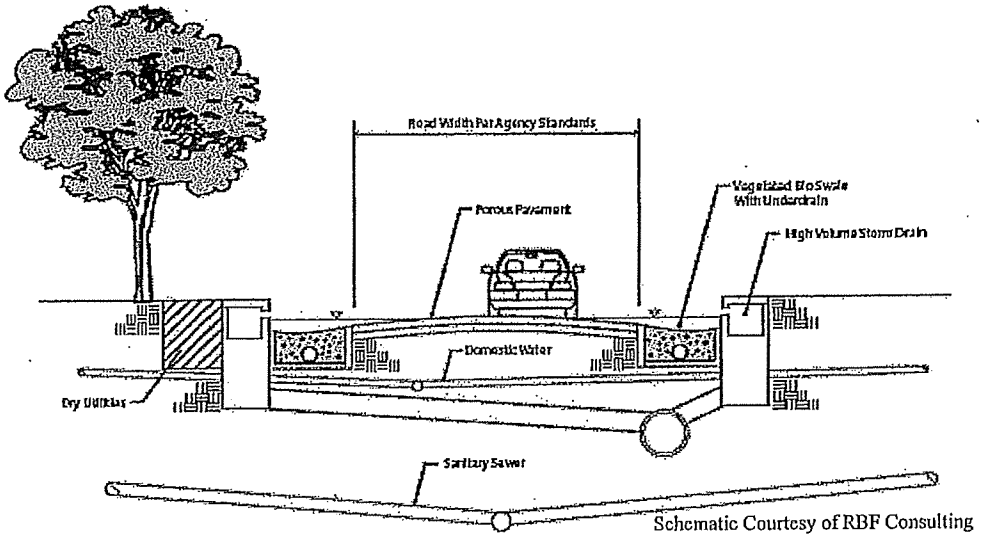
ECONOMICS

- Installation costs for filter strips may be estimated by considering the amount of grading, seeding, and establishment required for the site. Filter strip installation costs are similar to those of vegetative swales, and typically lower than costs for bioretention swales with soil amendment or sand media filtration devices (2003 CASQA Development Handbook Tables 5-4 and 5-5).

REFERENCES

- California Stormwater Quality Association. (2003, January) California Stormwater BMP Handbook: New Development and Redevelopment.
- Leeds, R., Brown, L. C., Sulc, M. R., VanLieshout, L, (n. d.) Vegetated Filter Strips: Application, Installation, and Maintenance. *Food, Agriculture and Biological Engineering.* Ohio State University Extension. http://ohioline.osu.edu/aex-fact/0467.html0
- URS Australia Pty Ltd, (2004, May), Water Sensitive Urban Design: Technical Guidelines for Western Sydney, Upper Parramatta River Catchment Trust. Section 3.
- Southeastern Wisconsin Regional Planning Commission (1991). Costs of Urban Nonpoint Source Water Pollution Control Measures. Technical Report No. 31. Southeastern Wisconsin Regional Planning Commission, Waukesha, WI.
- For additional information pertaining to Filter Strips, see the works cited in the San Diego County LID Literature Index.

Fact Sheet 15. Public Road Standard



Schematic Courtesy of RBF Consulting

CHARACTERISTICS

- Sidewalks are provided on one or both sides of the street depending on adjacent land uses, pedestrian needs.
- Parkway on one or both sides can be used for planting and surface drainage (for flat slopes).
- Road is crowned to the gravel shoulders or swale on each side before flowing into underground storm drain.
- Reduces sediment, oil and grease, and hydrocarbons when combined with biofilters and swales.

APPLICATION

- Appropriate for areas where traffic volumes are at or between 750-2,500 ADT.
- Grid street systems and loop road are most appropriate for non-circulation element roads.
- May not be appropriate for long cul-de- sac streets or hillside sites with high fire risks.

DESIGN

- Construction detailing same as typical street standard.
- Coordinate with local and regional zoning ordinances and public works standards.
- Streets with special uses, such as bike routes, may require additional pavement width.
- Depending on topography, parkway strip can be designed as a linear swale/ biofilter with curb openings directly into swale.

MAINTENANCE

- Standard street maintenance practices required.
- Parkway strip between curb and sidewalk requires mowing, tree care. This can be the responsibility of the local jurisdiction or the adjacent property owner depending on local codes and ordinances.

LIMITATIONS

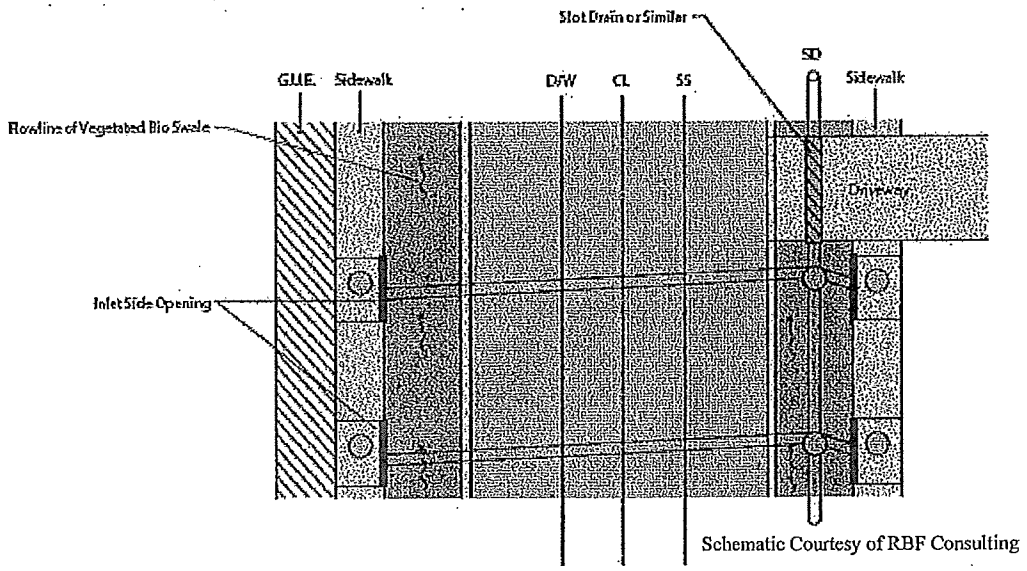
- Feasibility and amount of application is dependant upon local zoning standards
- May not be appropriate for long cul-de- sac streets or hillside sites with high fire risks (because of the potential of shared moving space to be blocked by a single vehicle, with no alternate emergency route).

ECONOMICS

- Narrower street section reduces initial construction costs.
- Increased parkway adds additional landscape maintenance cost, especially compared with conventional street section without a parkway strip.
- Properties on narrower streets with tree-lined landscaped parkways typically command higher values than those on wider treeless streets.

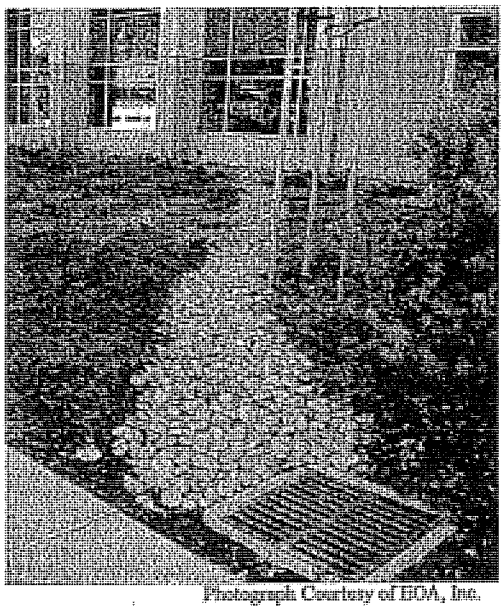
REFERENCES

- Spielberg, F., Chellman, C. E., (1997, June) *Traditional Neighborhood Development Street Design Guidelines.* Institute of Transportation Engineers (ITE) Transportation Planning Council Committee 5P-8. http://findarticles.com/p/articles/mi_qa3734/is_199706/ai_n8770782
- Skinny Streets program, Portland, OR.., Velarde, Loreto Streets, Mountain View, CA.
- For additional information pertaining to Public Road Standards, see the works cited in the San Diego County LID Literature Index and the County of San Diego Department of Public Works Public Road Standards.



Fact Sheet 28. Downspout to Swale

Discharging a roof downspout to landscaped areas via swales allows for polishing and infiltration of the runoff.



Photograph Courtesy of EDA, Inc.

CHARACTERISTICS

- Runoff from the roof is directed into a rocky or vegetated swale area.
- The water flows through swale with overflow continuing to the storm drain.

APPLICATIONS

- Appropriate for most buildings with landscaped areas adjacent to the building where soil drainage is appropriate and water infiltration does not pose a risk to the foundation.

DESIGN

- The downspout can be directly connected to a pipe which daylights some distance from the building foundation, releasing the roof runoff into a rock lined swale towards a landscaped area.
- The roof runoff is slowed by the rocks, absorbed by the soils and vegetation, and remaining runoff flows away from the building foundation into the storm drain.
- Xeriscape techniques, natural stone and rock linings should be used as an alternative to turf.

MAINTENANCE

- Maintenance is similar to that necessary for other swale areas and will depend on the specific style chosen.

LIMITATIONS

- Only suitable for grades between 1% and 6%
- When a vegetated swale is used, the site requires adequate sunlight for vegetation growth
- Avoid infiltrating too close to foundations and underground utilities.

ECONOMICS

- Costs are similar to those associated with other swale devices.

REFERENCES

- For additional information pertaining to the Downspout to Swale technique, see the works cited in the San Diego County LID Literature Index.

Fact Sheet 30. Soil Amendments

Soils in the arid climate of San Diego tend to lack organic matter and nutrients, and often have a high silt and/or clay content. Soils high in clay content have slow infiltration rates, resulting in high runoff potential. The infiltration and water storage capacity of such areas can be amended by improving the organic content of the soil. This is achieved by tilling amendments including organic materials into the native soil or by importing topsoil.

CHARACTERISITICS

- Serves to reduce stormwater runoff volumes
- Improves water quality through filtration
- Improves plant growth and overall aesthetics
- Reduces or even eliminates the need for fertilizing
- Reduces net erosion
- Results in reduced total maintenance costs for landscaping
- In order to be effective, slopes must be less than 33%

APPLICATION

- Soil amendments are advisable for many vegetated areas and should be designed to address soil characteristics, plant types, drainage, and plant water use requirements.
- Existing lawn or landscaped areas with poor plant growth due to compaction and low-organic content soils and sites with poor drainage characteristics are prime candidates for soil amendments and/or lawn alternatives.
- May be especially important in new construction where the existing topsoil is poor, has been removed or has been compacted
- Retrofitting of existing landscape with minimal disturbance
- Soil amendments may not be required under certain circumstances when utilizing low water use and low nutrient demand plant material such as some California native species.
- If appropriate, where no amendments are required soil can be ripped, tilled or otherwise treated to reduce compaction and encourage percolation.
- Soil amendments can improve water storage and infiltration characteristics in applications such as swales, filter strips, and bioretention.

DESIGN

- A licensed landscape architect or other qualified licensed professional should be consulted.
- The most cost-effective strategy is to save and reuse native topsoil, and to protect areas of native vegetation wherever possible.
- Soils should be analyzed by a lab to determine the specific soil amendments needed.
- To optimize water holding capacity and plant health, organic material including leaf compost, peat moss or composted manure should be included in the soil amendments.

- Incorporate amendments during conclusion of site development.
- Care must be taken around existing trees and shrubs to prevent root damage during construction and soil amendment application.

MAINTENANCE

- For areas that incorporate turf, annual soil aeration should be conducted
- Organic topdressing mulch may need to be supplemented at certain intervals.

LIMITATIONS

- On steep slopes, increasing soil moisture could potentially cause soil instability, therefore soil amendments may not be suitable for certain slopes and care must be taken in the timing of the amending.
- Areas with grades steeper than 33% are not effective locations for soil amendments.
- Soil amendments may not be necessary under certain circumstances when utilizing low water use and low nutrient demand plant material such as some California native specifies.

ECONOMICS

- Costs will vary according to site specific conditions, but have previous been estimated at $1.00 to $3.00 per square foot of soil amended (this does not include the cost of revegetating the area after amendments are made).

REFERENCES

- Low Impact Development Center, Inc. (n.d.). *Soil Amendments Costs.* http://www.lid-stormwater.net/soilamend/soilamend_costs.htm
- For additional information pertaining to Soil Amendments, see the works cited in the San Diego County LID Literature Index.

Site Design & Landscape Planning SD-10

Design Objectives

- ☑ 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

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

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

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.

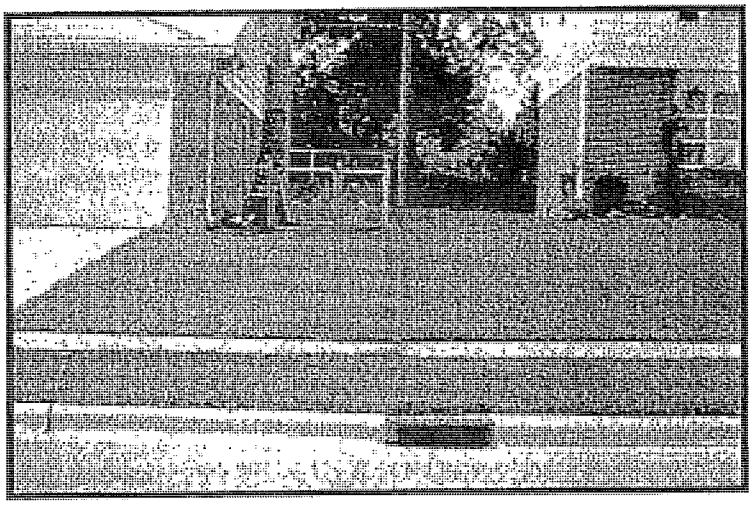
Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

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.

Efficient Irrigation SD-12



Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

Designing New Installations

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

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

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

Redeveloping Existing Installations

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

Other Resources

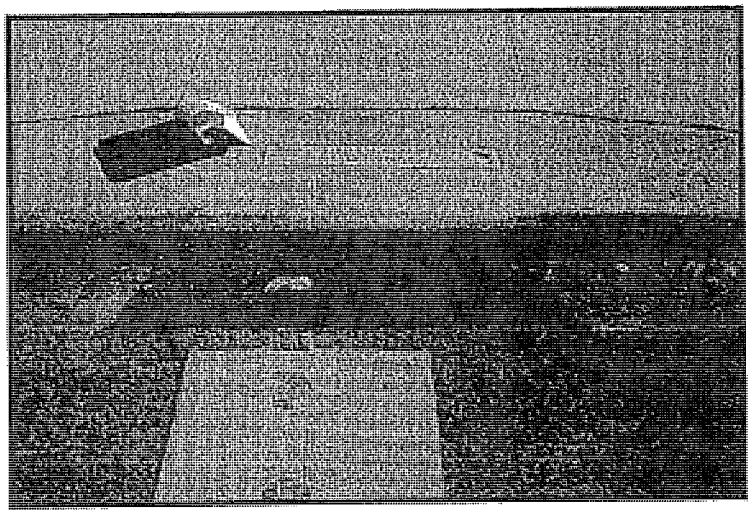
A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

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

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

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

Storm Drain Signage SD-13



Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

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

Designing New Installations

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

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

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

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

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

Redeveloping Existing Installations

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

Additional Information

Maintenance Considerations

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

Placement

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

Supplemental Information

Examples

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

Other Resources

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

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

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

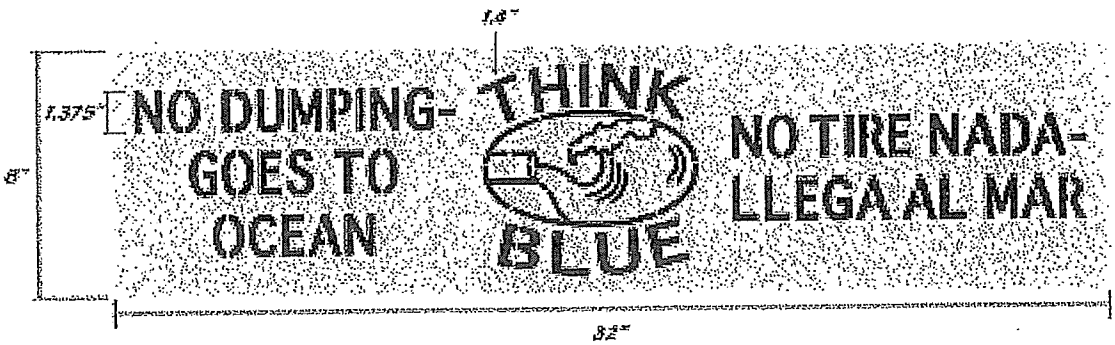
Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Stenciling Tips

NOTE: You may check out the storm drain stencil and a stenciling kit with the necessary paint, brushes, and other materials from:

I Love A Clean San Diego, Inc.
4891 Pacific Highway, Suite 115
San Diego, CA 92110
(619) 291-0103

Stencil Placement: The stencil needs to be painted above the storm drain. The stencil message should be readable from the roadside. If the curb is red, paint directly above the red area.



Please remember not sit/stand in the street while completing this project

Stenciling Steps: Wipe the street curb with cloth. The area to be painted should be as clean as possible so the paint will adhere properly. Place the stencil in the location you've selected. Use wide masking tape to tape only the perimeter of the first stencil without taping down the inside of the stencil itself. (This will form the 8" x 32" rectangular background for you to paint white.)

Open white paint only. Stir paint with mixing stick. Paint the rectangular area white. USE PAINT SPARINGLY!!! Remember, *neatness* is very important.

If your storm drains are relatively close together, paint all the white backgrounds first, then return to paint the Think Blue stencil so the white paint has time to dry.

Very Important: Make sure the paint is dry. Then tape the Think Blue stencil (illustrated above) on top of the white background. Open the blue paint, stir, and dab the blue paint *sparingly* using the Think Blue stencil.

TIPS:

If painting a rough surface, firmly hold down the stencil and dab (don't brush) the letters and the figure. Be careful not to get paint underneath the stencil.

The key to success is to USE AS LITTLE PAINT ON YOUR BRUSH AS POSSIBLE.

When finished painting, wipe off any paint on the outside of the container and tightly replace the lid to the paint.

Anytime you stop painting for more than a couple minutes, place the brush in its plastic bag to keep the brush from drying.

Trash Storage Areas SD-32

Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

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

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

Designing New Installations

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

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

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

Redeveloping Existing Installations

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

Additional Information

Maintenance Considerations

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

Other Resources

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

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

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

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

Dec. 1, 1992

Street Sweeping

Description

Street sweeping involves the use of specialized equipment to remove litter, loose gravel, soil, pet waste, vehicle debris and pollutants, dust, de-icing chemicals, and industrial debris from road surfaces. Street sweeping equipment can consist of a truck or truck-like vehicle equipped with multiple brushes, pick-up deflector, holding bin, water sprayer, vacuum nozzle and filter, or a combination of some or all of these features.

Pollutants Controlled and Impacts

When done regularly, street sweeping can remove 50-90% of street pollutants that potentially can enter surface water through storm sewers. Street sweepers will also make road surfaces less slippery in light rains, improve aesthetics by removing litter, and control pollutants which can be captured by the equipment.

Application

Land Use
Transportation, urban

Soil/Topography/Climate
Street sweeping is not effective on snow covered roads.

When to Apply
Street sweeping is typically done in the early morning hours when traffic is light. It is sometimes necessary to control parking by placing signs which limit the hours or the side of the street in which parking is allowed.

Where to Apply
Street sweeping is applicable on urban streets with curb and gutter, or paved drainageways.

Relationship With Other BMPs

Sweeping is recommended at least four times per year on all Porous Asphalt Pavement. Street sweeping in some areas may decrease the frequency in which Catch Basins need to be cleaned.

Specifications

General Considerations:

1. Approximately 90% of the contaminants will accumulate within 12 inches of the curb, therefore, only one sweep is generally necessary to remove contaminants.

2. When replacing gutters or constructing new ones in urban areas, consider installing broader concrete gutters to increase street cleaning efficiency.

3. Damaged pavement is not possible to clean effectively and should be resurfaced in areas where street cleaning is done.

4. Use vacuum sweepers on dry pavement only.

Frequency of Sweeping:
The frequency in which street sweeping should be done is very controversial, and the schools of thought range from "not at all" to "every other day." Some studies have shown that street sweeping may have a negative effect by breaking down aggregated particles (clumps of particles) into fine particles which can be carried more easily by runoff. We feel that the goal of street sweeping should be to keep the larger-sized pollutants from entering storm sewers.

We recommend street sweeping:

-after heavy rain storms in which sediment is present on the streets; and

-adjacent to construction sites where sediment has left the site and entered the street; and

-at least once during the fall to collect leaves and keep them out of the sewer system; and

-at least once during the spring to collect garbage and coarse sediment left behind during snow melt.

The effectiveness of street sweeping appears to be primarily dependent upon the frequency of sweeping and the interval between storms. Additional considerations are operator skill and the number of cars parked at the curb. Other factors in order of importance are: total mass of the area to be swept and its relation to loadings on other areas not accessible to sweepers; the efficiency of sweepers compared to the storm runoff of the pollutant of interest; and local storm characteristics.

Types of Sweepers:
Street sweeping effectiveness is a function of sweeping frequency, number of passes per sweeping, equipment speed and pavement conditions. Below are two types of street sweepers. Keep in mind that street sweeping equipment is manufactured by more than one company and each company competes for design efficiency.

Mechanical broom street sweepers are effective in removing larger particles, but are not effective in removing fine, pollutant-laden dust and dirt (smaller than 400 microns). These small particles contain the majority of pollutants found on the streets (i.e. oxygen demanding substances, nutrients, metals, oils). The removal efficiency for these machines is 50%, assuming a smoothly paved surface, particles greater than 400 microns, and the absence of parked vehicles. These are less expensive to operate than vacuum sweepers.

Vacuum-type street sweepers are more efficient in removing dust and dirt particles (about 90%) than mechanical broom sweepers. However, vacuum sweepers are ineffective when the pavement is wet.

Maintenance

In order to increase the effectiveness of street sweeping, roads should be kept well-surfaced.

REFERRAL NUMBERS

For more information on stormwater management

(888) 846-0800

To reach the County Department of Environmental Health

(619) 338-2222

For information on recycling, composting and household toxics

(877)-R-1 Earth
(877) 713-2784

To schedule a presentation for your community group or organization

(888) 846-0800

For a daily update on beach and bay closures

(619) 338-2073

project clean water

"clean water through local commitment and action"

Call us for more information:

(888) 846-0800

Or visit us at our web site:

www.sdcdpw.org

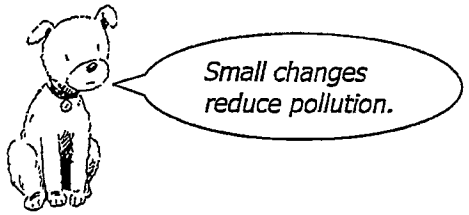
or

www.projectcleanwater.org

For pet licensing information, visit the

Department of Animal Services
web site:

www.sddac.com



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08/03

STORMWATER POLLUTION PREVENTION

PET WASTE

County of San Diego
Watershed Protection Program

WHAT IS STORMWATER POLLUTION?

When rain flows over streets and other surfaces, it picks up pollutants and carries them into the stormwater conveyance ("storm drain") system. This system is designed to prevent flooding by transporting water away from developed areas.

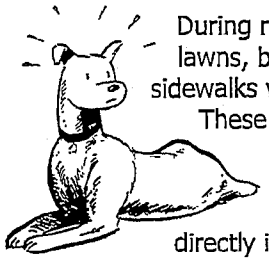
However, this water is not filtered or treated, and all the contaminants it contains eventually flow to our streams, lakes, and ocean where we swim and fish.

Once there, polluted runoff can harm wildlife and habitats. In some cases, it can even cause beach closures or make fish and shellfish unsafe to eat.

Pet wastes are among the many common stormwater pollutants that can degrade water quality. Other examples include paint, oil and automotive fluids, construction debris, yard wastes, pesticides, litter, pool chemicals, and dirty wash water.

ONLY RAIN IN THE STORM DRAIN

WHY IS IT SO IMPORTANT TO PICK UP AFTER YOUR PET?



During rainfall, pet waste left on lawns, beaches, trails and sidewalks washes into storm drains. These wastes and the pathogens they contain (bacteria, parasites, and viruses) end up flowing directly into streams, lakes and the ocean where they can harm human health and the environment.

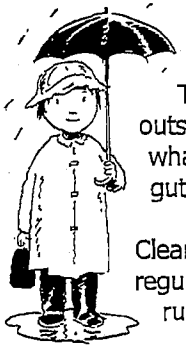
As they decompose, pet wastes demand a high level of oxygen from water. This demand can kill fish and plant life by reducing the amount of dissolved oxygen available to them.

Recent studies have shown dogs and cats are sources of fecal contamination at local beaches.

In addition to causing beach closures, this contamination can make people sick with sore throats, intestinal problems, rashes, nausea, and eye and ear infections.

County Code §67.805 prohibits the discharge of anything but rainwater to the stormwater conveyance system or receiving waters.

WHAT CAN I DO?



The next time you're caught outside in the rain, take a look at what's running off the street, into the gutters, and down storm drain inlets.

Clean up pet waste in your yard on a regular basis, to prevent polluted runoff.

Carry a bag or "scooper" when you take your pet on walks, to the park or other public places. Be prepared and clean up the pet waste.

Do your part to help keep our water clean!

PICK UP AFTER YOUR PET!

It's as easy as 1-2-3

1. **Bring a bag**

2. **Clean it up**

3. **Dispose of it properly (toilet or trash)**

Properly Collect and Dispose of Water

Water is often used for many outdoor activities. It is important to prevent the water from leaving the property and entering into the storm drain system. The water may contain pollutants that will make their way to the creeks, lagoons and ocean.

BMP Objective
The purpose of this best management practice is to prevent any non-rainwater from leaving a property and entering the street and/or storm drain system.

Implementation
DO:

- Sweep or vacuum the area to remove bulk litter and debris.
- Direct the water to a vegetated area using portable berms or sand bags. Any residual litter must be removed from the vegetated area.
- Protect the storm drain by employing the methods described below (for more information see Protect Storm Drain Inlets
- Cover the storm drain inlet with a plastic sheet that will not allow water into the storm drain and will "pond" the water
- Place a weighted object (like a sandbag or other weighted bag) on the plastic sheet to prevent it from moving with wind or water and to create a tight seal with the ground or pavement to keep water from getting around the sheet to the inlet
- Vacuum up standing water before removing drain inlet protection.
- BE SURE TO REMOVE THIS INLET PROTECTION WHEN COMPLETED - OTHERWISE FLOODING MAY OCCUR
- Sweep up the path between the area where water will be used and the storm drain inlet to prevent the leaves and/or debris from washing into the storm drain. Dispose of sweepings in a trash can.
- Use a wet-vac (vacuum that can suck up water) and vacuum the wash water, then dispose of the water to a sanitary sewer connection.
- Pour the water into the sanitary sewer system (toilet or sink) being careful not to put anything hazardous, toxic or that can clog the sink or toilet into the system.
- If not harmful to plants, the water may be poured into landscaping areas in amounts that will not cause the water to leave the landscaped areas.

DON'T:

- Do not dump the water into the street, parking lot or other area where the water will drain towards the storm drain system.
- Do not dump any water into the storm drain system

Clean Up Regularly Using Dry Methods – Home Owners Associations & Property Management Companies

Keeping your driveways, sidewalks and other paved surfaces around your property clean can help keep our waterways clean too. When it rains, trash, dirt, and chemicals that have built up on these surface can run into the street, storm drains, and eventually local water bodies. Sweep up these areas instead of hosing them down. Put pollutants into the garbage, instead of into the storm drain.

BMP Objective

This best management practice is intended to keep dirt, debris, and toxic chemicals from entering the storm drain system.

Implementation

DO:

- Routinely sweep/power sweep driveways, sidewalks, and parking lots and stalls regularly instead of hosing them down. Water may wash motor oil, other automotive fluids, fertilizer and pesticides from the garden, leaves, trash, and dirt into the storm drain. Keep the rain from washing these pollutants away by sweeping up dirt and debris often. Collect sweepings in a dust pan and throw them in the garbage.
- Spot Clean oil and grease spots off driveways and parking lots by using an absorbent such as kitty litter. Other absorbents include corn meal or sawdust. Apply the absorbent, let it sit for several hours, sweep it into a plastic bag, and throw it in the garbage. Do not leave absorbent unattended where it may be swept away by wind or rain.
- Inform residents if you notice vehicles that appear to be leaking oil or automotive fluids on the parking lot, driveway or street. Ask that they repair vehicles that might cause added expense for maintenance and clean up.
- Ask residents to use local car wash facilities instead of washing vehicles in driveways, etc. Consider making it part of a covenant or lease.
- When painting outside, use drop cloths to catch paint scrapings or sandblasting wastes. Dispose of waste in the garbage or other waste receptacle if hazardous waste.
- When gardening, sweep lawn clippings and dirt back into the garden.
- Excessive leaf litter should be recycled or disposed as green waste.
- Monitor your irrigation system to ensure that runoff is not generated.
- Consider leaving fallen leaves in the garden as mulch, or dispose of them as green waste. Visit http://www.co.san-diego.ca.us/dpw/recycling/pdf/GreenWasteRecyclingGuide.pdf for local green waste collection centers. Or in the City of San Diego, use free curbside collection where offered – call the City of San Diego for more information (858) 694-7000.

DON'T:

- Do not hose off driveways, sidewalks, parking lots and other paved surfaces.
- Do not bury or hose down absorbent material. Put it in the garbage or waste receptacle.
- Do not sweep, wash down or blow dirt, grass trimmings, leaves, or any debris into the street. Rain will wash this into the storm drain and eventually local waterways.

Protect Storm Drain Inlets

Storm drains are a direct connection to the creeks, bays, lagoons and beaches. It is very important to prevent pollutants from entering the storm drain. The pollutants most commonly found entering the storm drain system are leaves and debris, sediment, trash and litter, and washdown pollutants from cleaning activities (soaps and detergents). In order to prevent these pollutants from entering the storm drain, it is important to protect the storm drain inlets while performing activities. Protection includes preventing waters from entering the storm drain system, even if the water appears to be clean.

BMP Objective

Prevent pollutants from entering the storm drain inlets.

Implementation

The most important concept in protecting storm drain inlets is to prevent anything other than rainwater entering the inlet. Other waters, trash and debris must be collected and disposed of properly.

When you are engaging in an activity where debris or water is generated, the first course of action in protecting storm drain inlets is to locate where the debris or water will go. In almost all cases, water will flow to a storm drain inlet. Even if the inlet is blocks away, it is important to protect that inlet and prevent waters and pollutants from entering it. Everything that goes into the storm drain inlet, will flow downstream to a creek, bay, lagoon and the beaches.

The next step is to determine how you will protect the storm drain inlet. The most commonly used method is to obtain sand bags from your local hardware store. Fill the bags approximately ¾ full with play sand and place around the opening of the inlet to create a berm that prevents water from flowing into the inlet. If possible, use the bags to create a water tight seal that prevents any water from seeping under the bags into the inlet. It may take up to 6-8 bags to properly protect the inlet. It is important not to place the bags too close to the inlet opening, in case one should fall into the storm drain system. Also, be sure to use bags that are in good working condition, a deteriorating sand bag can break and allow the sand or gravel to flow into the storm drain system.

It is also important to capture as much of the water from your activity as close to the activity as possible. For example, if you are washing down a drive-thru area or trash area, use the sand bags closer to your activity to create dams along the waters path to the storm drain inlet. This allows you to use a wet vacuum to collect the waters (and pollutants) for proper disposal. Any collected waters should be disposed of in the sanitary sewer system (mop sink, toilet, etc.) or in landscaped areas where the water will not runoff into the street or storm drain system..

Limitations

It is important to create a water tight seal around the storm drain inlet to prevent any water from seeping past the bags or other berm material. If water seeps past, it will likely continue to carry the pollutants to the creeks; bays; lagoons and beaches.

CLEAN WATER TOOLBOX - a resource for the San Diego region

Proper Disposal of Household Hazardous Waste

Household Hazardous Waste (HHW) is any unwanted product that is labeled DANGER, WARNING, CAUTION, POISON, TOXIC, FLAMMABLE, CORROSIVE, REACTIVE, or EXPLOSIVE. Some common items that are considered HHW are:

- Aerosols
- Batteries (auto, household, rechargeable)
- Fertilizers
- Household Cleaners
- Motor Oil and Oil Filters
- Pesticides
- Propane
- Automotive Fluids
- CRTs (cathode ray tubes, TVs and monitors)
- Fluorescent Lights
- Mercury Items (some thermometers)
- Paint and Stains (latex and oil)
- Pool Chemicals
- Solvents

When these items are not properly disposed of, they can release toxic or poisonous pollutants to the environment. These products can cause illnesses and disease among humans, animals and plants.

There are designated disposal sites where the HHW materials can be properly disposed of and processed in a manner that prevents the toxic or poisonous materials from entering the environment.

BMP Objective

The purpose of this best management practice is to prevent hazardous wastes from entering the waterways – including storm drains, creeks, rivers, lagoons and the ocean.

Implementation

DO NOT Pour HHW products down the drain, on the ground or into storm drains. It is illegal and improper to put these products in the trash as well.

Each City has designated HHW disposal sites – call the numbers below to locate the nearest HHW disposal sites.

City of San Diego 858-694-7000
Chula Vista 619-691-5122
Del Mar 800-714-1195
Encinitas 800-714-1195
Imperial Beach 619-691-5122
Lemon Grove 800-449-7587
Oceanside 760-439-2824
San Marcos760-744-1050
Solana Beach 800-714-1195
Carlsbad 800-714-1195
Coronado 619-522-7383
El Cajon 619-596-5100
Escondido 760-839-4818
La Mesa 619-287-5696 x4270
National City 619-691-5122
Poway 800-714-1195
Santee 619-596-5100
Vista 800-714-1195

Safely transport your HHW materials to the proper disposal sites – call ahead for hours of operation and to see if there are limitations on quantities and types of materials accepted.

When transporting HHW materials – keep them in closed, leak-proof containers to prevent spills and mixing of chemicals. The containers should be no larger than 5 gallons and placed in the trunk away from passengers and pets.

Properly Handle Solid Waste

Businesses and property owners should consider their management of both litter and solid waste. Separating solid waste can minimize the amount of waste that requires paid disposal. It also allows possible pollutants to be properly contained. In some cases garbage may leak and introduce toxic pollutants to rainwater runoff. Trash itself is increasingly becoming a pollutant in runoff, eventually littering waterways with trash and harming aquatic life. Animals may mistake some trash as food and become tangled or swallow harmful materials.

BMP Objective

The purpose of this best management practice is to keep garbage out of waterways and prevent leaks from garbage containers from introducing other pollutants to rainwater runoff.

Implementation

DO:

- First, segregate wastes into these categories:
- Reusable materials: Consider what might be reused by you, your businesses or others. Some construction wastes can be reused, for example, at a lower cost than landfilling.
- Recyclables: This goes beyond plastic containers and glass to automotive fluids and yellow grease. Often talking to material suppliers will help you locate recycling facilities. San Diego County-specific information on reuse and recycling is available at http://www.sdcounty.ca.gov/dpw/recycling/commercial.html.
- Green waste: Keep green waste clean by not mixing it with other garbage. The cost of disposing of green waste is lower than general landfill costs. In communities with curbside pickup of yard wastes, place clippings and pruning waste at the curb in approved bags or containers. For commercial disposal of green waste visit: http://www.co.san-diego.ca.us/dpw/recycling/pdf/GreenWasteRecyclingGuide.pdf
- Waste that may be composted: Depending on the user, this may or may not be appropriate. Landscapers, for example, can start composting piles for clients. Meat and greasy food scraps should not be added to compost piles. Other food scraps are able to be composted.
- Oil and Grease: Properly Contain and Store Oil and Grease (Food Service or Auto Facilities)in sealed waterproof containers, and Properly Dispose of Oil and Grease (Food Service, Auto Facilities or Residential). If the oil and grease is stored outside, ensure the container and surrounding area is kept clean using dry methods and that the lid is kept shut when not in use.
- Garbage: Do not put hazardous waste in the garbage.
- Hazardous waste: See Proper Disposal of HHW Materials. Provide Secondary Containment.
- Electronic waste: TVs, computer monitors and batteries are no longer allowed to go to the landfill. Contact your local household hazardous waste program for recycling options for these items.
- Fluorescent tubes: Fluorescent light tubes contain mercury. These lights should be collected for recycling to prevent the discharge of mercury into landfills and the environment.
- Collect and cover green waste with a tarp to prevent rain from washing debris into storm drains. Keep piles away from storm drain inlets. Consider using a Berm.
- Pick up litter on your property or at your work site. If litter is a persistent problem, post no littering signs and provide adequate garbage cans with lids on the property.
- For dumpsters,
- Keep trash container lids closed and consider constructing an overhang above the dumpster to further protect it from rain.
- If your dumpster leaks, contact your solid waste hauler to have it repaired or replaced.
- Sweep areas around dumpster to collect any litter.

DON'T:

- Do not hose down dumpster areas to the storm drain.
- Do not pour liquids directly into garbage cans or dumpsters. Depending on the liquid, it may need to be directed to the sanitary sewer, sealed in an unbreakable container and put in the garbage, or disposed of as hazardous waste.

Limitations

Waste disposal options such as composting may be limited for some users.

Proper Materials Storage

Proper storage of materials can range from sealing chemicals in a well-labeled container indoors to covering piles of materials outdoors. Hazardous materials require special attention, but non-hazardous materials also need to be stored so that they do not contribute to dirt, trash, and debris in stormwater. Designate a storage area where runoff will not lead to the street or storm drains. Minimize mishandling by training staff and posting applicable pollution prevention information in storage areas.

BMP Objective

The purpose of this best management practice is to minimize leaks, spills, and runoff that may might pollute stormwater.

Implementation

DO:

- The first step in properly storing materials is to compile a materials inventory by reviewing purchase orders and touring the physical plant or work area of your business.
- Identify chemicals that are hazardous or toxic. Maintain Material Safety Data Sheets (MSDS) and other safety material for stored inventory in an area accessible to employees. Include information on safety equipment and appropriate materials and procedures to clean spills. In some cases, posters in storage areas may be the best way to remind employees of this information when it is needed. Provide all materials in the first language of employees.
- Keep applicable clean up kits where materials are stored.
- Label stored materials for contents, unit number, expiration date, handling instructions, and health or environmental hazards.
- Store materials where runoff will not lead to the street, gutter, or storm drain. Storage areas should be graded so that runoff will not lead to storm drains or stored materials can be lifted away from the runoff, for example, by storing on pallets and then covering with a tarp.
- Close off drains in storage areas.
- Provide Secondary Containment. This provides a backup in case of leaks or spills.
- If possible, store materials indoors. This prevents wind and rain from carrying them away.
- Outdoors, cover any materials that are toxic or could contribute to trash, debris, and sediment in stormwater. For example, use leak proof lids on containers or plastic tarps over dirt piles. If they are exposed to runoff, they should also be isolated by either using berms, or elevated, for example, by using pallets.
- Keep in mind the lifespan of the cover used. Tarps and plastic sheets, for example, may not hold up well in certain climates.
- For dirt piles, block rainwater runoff with a Berm.
- In storage areas, Clean Up Regularly with Dry Methods.
- Keep dumpster lids closed and consider constructing a roof or overhang to shelter the dumpster. Replace leaking dumpsters.
- Take care when loading and unloading materials to minimize losses or fugitive emission losses such as dust or mist.

DON'T:

- Do not dispose of unwanted materials in the street or storm drain.
- Do not assume that a material is safe for stormwater because it says it is non-toxic or biodegradable. Non-toxic means the product is not toxic to the user. Biodegradable means the product will eventually break down, but it may harm the environment in the meantime.

Provide Secondary Containment

Businesses often store materials in containers that have the potential to leak due to container failure, overfilling or improper draining. These containers should have secondary containers which provide for additional storage capacity for the materials stored in the primary container which may leak.

BMP Objective

The purpose of this best management practice is to prevent stored materials and wastes from leaking and/or spilling from their containers to the environment.

Implementation

Secondary containment can take the form of primary containers set physically within or on top of secondary (typically larger) containers. The secondary containers can separate the primary container from the surrounding area by use of a berm or containment wall or simply be a larger container that the primary container would drain to in the event of container failure, overfilling or improper draining. Typically, the size of the secondary containment is 110% of your primary container size – a 55 gallon primary container would need 60.5 gallons of secondary containment.

To implement a separating berm or wall, it is recommended that a licensed contractor perform the construction for you. The containment area (within the berm or wall) should be properly sized and depending on the size, permitted through your local agency. The secondary containment area should be on a hard concrete or asphalt surface to prevent the liquid material from entering the ground and causing pollution. The berm can be made of asphalt or concrete and the wall should be made of concrete. The following link has some design drawings of berms - Berm Design Drawings

To implement a secondary container, use the resource links to identify vendors that sell the product most suitable for your use. Call the manufacturers or suppliers to seek assistance in the proper type, size and model depending on your application.

Limitations

It is important to recognize that although secondary containment may in place, spills may still occur, especially when draining containers or filling them with liquid materials. It is important to always maintain spill clean up materials nearby and to train all employees on proper draining, filling and spill clean up procedures.

Use Non-Toxic Products

While many people are aware of outdoor air quality issues, many do not consider how the chemicals used inside buildings may degrade indoor air quality. Chemicals used outdoors can also be tracked in on shoes, etc. If you use non-toxic materials on your property, you minimize risks to the environment and your employees. In many cases, non-toxic products are just as effective as more toxic traditional products and readily available through alternative suppliers.

BMP Objective

This purpose of this best management practice is to reduce pollutants that are commonly found in stormwater.

Implementation

DO:

- Look for labels that state product is "non-toxic," "non-petroleum based," "free of ammonia, phosphates, dye, or perfume," or "readily biodegradable."
- Read label ingredients. Avoid phenols, formaldehyde, and caustic or acid products.
- Consider replacing the following products:
  - Automotive Products: Alternatives to grease lubricants, car polishes, degreasers, and windshield washer solution are all available as well as refined motor oil.
  - Vehicle/Trailer lubrication: Adhesive lubricants can replace typical chassis grease.
  - Cleaners: Look for vegetable-based or citrus-based soaps as opposed to petroleum-based soaps and detergents.
  - Paint products: Water-based paints, wood preservatives, stains and finishes are available.
  - Pesticides: Alternative products and methods can control most insects, fungi and weeds. See Implement IPM for more information.
  - Chemical Fertilizers: Compost and soil amendments are natural alternatives.
  - Consumables: Manufacturers have reduced or are in the process of reducing heavy metals in consumables such as batteries and fluorescent lamps. Low mercury containing fluorescent lamps are now available in most hardware and lighting stores. Rechargeable batteries minimize heavy metal waste.
  - Janitorial chemicals: Even biodegradable soap can harm fish and wildlife before it biodegrades. Safer products and procedures are available for floor stripping and cleaning, as well as carpet, glass, metal and restroom cleaning and disinfecting.
  - Aerosols: Use pump-type or non-aerosol products
  - chlorinated solvents; CFCs, and 1,1,1 trichloroethane (TCA): Alternatives to all of these products exist.
- Promote your business by obtaining recognition from the County of San Diego as a Green Business. See http://www.sdcounty.ca.gov/deh/hmd/greenbusiness.html for more information.

DON'T:

- Do not assume non toxic or biodegradable products are safe. Non-toxic means the product is not toxic to the user. Biodegradable means the product will eventually break down, but it may harm the environment in the meantime.
- Do not dispose of any toxic chemical by pouring it into the street, a storm drain, drains in your home, or the toilet. Take responsibility for Proper Disposal of HHW. Other Businesses may have to contract with professional services to dispose of hazardous waste.

Limitations

Availability and cost of alternative products may be a limiting factor.

Label Storm Drain Inlets

AWARENESS - is a key element in getting employees and the public to change their behavior. Providing notifications on storm drain inlets will make people aware that the storm drain delivers what drains into it directly to the creeks, beaches and the ocean. Labeling can come in the form of painting a message or by adhering a tile directly to the inlet - both labeling methods provide the same result: a message that the storm drain leads to the creeks, beaches and ocean.

BMP Objective

The objective of labeling storm drain inlets is to prevent people from pouring things into the storm drain or allowing non-rainwater from entering the storm drain system.

Implementation

The first step to labeling storm drain inlets is to locate all inlets that are on your property. If there are inlets that your property drains to but are in the street or City's right-of-way, it is important that you contact your local jurisdiction prior to labeling the inlet. Many jurisdictions have standard markings that they require for inlet labeling.

If you are stenciling the inlet - obtain the proper stencil, tape the stencil down and paint the markings onto the inlet.

If you are adhering a placard - obtain the proper adhesive; clean the surface with wire brush and sweep dust away; apply the adhesive per the manufacturer's requirements and stick the placard onto the appropriate surface.

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a property. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side.

Contain and Clean Up Spills

There are many activities that have the potential to cause accidental or illegal spills. Proper training and actions can minimize the amount of pollutant discharge to the environment. Activities that have the potential to cause spills include grease handling, waste management, loading and unloading of materials and chemicals.

BMP Objective

The purpose of this best management practice is to prevent spilled pollutants from leaving a property and entering the parking lot, street and/or storm drain system.

Implementation

One of the most important activities to have a plan. The plan should:

- Identify the potential spill areas and activities
- Specify material handling procedures
- Describe spill response procedures
- Provide for spill clean-up equipment and materials

Purchase and maintain spill cleanup materials where it will be readily accessible in the event of spills. In the event of a spill, clean up the spill immediately. Use dry cleaning methods if possible – this includes, absorbents (kitty litter, other commercial absorbents – see below), brooms, dustpans, shovels, sweepers, etc. Spread the absorbents on the spill and allow the material to soak up the spilled liquids. Use a broom, shovel or sweeper to sweep up the material and dispose of properly in a trash can.

If water is used, use as little as possible. Use rags for smaller spills and absorbent materials for larger spills. If the material is hazardous, contact the appropriate reporting agency and take appropriate cleanup and disposal actions.

Limitations

Hazardous material should be cleaned up and disposed of properly by a professional – contact your local agency for specific requirements.

Properly Collect and Dispose of Wash Water - Power Washing

Water is discharged from high pressure washing systems during power washing activities. It is important to prevent the water from leaving the property and/or entering into the storm drain system. The water may contain pollutants that will make their way to the creeks, lagoons and ocean.

BMP Objective

The purpose of this best management practice is to prevent discharge water from power washing (or any non-rainwater) from leaving a property and entering the street and/or storm drain system.

Implementation

DO:

- Sweep or vacuum the area to remove bulk litter and debris.
- Direct the water to a vegetated area using portable berms or sand bags. Any residual litter must be removed from the vegetated area.
- Protect the storm drain by employing the methods described below (for more information see BMP "Protect storm drain inlets")
- Cover the storm drain inlet with a plastic sheet that will not allow water into the storm drain and will "pond" the water
- Place a weighted object (like a sandbag or other weighted bag) on the plastic sheet to prevent it from moving with wind or water and to create a tight seal with the ground or pavement to keep water from getting around the sheet to the inlet
- Vacuum up standing water before removing drain inlet protection.
- BE SURE TO REMOVE THIS INLET PROTECTION WHEN COMPLETED - OTHERWISE FLOODING MAY OCCUR
- Sweep up the path between the area where water will be used and the storm drain inlet to prevent the leaves and/or debris from washing into the storm drain. Dispose of sweepings in a trash can.
- Use a wet-vac (vacuum that can suck up water) and vacuum the wash water, then dispose of the water to a sanitary sewer connection.
- Pour the water into the sanitary sewer system (toilet or sink) being careful not to put anything hazardous, toxic or that can clog the sink or toilet into the system.
- If not harmful to plants, the water may be poured into landscaping areas in amounts that will not cause the water to leave the landscaped areas.

DON'Ts

- Do not dump any water into the storm drain system
- Do not dump the water into the street, parking lot or other area where the water will drain towards the storm drain system.

Plant Selection - General

Properly selecting and placing vegetation can significantly minimize the costs of maintaining gardens. Native landscapes are adapted to the local climate, insects, and soil, so they require less water, pesticides, and fertilizer. Consequently, these landscapes also require fewer chemicals and less time input from gardeners.

BMP Objective

The purpose of this best management practice is to reduce water and chemical use in vegetated areas.

Implementation

DO:

- Choose native plants. Do not assume something is native because you have seen it in your area. Contact your local nursery for information or visit the California Exotic Pest Plant Council website at www.caleppc.org.
- Contact California Native Plant Society for more information on native plant selection. www.CNPS.org
- Some plants attract "good bugs". These are referred to as "insectary plants" create a less hospitable habitat for pests. Some examples include:
    - Aster (Aster)
    - Baby blue eyes (Nemophila menziesii)
    - Calendula (Calendula)
    - California lilac (Ceanothus)
    - California poppy (Eschscholzia californica)
    - Chervil (Anthriscus cerefolium)
    - Chrysanthemum (Chrysanthemum)
    - Coriander (Coriander sativum)
    - Cosmos (Cosmos)
    - Coyote brush (Baccharis pilularis)
    - Dill (Anethum graveolens)
    - Elderberry (Sambucus mexicana)
    - Fleabane (Erigeron)
    - Holly-leaved cherry (Prunus ilicifolia)
    - Monkey flower (Mimulus)
    - Native buckwheat (Eriogonum)
    - Pincushion flower (Scabiosa)
    - Rosemary (Rosmarinus officinalis)
    - Rudbeckia (Rudbeckia)
    - Sunflower (Helianthus)
    - Tidy-tips (Layia platyglossa)
    - Toyon (Heteromeles arbutifolia)
    - Yarrow (Achillea)
    - Zinnia (Zinnia)
- Monitoring your plants will allow you to see if pests are at work in your yard.
- Some tolerance for damage may help to prevent use or need for chemical use.
- Mechanically pull weeds to reduce the need to spray herbicides.
- Place plants so that they will not outgrow their location. Pay attention to the anticipated height and width of the plant even if it may currently fit the location. Many native plants in an appropriate locations may not need pruning.
- Keep in mind that initial planting of native plants will require watering until the plants become established. Once established water may be cut back depending on the need of the plant.
- Also pay attention to how the roots of trees and shrubs may grow. Tree roots are a common cause of blockages in sewer lines and foundation problems. Problem trees include poplars, willows, figs, rubber trees, large eucalyptus trees, fruitless mulberry and the Modesto ash. For more information visit http://www.sewersmart.org/prevention-4.html

- Minimize the amount of grass on your property. A conventional lawn requires intensive upkeep and often contributes to high runoff. A small area of turf or groundcover near a patio or window view will maintain the look and feel of lawn with out a large area to irrigate. See http://www.recycleworks.org/greenbuilding/sus_lawnarea.html for alternative options.
- Drought tolerant plants also make good sense in a southern California landscape. Visit www.bewaterwise.org for more information.

Limitations

Implementation may be limited by the availability of native and insectary plants.

Weed Control

Chemical weed control is often favored over mechanical weed control, but chemicals can harm both the environment and the person applying them. Humans can absorb herbicides through skin contact, or inhale them. Herbicides on outside vegetation can also be tracked indoors on shoes and deposited on carpets or floors. If herbicides are washed into stormwater, they can impair the health of aquatic life.

BMP Objective

The purpose of this best management practice is to reduce herbicide runoff to the storm drain system.

Implementation

DO:

- Prevent weeds by planting groundcover. Ivy, for example, will deter weeds. Ground covers are often invasive, however, so confine them to isolated areas.
- To control weeds, use drip irrigation and mulch. Wheat straw and hardwood leaves, are examples of good mulches.
- If possible, hand-pull weeds including roots.
- Otherwise, cut weeds down to the ground. Repeat cutting before they flower, grow new leaves, or go to seed.
- Use herbicides containing pelargonic acid or herbicidal soap as a last resort.
- In order to dispose of herbicide containers, first rinse them and use the rinse water as product. Clean containers can be put in the garbage.
- Follow all instructions on container when using herbicides.
- In San Diego County application of pesticides are regulated through the Department of Agriculture, Weights and Measures, Standards Compliance Program. Contact the Department for specific requirements and conditions tha may impact your facility compliance.

DON'T:

- Do not over apply herbicide, or fail to properly dilute herbicides. Follow the instructions on the container.
- Do not dispose of unwanted herbicide in any drain, the street, or in the garbage. It should be disposed of as hazardous waste. See http://www.earth911.org/master.asp?s=ls&cat=9&serviceId=181&type=-1 for disposal location in your area.

Limitations

Mechanical weed control may not be feasible for some users given limit time resources.

Properly Store and Contain Oil and Grease - Landscape

Gasoline used for landscape maintenance equipment is of special concern because of the porous surfaces of work areas. Soil will readily absorb any spilled gasoline and can contaminate groundwater as well as stormwater. Simple handling tips can minimize this risk.

BMP Objective

This purpose of this best management practice is to prevent gasoline spills.

Implementation

DO:

- Only use approved gasoline containers. Containers should have spouts that allow for pouring without spilling and minimize the generation of vapors. They should be approved of by nationally recognized testing labs such as Underwriters Laboratories (UL).
- Seal lids tightly.
- Store gasoline containers on the ground. This will minimize the risk that they might fall and spill.
- Keep gasoline containers as far away from waterways and storm drains as possible. If there is a spill, this will allow more time to intercept it before it reaches the water or drain.
- Use a funnel to prevent spills when fueling power mowers, blowers, and all other gas-powered equipment. Use drip trays underneath equipment when fueling.
- Contain and Clean Up Spills immediately. Use an absorbent such as kitty litter. Collect the absorbent, seal it in a plastic bag and dispose of it as hazardous waste.
- Keep spill clean up supplies available at the work site, including a container to properly contain the picked up waste.

DON'T:

- Do not pour gasoline down any drain, into the street, waterways or the garbage. Take responsibility for Proper Disposal of HHW. Take gasoline in for disposal in an approved container.

Properly Store, Use, and Dispose of Fertilizer

Fertilizer use is a significant source of pollution causing overgrowth of algae in waterways, which can kill fish and other aquatic life. If grass alone were considered a national crop, it would be the fifth largest in the nation. Accordingly, minimizing fertilizer use and runoff from lawns as well as gardens improves water quality. Fertilizers can also be toxic where they are applied, so proper handling can protect your immediate environment and employees.

BMP Objective

The purpose of this best management practice is to reduce fertilizer runoff to storm drains and waterways.

Implementation

DO:

- Consider Plant Selection (General or Nurseries) to reduce the need for fertilizers.
- Perform soil analysis seasonally to determine actual fertilization need and application rates.
- Fertilize garden areas with a mulch of leaves, bark, and composted manure and/or garden waste where it is not likely to get carried off into storm drains.
- Consider grass cycling when it is not likely to blow off and into storm drains. It can eliminate the need for fertilizers. Leave your clippings on the lawn when mowing. Once cut, grass clippings first dehydrate, then decompose, quickly disappearing from view. Proper mowing is required for successful grass cycling. Cut grass when the surface is dry, and keep the mower blades sharp. Follow the "1/3 Rule": mow the lawn often enough so that no more than 1/3 the length of the grass blade is cut in any one mowing. Frequent mowing will produce short clippings that will not cover up the grass surface. The lawn may have to be cut once every 7 days when the lawn is growing quickly but only every 7 to 14 days when it is growing slowly. However do not allow grass clippings to remain on adjacent hard surfaces where it cannot cycle.
- Apply chemical fertilizer only as needed, when plants can best use it, and when the potential for it being carried away by runoff is low. Make sure the fertilizer spreader is calibrated. Do not apply when there is a chance of rain.
- Leftover fertilizer must either be used up or stored properly.
- Store fertilizer is a water proof container or inside in a shed or storage cabinet where it is protected from rainfall.
- Store fertilizer off the ground.
- Do not remove labels from fertilizers.
- Dispose of unwanted fertilizer at a local collection point. Visit http://www.earth911.org/master.asp?s=ls&serviceid=183 to find a location near you.

DON'T:

- Never dispose of leftover fertilizers in the trash, gutter, street, or storm drain.

Properly Store, Use, and Dispose of Pesticides

Pesticides are potent chemicals. They make their way into waterways and the air, and are harmful to both wildlife and human health. A 1999 USGS Survey of urban streams found that insecticide concentrations frequently exceeded USEPA guidelines for protecting aquatic life. Pesticides used outdoors can also be brought inside on shoes and clothing, where they may contaminate carpets and floors. It is best to discourage pests using integrated pest management, but the effects of conventional pesticides can be minimized through proper handling.

BMP Objective

The purpose of this best management practice is to reduce pesticide use and runoff from gardens.

Implementation

DO:

- The label on a pesticide container is a legal document. Use pesticides as instructed only.
- Identify the specific problem or pest by taking a sample to your local nursery or contacting the Master Gardener's Program.
- Select a pesticide specifically for the pest to be exterminated.
- Spot treat wherever possible to minimize chemical use.
- Use mechanical methods of removing pests first. This may postpone the need for chemicals at all.
- Tolerate some damage.
- Look for less toxic methods for pest control.
- Employ Integrated Pest Management to avoid the use of or at least minimize the amount of hazardous chemicals used.
- Buy prepared pesticides instead of pesticides that need to be diluted. More concentrated pesticides pose greater environmental and health risks in storage and during handling. Spills are more likely to occur during mixing.
- If you do dilute pesticides, use rinse water from measuring cups, etc. as product. Do not wash this down any drain.
- Consider using baits and traps which instead of generally applying chemicals.
- Do not use aerosols. Aerosols carry pollutants into the air and are a risk to the person applying them as well as the environment (indoor or out). Air disperses the pollutants and carries them beyond the desired area for pest control.
- Avoid calendar application of pesticides. Instead, monitor the pest and treat for specific problems.
- Use gloves and masks when using pesticides if suggested by instructions. Gloves are not to avoid stains on hands, but to prevent chemicals from entering your blood stream through your skin.
- Store pesticides inside in a shed or storage cabinet where they are protected from rainfall.
- Do not remove labels from pesticide containers.
- Store pesticides off the ground.
- Contain and Clean Up Spills. Keep clean up materials for toxics such as pesticides nearby in a location known to all. Do not hose down spills but instead use paper towels or an absorbent such as kitty litter. Sweep up absorbent or gather the towels, put them in a sealed container and dispose of them as hazardous waste.
- When you are ready to dispose of pesticides, first rinse empty containers and use rinse water as product. Small cleaned containers may be disposed of in the garbage.
- Dispose of unwanted pesticides at a local collection point. Visit http://www.earth911.org/master.asp?s=ls&serviceid=179 to find a location near you.

DON'T:

- Do not apply pesticides outside when there is a chance of rain. This creates a high potential for pesticides to wash into storm drains. Avoid irrigation in the areas where pesticides are applied, at least until they have had a chance to work.
- Do not dispose of any pesticide by pouring it into the street, a storm drain, drains in your home, or the toilet.
- Do not put pesticides in the trash.

Integrated Pest Management (IPM) Principles

1. What is IPM?

Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment.

The IPM approach can be applied to both agricultural and non-agricultural settings, such as the home, garden, and workplace. IPM takes advantage of all appropriate pest management options including, but not limited to, the judicious use of pesticides. In contrast, *organic* food production applies many of the same concepts as IPM but limits the use of pesticides to those that are produced from natural sources, as opposed to synthetic chemicals.

2. How do IPM programs work?

IPM is not a single pest control method but, rather, a series of pest management evaluations, decisions and controls. In practicing IPM, growers who are aware of the potential for pest infestation follow a four-tiered approach. The four steps include:

- **Set Action Thresholds**

  Before taking any pest control action, IPM first sets an action threshold, a point at which pest populations or environmental conditions indicate that pest control action must be taken. Sighting a single pest does not always mean control is needed. The level at which pests will either become an economic threat is critical to guide future pest control decisions.

- **Monitor and Identify Pests**

  Not all insects, weeds, and other living organisms require control. Many organisms are innocuous, and some are even beneficial. IPM programs work to monitor for pests and identify them accurately, so that appropriate control decisions can be made in conjunction with action thresholds. This monitoring and identification removes the possibility that pesticides will be used when they are not really needed or that the wrong kind of pesticide will be used.

- **Prevention**

  As a first line of pest control, IPM programs work to manage the crop, lawn, or indoor space to prevent pests from becoming a threat. In an agricultural crop, this may mean using cultural methods, such as rotating between different crops, selecting pest-resistant varieties, and planting pest-free rootstock. These control methods can be very effective and cost-efficient and present little to no risk to people or the environment.

- **Control**

  Once monitoring, identification, and action thresholds indicate that pest control is required, and preventive methods are no longer effective or available, IPM programs then evaluate the proper control method both for effectiveness and risk. Effective, less *risky* pest controls are chosen first, including highly targeted chemicals, such as pheromones to disrupt pest mating, or mechanical control, such as trapping or weeding. If further monitoring, identifications and action thresholds indicate that less risky controls are not working, then additional pest control methods would be employed, such as targeted spraying of pesticides. Broadcast spraying of non-specific pesticides is a last resort.

3. **Do most growers use IPM?**

   With these steps, IPM is best described as a continuum. Many, if not most, agricultural growers identify their pests before spraying. A smaller subset of growers use less risky pesticides such as pheromones. All of these growers are on the IPM continuum. The goal is to move growers further along the continuum to using all appropriate IPM techniques.

4. **How do you know if the food you buy is grown using IPM?**

   In most cases, food grown using IPM practices is not identified in the marketplace like *organic* food. There is no national certification for growers using IPM, as the United States Department of Agriculture has developed for organic foods. Since IPM is a complex pest control process, not merely a series of practices, it is impossible to use one IPM definition for all foods and all areas of the country. Many individual commodity growers, for such crop as potatoes and strawberries, are working to define what IPM means for their crop and region, and IPM-labeled foods are available in limited areas. With definitions, growers could begin to market more of their products as *IPM-Grown*, giving consumers another choice in their food purchases.

5. **If I grow my own fruits and vegetables, can I practice IPM in my garden?**

   Yes, the same principles used by large farms can be applied to your own garden by following the four-tiered approach outlined above. For more specific information on practicing IPM in your garden, you can contact your state Extension Services for the services of a Master Gardener.

6. **For More Information on IPM**
   - Pesticides and Food: What "Integrated Pest Management" Means
   - EPA is encouraging the innovation of biological pesticides, also known as biopesticides.
   - Find your state's Extension Service
   - Pesticide Environmental Stewardship Program (PESP)
   - Radcliffe's IPM World Textbook
   - IPMNet

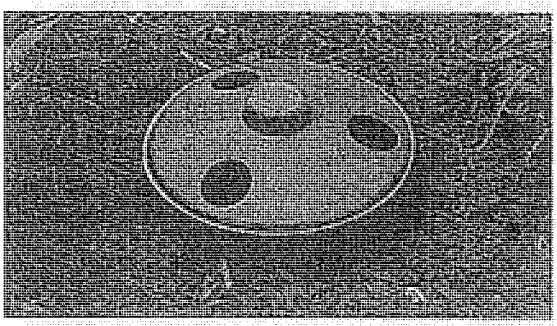
Pesticides and Water Quality

What is IPM?

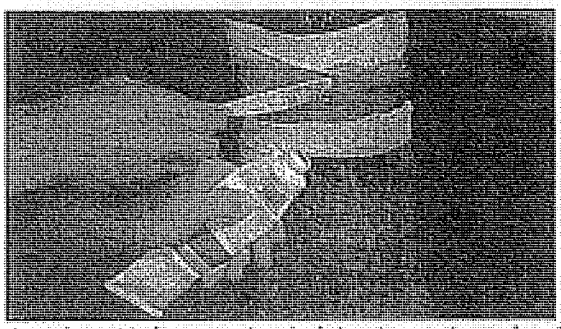
Back to Urban Water Quality

Integrated pest management (IPM) is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment.

Remove weeds by hand or with hand tools instead of with herbicides.



Use beer-baited commercial traps to help trap slugs and snails.



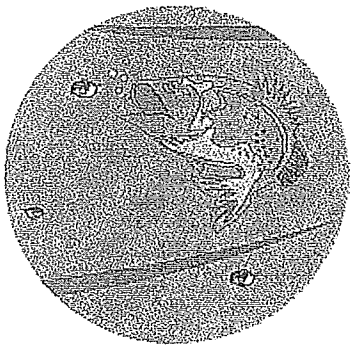
Apply sticky material to tree trunks to exclude flightless insects.

Pesticides and Water Quality

How Are Pesticides Affecting Water Quality?

Back to Urban Water Quality

Contamination of creeks and rivers



California creeks and rivers are being contaminated with pesticides, primarily diazinon and chlorpyrifos. These and other pesticides are not only a threat to aquatic life, but they can also affect the quality of our drinking water.

For more information on surface water contamination, see the following U.S. Geological Survey reports:

- "Pesticides in Surface Water Measured at Select Sites in the Sacramento River Basin, California, 1996-1998"
- "Pesticides in Surface Waters"
- "Water Quality in the Sacramento River Basin, California, 1994-1998"

For other USGS reports online see:

- USGS Water Resources in California Online Reports

Toxicity to living organisms

All pesticides are toxic at some level, but organophosphates are among the most toxic pesticides to vertebrates. Both diazinon and chlorpyrifos are members of the organophosphate class of pesticides. Organophosphates are insecticides that contain phosphorus; they are nerve poisons and act by inhibiting important enzymes in the nervous system. Other classes of insecticides include carbamates, soaps and oils, botanical insecticides, pyrethroids, insect growth regulators, and microbials.

Threat to aquatic invertebrates

During the past decade diazinon and chlorpyrifos have been found in California rivers and creeks at levels

Diazinon and chlorpyrifos are the primary pesticides threatening surface water quality

Diazinon and chlorpyrifos have been found in California waterways.The U.S. EPA's Office of Pesticide Programs provides summary sheets describing risks related to these pesticides.

- Diazinon
- Chlorpyrifos

Avoid the use of products that contain diazinon and chlorpyrifos

Pesticide labels provide information on the ingredients contained in a product. Always read the label before applying a pesticide.

- Learn how to read a pesticide label

that threaten aquatic invertebrates. Several other types of insecticides have the potential to cause harm, especially malathion, carbaryl, and the pyrethroids. All pesticides must be used with caution and should never be allowed to go into storm water, as their impact in some cases is not known.

Environmental regulations

Agencies involved in pesticide regulation and water quality:

- California Department of Pesticide Regulation
- California State Water Resources Control Board
- U.S. Environmental Protection Agency Water Programs

The Federal Clean Water Act of 1972 requires that a written plan (called a Total Maximum Daily Load or TMDL) be developed for every water body that is impaired and does not meet water quality standards. Many California rivers and creeks have been identified as impaired.

Find out more about the TMDL process and which water bodies have been identified:

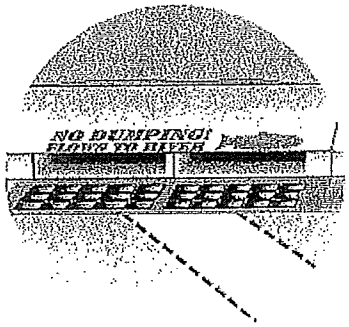
- U.S. EPA TMDL Program
- California State Water Resources Control Board TMDL Program

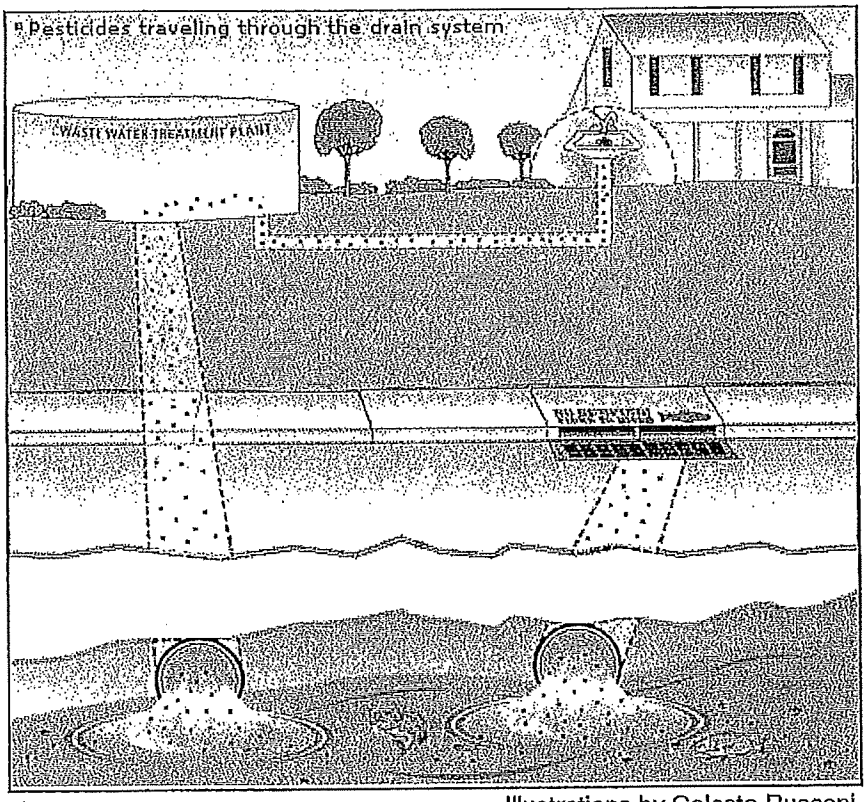
Illustration by Celeste Rusconi.

Pesticides and Water Quality

How Do Pesticides Get into Our Creeks and Rivers?

Back to Urban Water Quality





Illustrations by Celeste Rusconi.

Pesticides reach creeks and rivers through storm drains and household drains

- When you apply a pesticide, some of the material may move to other locations.
- Storm drains are frequently located in streets. Rain and runoff from garden and lawn irrigation runs down the streets through gutters into the storm drains. The runoff flows through pipes directly into our creeks, lakes, and rivers.
- Sewers run from drains within the home and carry wastewater from toilets, sinks, and showers to treatment plants.

Wastewater treatment plants do not detoxify pesticides

- While wastewater treatment plants send incoming wastewater through a thorough treatment and disinfectant

process before releasing water into the river, they do not actually detoxify pesticides, thus sending residue into our waterways.

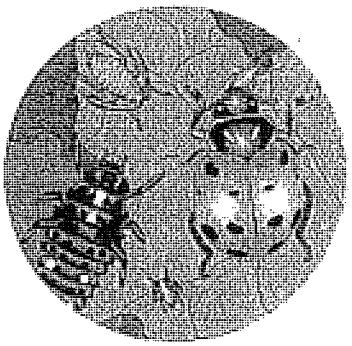
How to avoid problems

- Use alternatives to pesticides when possible.
- If you must use pesticides, follow all instructions on the product label for proper use and be sure to store and dispose of all pesticides properly.

Pesticides and Water Quality

What Are Safer Alternatives?

Back to Urban Water Quality



Learn how to

- Identify and manage many home and landscape pests
- Reduce diazinon and chlorpyrifos use on
  - Ants
  - Aphids
  - Cockroaches
  - Fleas
  - Lawn Insects
  - Spiders
  - Termites
  - Tree Borers

Preferred IPM methods

- Plant pest-resistant or well-adapted plant varieties such as native plants
- Discourage pests by modifying the way you design, irrigate, fertilize, and manage your garden
- Alter the garden or home environment to deprive pests of the food, water, shelter, or other requirements they need to thrive
- Keep pests out of the home and garden using barriers, screens, and caulking
- Squash, trap, wash off, or prune out pests
- Rely on natural enemies in your garden to eat pests, thereby eliminating the need for insecticides that may end up in our waterways
- Pesticides should only be used when nonchemical controls are ineffective and pests are reaching intolerable levels; choose them carefully so that the least toxic, most effective material is used

Why IPM?

Integrated pest management (IPM) uses environmentally sound, yet effective, ways to keep pests from annoying you or damaging plants. IPM programs usually combine several pest control methods for long-term prevention and management of pest problems without harming you, your family, or the environment—IPM also reduces pollution in California waterways.

Successful IPM begins with correct identification of the pest. Only then can selection of the appropriate IPM methods and materials be made.

Definition of IPM

Illustration by Celeste Rusconi.

FREE Pest Notes

for Home and Landscape from the University of California

Birds, Mammals, and Reptiles

Bats
Birds on Tree Fruits and Vines
Cliff Swallows
Coyote
Deer
Ground Squirrel
House Mouse
Lizards
Moles
Opossum
Pocket Gophers
Rabbits
Raccoons
Rats
Rattlesnakes
Skunks
Tree Squirrels
Voles (Meadow Mice)
Woodpeckers

Insects, Mites, Mollusks, Nematodes, and Spiders

Ants
Aphids
Asian Citrus Psyllid/HLB Disease
Avocado Lace Bug
Bagrada Bug
Bark Beetles
Bed Bugs
Bee and Wasp Stings
Black Widow and Other Widow Spiders
Boxelder Bug
Brown Recluse and Other Recluse Spiders
California Oakworm
Carpenter Ants
Carpenter Bees
Carpenterworm
Carpet Beetles
Citrus Leafminer
Clearwing Moths
Clothes Moths
Cockroaches
Codling Moth
Conenose Bugs
Cottony Cushion Scale
Delusory Parasitosis
Drywood Termites
Earwigs
Elm Leaf Beetle
Eucalyptus Longhorned Borers
Eucalyptus Redgum Lerp Psyllid
Eucalyptus Tortoise Beetles
Eye Gnats
False Chinch Bug
Fleas
Flies
Fungus Gnats
Giant Whitefly
Glassy-winged Sharpshooter
Grasshoppers
Hackberry Woolly Aphid
Head Lice
Hobo Spider
Hoplia Beetle
Horsehair Worms
Indian Walking Stick
Lace Bugs
Lawn Insects
Leafrollers on Ornamental and Fruit Trees
Millipedes and Centipedes
Mosquitoes
Moth or Drain Flies
Myoporum Thrips

Nematodes
Oak Pit Scales
Olive Fruit Fly
Pantry Pests
Psyllids
Red Imported Fire Ant
Redhumped Caterpillar
Roses: Insect and Mite Pests and Beneficials
Scales
Scorpions
Sequoia Pitch Moth
Silverfish and Firebrats
Sixspotted Spider Mite on Plumeria
Snails and Slugs
Spider Mites
Spiders
Springtails
Squash Bugs
Sycamore Scale
Termites
Thrips
Ticks (Lyme Disease in California)
Walnut Husk Fly
Whiteflies
Windscorpion
Wood-boring Beetles in Homes
Wood Wasps and Horntails
Yellowjackets and Other Social Wasps
Zoropsis Spinimana, A Mediterranean Spider in California

April 2014

www.ipm.ucanr.edu

Visit our Web site to download any of these helpful guides or to check out all of our pest-related publications.

FREE

Pest Notes

for Home and Landscape from the University of California

Plant Diseases

Anthracnose
Apple and Pear Scab
Damping-off Diseases in the Garden
Fire Blight
Lawn Diseases: Prevention and Management
Mushrooms and Other Nuisance Fungi in Lawns
Oleander Leaf Scorch
Olive Knot
Palm Diseases in the Landscape
Peach Leaf Curl
Phytophthora Root and Crown Rot in the Garden
Pitch Canker
Powdery Mildew on Fruits and Berries
Powdery Mildew on Ornamentals
Powdery Mildew on Vegetables
Roses: Diseases and Abiotic Disorders
Sooty Mold
Sudden Oak Death
Wood Decay Fungi in Landscape Trees

Weeds

Annual Bluegrass
Bermudagrass
Brooms
Burning & Stinging Nettle
Catchweed Bedstraw
Chickweeds
Clovers
Common Groundsel
Common Knotweed
Common Purslane
Crabgrass
Creeping Woodsorrel and Bermuda Buttercup
Dallisgrass
Dandelions
Dodder
Field Bindweed
Green Kyllinga
Invasive Plants
Kikuyugrass
Mallows
Mistletoe
Nutsedge
Perennial Pepperweed

For other University of California gardening publications, go to www.anrcatalog.ucdavis.edu.

Plantains
Poison Oak
Puncturevine
Roses: Cultural Practices and Weed Control
Russian Thistle
Spotted Spurge
Weed Management in Landscapes
Weed Management in Lawns
Wild Blackberries
Woody Weed Invaders
Yellow Starthistle

Management Methods Including Pesticides and Biological Control

Biological Control & Natural Enemies
Bordeaux Mixture
Hiring a Pest Control Company
Pesticides: Safe and Effective Use in the Home and Landscape
Soil Solarization for Gardens and Landscapes

University of California
Agriculture and Natural Resources

UC IPM
University of California Statewide Integrated Pest Management Program

UC CE
University of California Cooperative Extension

Can't download?

Visit or call your local University of California Cooperative Extension office. To find your local office, go to http://ucanr.org/ce.cfm, or look in the county government pages of your phone book.

April 2014

www.ipm.ucanr.edu

Visit our Web site to download any of these helpful guides or to check out all of our pest-related publications.

Landscaping Erosion Prevention

Erosion transports soil from properties and settles it downstream in the bottoms of rivers and streams. Besides the lost of valuable topsoil, erosion can significantly change habitats and make them unsuitable for existing fish and aquatic life. Landscaping should be designed to prevent erosion by securing soil with plant roots and covering exposed soil with some form of groundcover. Grading and terracing should also prevent runoff from entering storm drains. Finally, during the landscaping process, exposed soil should be protected from rain.

BMP Objective

The purpose of this best management practice is to reduce sediment runoff to storm drains.

Implementation

DO:

- Design landscaped areas so that terracing and landscaping does not direct runoff into the street or a storm drain. Terracing can slow the flow of water and consequently minimize erosion.
- Create zoned, water-efficient irrigation systems using technologies such as drip irrigation, soaker hoses, or microspray. This will minimize runoff from landscaped areas.
- Place permanent groundcover or mulch over exposed soil. Groundcover can be synthetic or organic, including compost, wood chips and river rocks. This will not only prevent erosion, it will reduce the need for watering and stop weeds from growing.
- Minimize the amount of watering that vegetated areas need, by carefully considering Plant Selection. Less watering creates less runoff.
- Schedule Activity in Dry Weather. Plan earth moving activities when rain will not interfere.
- Cover any exposed soil that may be vulnerable to rain. When not working, fasten a tarp over dirt piles, etc. Implement erosion and sediment controls as needed.
- Yard care service providers must arrange for proper disposal of green waste for the client through green waste disposal. Disposal records should be maintained by service provider.
- Sweep up any leaves, lawn clippings, or other debris and dispose of them as green waste, put them in your garden if they will not blow away or compost them. It is less expensive to dispose of green waste than landfill garbage, so don't contaminate green waste with garbage. In communities with curbside pickup of yard wastes, place clippings and pruning waste at the curb in approved bags or containers. For commercial disposal of green waste visit: http://www.co.san-diego.ca.us/dpw/recycling/pdf/GreenWasteRecyclingGuide.pdf

DON'T:

- Do not landscape riparian areas, except to remove non-native plants, and replace them with native riparian landscaping. See Plant Selection for more information.
- Do not remove native vegetation along creek banks or remove large woody debris from creek banks or creeks.

Definitions

Best Management Practices (BMPs):	Techniques or controls used to prevent or reduce the discharge of pollutants into stormwater, receiving waters, or the stormwater conveyance system.
Dry Cleaning Methods:	Methods of cleaning surfaces that minimizes the use of water. Examples include sweeping, vacuuming, and using hydrophobic mops and rags.
Illegal Connection:	An unauthorized pipe, facility, or other device connected to the storm drain system or receiving waters. Devices that convey pollutants may be illegal even if they were permitted at the time of installation.
Illegal Discharge:	The unauthorized discharge of pollutants or non-stormwater into the stormwater conveyance system or receiving waters.
Pollutants:	Anything that can cause or contribute to water quality degradation.
Pollution Prevention:	Practices that minimize or eliminate the generation of pollutants at the source.
Receiving Waters:	Any water bodies including the Pacific Ocean, lakes, streams, lagoons, rivers, reservoirs, and intermittent waters such as vernal pools and seasonal dry creeks.
Stormwater Conveyance System (storm drain system):	Any public or private drainage system (non-sewage) including streets, curbs, gutters, inlets, ditches, pipes, channels, culverts, streams, etc.

Background

What is Stormwater Pollution

When water flows over work areas, parking lots, streets, and other surfaces, it picks up pollutants and carries them into the storm drain system. This system is designed to prevent flooding by transporting water away from urban areas. Water and all the contaminants that it collects eventually flow without treatment through the storm drain system to our streams, lakes, and the ocean where we swim and fish. This polluted runoff harms inland freshwater wildlife and habitats, and in some cases causes, beach closures and makes our fish and shellfish unsafe to eat.

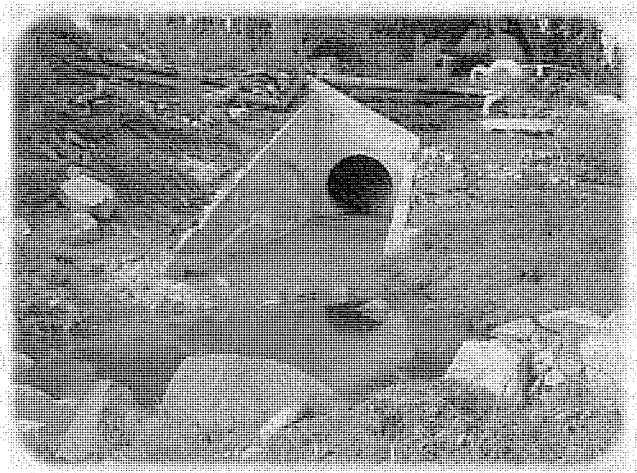
The Storm Drain System and the Sewer System are NOT Connected

In San Diego County, wastewater and surface runoff are discharged into two separate underground systems. Wastewater that is disposed to a toilet, sink, or a piped sewer drain flows into the sanitary sewer system where it is filtered and treated. Water runoff that leaves your business via driveways, sidewalks, parking lots, streets, gutters, storm drain inlets, drainage ditches, and concrete channels flows into a separate storm drain system. Anything that enters the storm drain system eventually flows untreated and unfiltered into our creeks, bays, lagoons – and ultimately the ocean. The things you do at work are directly connected to the health and safety of our citizens and the environment.

Background

Your Responsibilities

As required by federal and state laws, the County of San Diego, the Unified Port District, and each of the 18 incorporated cities in the County have adopted local stormwater management ordinances to protect our water resources. *These ordinances prohibit the discharge of pollutants into the storm drain system.* Pollutants typically associated with automotive maintenance and repair activities include antifreeze, fuels, waste oils, solvents, and paints. Other pollutants commonly contributing to stormwater pollution include sediment, fertilizers, pesticides, and litter. As a business owner or operator, you are legally responsible for ensuring that these and any other potential stormwater pollutants are properly managed. To do so, you will need to select and use Best Management Practices that are specific to your business activities.



A storm drain outlet which flows unfiltered directly into a local stream.

Background

Best Management Practices (BMPs)

Best Management Practices, commonly called BMPs, are actions you can take to prevent pollutants from leaving your facility. In general, there are two main types of BMPs:

- **Source control BMPs** keep pollutants from entering runoff. Examples include preventive maintenance and routine sweeping.

- **Treatment control BMPs** remove pollutants from runoff before it reaches the storm drain system. Common examples are storm drain filters and oil / water separators.

Source control BMPs are often preferable because they are usually simpler and more cost-effective. One of the main types of source control BMPs is "pollution prevention". Pollution prevention methods (process changes, materials substitution, waste reduction) help to limit the amount of pollutants that are generated, thus eliminating the need to manage or remove them. Pollution prevention BMPs can help your business to run more efficiently and can save you money.

Using the BMPs described in this booklet will help you to satisfy regulatory requirements and to preserve and protect San Diego's waterways. Successfully meeting this challenge will require the active participation of all employees at your business. To assist your employees in understanding these requirements, please have them read and review this Green Wrench Guide. Also have your employees sign and date the training log included on pages 19 and 20 of this guide so that you will have a record of their training activities.

Vehicles and Equipment

This section describes core BMPs for vehicle fluid management, engine and parts cleaning, vehicle and equipment washing, and body repair and painting. No matter which of these activities you are doing, it is important to always protect storm drain inlets on or down-gradient of work areas. Cover inlets with plastic or other impermeable material to prevent the entry of spilled fluids or wash water. Tape or weigh down the edges to keep the protective material in place.

Vehicle Fluid Management

Antifreeze, waste oil, and used solvents are hazardous wastes and must be stored, managed, and disposed of in accordance with all local, state, and federal laws.

- Whenever possible, drain vehicle fluids indoors or within covered areas, and only over floors that are constructed of a non-porous material such as concrete. Asphalt and dirt floors are not acceptable because they absorb spilled or leaked fluids.

- Use drip pans, containers, or other methods of drip and spill containment.
- Take extra precautions to prevent spills while draining fluids from vehicles. Transfer waste fluids to a labeled waste storage container as soon as possible.
- Provide drip pans under stored vehicles and those with known leaks. Drain fluids from disabled or stored vehicles as soon as possible to prevent leaks and spills.

Vehicles and Equipment

- Transfer any fluids from drip pans or collection devices to designated waste storage areas regularly.
- Store vehicle fluids in separate, sealed, and leak-proof containers.

Vehicle & Equipment Washing

- Never discharge wash water or rinse water to a storm drain system or receiving water. Wash vehicles and equipment in designated areas. Use wash racks whenever possible.
- Use a spray nozzle or rinse bucket to conserve water and minimize discharge water.
- Whenever possible, use biodegradable soaps.
- Consider the use of a wash water recycling system to minimize wastewater from car washing.
- Use an oil / water separator or similar treatment system to remove oil, grease, and solids when discharging to the sanitary sewer.
- Use a commercial car wash facility if you are not able to meet the minimum standards described in this guide.
- Contact your local sewer agency for discharge information to the sanitary sewer. Use of oil / water separators and wash water recycling systems may have special discharge requirements.

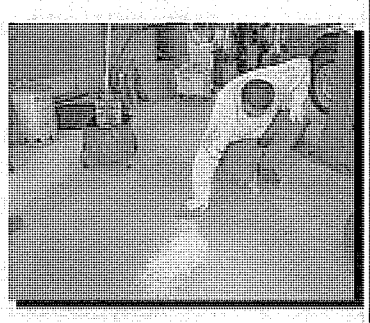
Good Housekeeping

"Good Housekeeping" refers to the routine practices you can use to maintain a clean work environment, and to prevent pollutants from entering our waterways. These practices include the use of dry cleaning methods for floor and paved surfaces, waste management practices, and grounds maintenance.

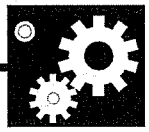
Floors and Paved Surfaces

- Sweep or vacuum your shop floors frequently. Use mops instead of hosing down work areas.
- Consider using a three mop system as described below:

1. Remove any spilled oil using a hydrophobic (oil absorbing) mop and wring out oil into a bucket labeled "Oil Only". Add the waste oil from this bucket to your waste oil drum or tank where it can be recycled. Keep the oil mop and the "Oil Only" bucket readily available in the work area for any future oil spills.
2. If antifreeze is spilled, use a regular mop and wring out the antifreeze into a bucket labeled "Coolant Only". Recycle the spilled material with other used antifreeze. Use rags sparingly for small spills or to dry a work area. Use a rag service or manage the rags as a hazardous waste.



3. Use a regular mop and bucket with detergent as a final rinse and use water sparingly. Dispose of wash water to an oil / water separator or the sewer.



- Never pour mop water onto paved areas, such as parking lots, sidewalks, street gutters, or storm drains.
- Oil / water separators must be regularly inspected and cleaned.
- Do not hose down fuel-dispensing islands; use only dry clean-up methods. Absorbent used for fuel spills should be promptly swept up and disposed of as hazardous waste.

Material and Waste Management

- Materials and waste such as fuels, solvents, batteries, and oils must be stored off the ground and in areas where they will not be exposed to rain water.
- If possible, provide overhead coverage for all outside hazardous materials or waste storage areas. If overhead coverage is not available, then cover stored materials with an impervious material such as a plastic tarp.
- Store batteries indoors and place used batteries in plastic trays to contain any potential leaks. Recycle used batteries regularly.
- Sweep parking lots and areas around your facility regularly. Do not hose down these areas. Provide trash cans with lids in your parking lot to discourage littering.
- Keep trash storage and disposal areas clean and free of debris. Inspect trash storage areas weekly. Maintain dumpsters and other containers in good condition and keep them securely closed when not in use.

Good Housekeeping

- Contact your local solid waste hauler for recycling options and containers.
- Post "No Dumping or Littering" signs around your property.

Rooftops and Landscaped Areas

- Clean the rooftops of your buildings at least once before the rainy season. Cover any materials that are stored on the roof to protect them from rainwater.
- Maintain landscaped areas so that dirt and sediment do not reach the sidewalk or street.
- Apply pesticides and fertilizers according to label instructions and do not apply prior to rain. Consider using less toxic alternatives to pesticides and fertilizers whenever possible.
- Recycle or dispose of green waste properly.
- Properly berm and cover soil stockpiles.
- Ensure that sprinkler heads are adjusted properly to prevent over-irrigation and water runoff.

Hazardous Waste Recycling and Treatment

Please call the County of San Diego, DEH Hazardous Materials Duty Specialist at **(619) 338-2231** for incompatible waste storage and on-site hazardous waste treatment requirements.

Recycling

- Reuse and recycle solvents, paints, oil filters, antifreeze, motor oil, batteries, water, and lubricants whenever possible.
- Segregate wastes – it saves money! Combining different types of hazardous wastes will limit your recycling options and can be dangerous. A licensed hazardous waste hauler can provide information on hazardous waste storage and disposal costs.
- Label waste barrels and drums in accordance with all local, state, and federal laws and regulations. This will also help to remind employees to separate wastes and to recycle.

On-Site Waste Treatment

- Consider self-contained, zero discharge treatment alternatives that incorporate wastewater recycling.
- Choose treatment systems that are effective, but easy to maintain and repair.
- Properly maintain and service all pre-treatment equipment, including oil / water separators.

How to Reach Us

Regional Stormwater Hotline

To report spills and discharges to the storm drain system, call **(888) 846-0800.**

General Information

For additional information regarding water quality in the San Diego region, please use the resources listed below.

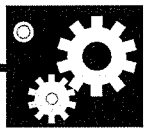
(888) 846-0800	**www.projectcleanwater.org**
(888) THINK-BLue	**www.thinkbluesd.com**

Local Stormwater Program Information

Stormwater and BMP requirements may vary by jurisdiction. Please contact your jurisdiction for questions or if you would like additional information. Updated phone numbers are posted on the www.projectcleanwater.org website.

Carlsbad	(760) 602-2799
Chula Vista	(619) 397-6111
Coronado	(619) 522-7380
County of San Diego (Unincorporated Communities)	(888) 846-0800
Del Mar	(760) 753-1120
El Cajon	(619) 441-5580
Encinitas	(760) 633-2632
Escondido	(760) 839-6315
Imperial Beach	(619) 628-1369
La Mesa	(619) 667-1152
Lemon Grove	(619) 825-3810

How to Reach Us



National City . . . . . (619) 336-4389
Oceanside . . . . . (760) 435-5800
Poway . . . . . (858) 679-4228
San Diego . . . . . (619) 235-1000
San Diego Unified Port District . . . . . (619) 686-6254
San Marcos . . . . . (760) 752-7550
Santee . . . . . (619) 258-4100
Solana Beach . . . . . (858) 720-2400
Vista . . . . . (760) 726-1340

Other Agency Contacts

County of San Diego, Department of Environmental Health, Hazardous Materials Management Division:

To report hazardous materials and waste spills, call **(619) 338-2284**

To obtain general information on hazardous materials and waste requirements, call **(619) 338-2231**

Air Pollution Control District:

To obtain information on air emission requirements, call **(858) 650-4700**

Extended Detention Basin TC-22

Design Considerations

- Tributary Area
- Area Required
- Hydraulic Head

Description

Dry extended detention ponds (a.k.a. dry ponds, extended detention basins, detention ponds, extended detention ponds) are basins whose outlets have been designed to detain the stormwater runoff from a water quality design storm for some minimum time (e.g., 48 hours) to allow particles and associated pollutants to settle. Unlike wet ponds, these facilities do not have a large permanent pool. They can also be used to provide flood control by including additional flood detention storage.

Targeted Constituents

✓	Sediment	▲
✓	Nutrients	●
✓	Trash	■
✓	Metals	▲
✓	Bacteria	▲
✓	Oil and Grease	▲
✓	Organics	▲

Legend *(Removal Effectiveness)*

● Low ■ High

▲ Medium

California Experience

Caltrans constructed and monitored 5 extended detention basins in southern California with design drain times of 72 hours. Four of the basins were earthen, less costly and had substantially better load reduction because of infiltration that occurred, than the concrete basin. The Caltrans study reaffirmed the flexibility and performance of this conventional technology. The small headloss and few siting constraints suggest that these devices are one of the most applicable technologies for stormwater treatment.

Advantages

- Due to the simplicity of design, extended detention basins are relatively easy and inexpensive to construct and operate.
- Extended detention basins can provide substantial capture of sediment and the toxics fraction associated with particulates.
- Widespread application with sufficient capture volume can provide significant control of channel erosion and enlargement caused by changes to flow frequency relationships resulting from the increase of impervious cover in a watershed.

CASQA California Stormwater Quality Association

Limitations

- Limitation of the diameter of the orifice may not allow use of extended detention in watersheds of less than 5 acres (would require an orifice with a diameter of less than 0.5 inches that would be prone to clogging).
- Dry extended detention ponds have only moderate pollutant removal when compared to some other structural stormwater practices, and they are relatively ineffective at removing soluble pollutants.
- Although wet ponds can increase property values, dry ponds can actually detract from the value of a home due to the adverse aesthetics of dry, bare areas and inlet and outlet structures.

Design and Sizing Guidelines

- Capture volume determined by local requirements or sized to treat 85% of the annual runoff volume.
- Outlet designed to discharge the capture volume over a period of hours.
- Length to width ratio of at least 1.5:1 where feasible.
- Basin depths optimally range from 2 to 5 feet.
- Include energy dissipation in the inlet design to reduce resuspension of accumulated sediment.
- A maintenance ramp and perimeter access should be included in the design to facilitate access to the basin for maintenance activities and for vector surveillance and control.
- Use a draw down time of 48 hours in most areas of California. Draw down times in excess of 48 hours may result in vector breeding, and should be used only after coordination with local vector control authorities. Draw down times of less than 48 hours should be limited to BMP drainage areas with coarse soils that readily settle and to watersheds where warming may be determined to downstream fisheries.

Construction/Inspection Considerations

- Inspect facility after first large to storm to determine whether the desired residence time has been achieved.
- When constructed with small tributary area, orifice sizing is critical and inspection should verify that flow through additional openings such as bolt holes does not occur.

Performance

One objective of stormwater management practices can be to reduce the flood hazard associated with large storm events by reducing the peak flow associated with these storms. Dry extended detention basins can easily be designed for flood control, and this is actually the primary purpose of most detention ponds.

Dry extended detention basins provide moderate pollutant removal, provided that the recommended design features are incorporated. Although they can be effective at removing

some pollutants through settling, they are less effective at removing soluble pollutants because of the absence of a permanent pool. Several studies are available on the effectiveness of dry extended detention ponds including one recently concluded by Caltrans (2002).

The load reduction is greater than the concentration reduction because of the substantial infiltration that occurs. Although the infiltration of stormwater is clearly beneficial to surface receiving waters, there is the potential for groundwater contamination. Previous research on the effects of incidental infiltration on groundwater quality indicated that the risk of contamination is minimal.

There were substantial differences in the amount of infiltration that were observed in the earthen basins during the Caltrans study. On average, approximately 40 percent of the runoff entering the unlined basins infiltrated and was not discharged. The percentage ranged from a high of about 60 percent to a low of only about 8 percent for the different facilities. Climatic conditions and local water table elevation are likely the principal causes of this difference. The least infiltration occurred at a site located on the coast where humidity is higher and the basin invert is within a few meters of sea level. Conversely, the most infiltration occurred at a facility located well inland in Los Angeles County where the climate is much warmer and the humidity is less, resulting in lower soil moisture content in the basin floor at the beginning of storms.

Vegetated detention basins appear to have greater pollutant removal than concrete basins. In the Caltrans study, the concrete basin exported sediment and associated pollutants during a number of storms. Export was not as common in the earthen basins, where the vegetation appeared to help stabilize the retained sediment.

Siting Criteria

Dry extended detention ponds are among the most widely applicable stormwater management practices and are especially useful in retrofit situations where their low hydraulic head requirements allow them to be sited within the constraints of the existing storm drain system. In addition, many communities have detention basins designed for flood control. It is possible to modify these facilities to incorporate features that provide water quality treatment and/or channel protection. Although dry extended detention ponds can be applied rather broadly, designers need to ensure that they are feasible at the site in question. This section provides basic guidelines for siting dry extended detention ponds.

In general, dry extended detention ponds should be used on sites with a minimum area of 5 acres. With this size catchment area, the orifice size can be on the order of 0.5 inches. On smaller sites, it can be challenging to provide channel or water quality control because the orifice diameter at the outlet needed to control relatively small storms becomes very small and thus prone to clogging. In addition, it is generally more cost-effective to control larger drainage areas due to the economies of scale.

Extended detention basins can be used with almost all soils and geology, with minor design adjustments for regions of rapidly percolating soils such as sand. In these areas, extended detention ponds may need an impermeable liner to prevent ground water contamination.

The base of the extended detention facility should not intersect the water table. A permanently wet bottom may become a mosquito breeding ground. Research in Southwest Florida (Santana et al., 1994) demonstrated that intermittently flooded systems, such as dry extended detention

ponds, produce more mosquitoes than other pond systems, particularly when the facilities remained wet for more than 3 days following heavy rainfall.

A study in Prince George's County, Maryland, found that stormwater management practices can increase stream temperatures (Galli, 1990). Overall, dry extended detention ponds increased temperature by about 5°F. In cold water streams, dry ponds should be designed to detain stormwater for a relatively short time (i.e., 24 hours) to minimize the amount of warming that occurs in the basin.

Additional Design Guidelines

In order to enhance the effectiveness of extended detention basins, the dimensions of the basin must be sized appropriately. Merely providing the required storage volume will not ensure maximum constituent removal. By effectively configuring the basin, the designer will create a long flow path, promote the establishment of low velocities, and avoid having stagnant areas of the basin. To promote settling and to attain an appealing environment, the design of the basin should consider the length to width ratio, cross-sectional areas, basin slopes and pond configuration, and aesthetics (Young et al., 1996).

Energy dissipation structures should be included for the basin inlet to prevent resuspension of accumulated sediment. The use of stilling basins for this purpose should be avoided because the standing water provides a breeding area for mosquitoes.

Extended detention facilities should be sized to completely capture the water quality volume. A micropool is often recommended for inclusion in the design and one is shown in the schematic diagram. These small permanent pools greatly increase the potential for mosquito breeding and complicate maintenance activities; consequently, they are not recommended for use in California.

A large aspect ratio may improve the performance of detention basins; consequently, the outlets should be placed to maximize the flowpath through the facility. The ratio of flowpath length to width from the inlet to the outlet should be at least 1.5:1 (L:W) where feasible. Basin depths optimally range from 2 to 5 feet.

Figure 1
Example of Extended Detention Outlet Structure

The facility's drawdown time should be regulated by an orifice or weir. In general, the outflow structure should have a trash rack or other acceptable means of preventing clogging at the entrance to the outflow pipes. The outlet design implemented by Caltrans in the facilities constructed in San Diego County used an outlet riser with orifices sized to discharge the water quality volume, and the riser overflow height was set to the design storm elevation. A stainless steel screen was placed

around the outlet riser to ensure that the orifices would not become clogged with debris. Sites either used a separate riser or broad crested weir for overflow of runoff for the 25 and greater year storms. A picture of a typical outlet is presented in Figure 1.

The outflow structure should be sized to allow for complete drawdown of the water quality volume in 72 hours. No more than 50% of the water quality volume should drain from the facility within the first 24 hours. The outflow structure can be fitted with a valve so that discharge from the basin can be halted in case of an accidental spill in the watershed.

Summary of Design Recommendations

(1) Facility Sizing - The required water quality volume is determined by local regulations or the basin should be sized to capture and treat 85% of the annual runoff volume. See Section 5.5.1 of the handbook for a discussion of volume-based design.

Basin Configuration – A high aspect ratio may improve the performance of detention basins; consequently, the outlets should be placed to maximize the flowpath through the facility. The ratio of flowpath length to width from the inlet to the outlet should be at least 1.5:1 (L:W). The flowpath length is defined as the distance from the inlet to the outlet as measured at the surface. The width is defined as the mean width of the basin. Basin depths optimally range from 2 to 5 feet. The basin may include a sediment forebay to provide the opportunity for larger particles to settle out.

A micropool should not be incorporated in the design because of vector concerns. For online facilities, the principal and emergency spillways must be sized to provide 1.0 foot of freeboard during the 25-year event and to safely pass the flow from 100-year storm.

(2) Pond Side Slopes - Side slopes of the pond should be 3:1 (H:V) or flatter for grass stabilized slopes. Slopes steeper than 3:1 (H:V) must be stabilized with an appropriate slope stabilization practice.

(3) Basin Lining – Basins must be constructed to prevent possible contamination of groundwater below the facility.

(4) Basin Inlet – Energy dissipation is required at the basin inlet to reduce resuspension of accumulated sediment and to reduce the tendency for short-circuiting.

(5) Outflow Structure - The facility's drawdown time should be regulated by a gate valve or orifice plate. In general, the outflow structure should have a trash rack or other acceptable means of preventing clogging at the entrance to the outflow pipes.

The outflow structure should be sized to allow for complete drawdown of the water quality volume in 72 hours. No more than 50% of the water quality volume should drain from the facility within the first 24 hours. The outflow structure should be fitted with a valve so that discharge from the basin can be halted in case of an accidental spill in the watershed. This same valve also can be used to regulate the rate of discharge from the basin.

The discharge through a control orifice is calculated from:

$$Q = CA(2gH-H_o)^{0.5}$$

where: Q = discharge (ft^3/s)
C = orifice coefficient
A = area of the orifice (ft^2)
g = gravitational constant (32.2)
H = water surface elevation (ft)
H_o= orifice elevation (ft)

Recommended values for C are 0.66 for thin materials and 0.80 when the material is thicker than the orifice diameter. This equation can be implemented in spreadsheet form with the pond stage/volume relationship to calculate drain time. To do this, use the initial height of the water above the orifice for the water quality volume. Calculate the discharge and assume that it remains constant for approximately 10 minutes. Based on that discharge, estimate the total discharge during that interval and the new elevation based on the stage volume relationship. Continue to iterate until H is approximately equal to H_o. When using multiple orifices the discharge from each is summed.

(6) Splitter Box - When the pond is designed as an offline facility, a splitter structure is used to isolate the water quality volume. The splitter box, or other flow diverting approach, should be designed to convey the 25-year storm event while providing at least 1.0 foot of freeboard along pond side slopes.

(7) Erosion Protection at the Outfall - For online facilities, special consideration should be given to the facility's outfall location. Flared pipe end sections that discharge at or near the stream invert are preferred. The channel immediately below the pond outfall should be modified to conform to natural dimensions, and lined with large stone riprap placed over filter cloth. Energy dissipation may be required to reduce flow velocities from the primary spillway to non-erosive velocities.

(8) Safety Considerations - Safety is provided either by fencing of the facility or by managing the contours of the pond to eliminate dropoffs and other hazards. Earthen side slopes should not exceed 3:1 (H:V) and should terminate on a flat safety bench area. Landscaping can be used to impede access to the facility. The primary spillway opening must not permit access by small children. Outfall pipes above 48 inches in diameter should be fenced.

Maintenance

Routine maintenance activity is often thought to consist mostly of sediment and trash and debris removal; however, these activities often constitute only a small fraction of the maintenance hours. During a recent study by Caltrans, 72 hours of maintenance was performed annually, but only a little over 7 hours was spent on sediment and trash removal. The largest recurring activity was vegetation management, routine mowing. The largest absolute number of hours was associated with vector control because of mosquito breeding that occurred in the stilling basins (example of standing water to be avoided) installed as energy dissipaters. In most cases, basic housekeeping practices such as removal of debris accumulations and vegetation management to ensure that the basin dewaters completely in 48-72 hours is sufficient to prevent creating mosquito and other vector habitats.

Consequently, maintenance costs should be estimated based primarily on the mowing frequency and the time required. Mowing should be done at least annually to avoid establishment of woody vegetation, but may need to be performed much more frequently if aesthetics are an important consideration.

Typical activities and frequencies include:

- Schedule semiannual inspection for the beginning and end of the wet season for standing water, slope stability, sediment accumulation, trash and debris, and presence of burrows.
- Remove accumulated trash and debris in the basin and around the riser pipe during the semiannual inspections. The frequency of this activity may be altered to meet specific site conditions.
- Trim vegetation at the beginning and end of the wet season and inspect monthly to prevent establishment of woody vegetation and for aesthetic and vector reasons.
- Remove accumulated sediment and regrade about every 10 years or when the accumulated sediment volume exceeds 10 percent of the basin volume. Inspect the basin each year for accumulated sediment volume.

Cost

Construction Cost

The construction costs associated with extended detention basins vary considerably. One recent study evaluated the cost of all pond systems (Brown and Schueler, 1997). Adjusting for inflation, the cost of dry extended detention ponds can be estimated with the equation:

$$C = 12.4V^{0.760}$$

where: C = Construction, design, and permitting cost, and
V = Volume (ft^3).

Using this equation, typical construction costs are:

$ 41,600 for a 1 acre-foot pond

$ 239,000 for a 10 acre-foot pond

$ 1,380,000 for a 100 acre-foot pond

Interestingly, these costs are generally slightly higher than the predicted cost of wet ponds (according to Brown and Schueler, 1997) on a cost per total volume basis, which highlights the difficulty of developing reasonably accurate construction estimates. In addition, a typical facility constructed by Caltrans cost about $160,000 with a capture volume of only 0.3 ac-ft.

An economic concern associated with dry ponds is that they might detract slightly from the value of adjacent properties. One study found that dry ponds can actually detract from the perceived value of homes adjacent to a dry pond by between 3 and 10 percent (Emmerling-Dinovo, 1995).

Maintenance Cost

For ponds, the annual cost of routine maintenance is typically estimated at about 3 to 5 percent of the construction cost (EPA website). Alternatively, a community can estimate the cost of the maintenance activities outlined in the maintenance section. Table 1 presents the maintenance costs estimated by Caltrans based on their experience with five basins located in southern California. Again, it should be emphasized that the vast majority of hours are related to vegetation management (mowing).

Table 1 Estimated Average Annual Maintenance Effort

Activity	Labor Hours	Equipment & Material ($)	Cost
Inspections	4	7	183
Maintenance	49	126	2282
Vector Control	0	0	0
Administration	3	0	132
Materials	-	535	535
Total	**56**	**$668**	**$3,132**

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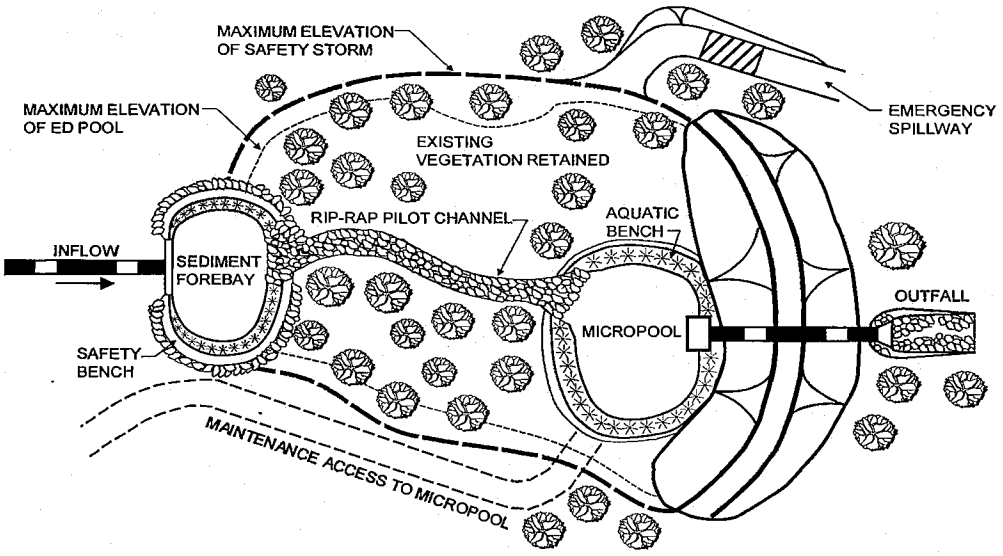
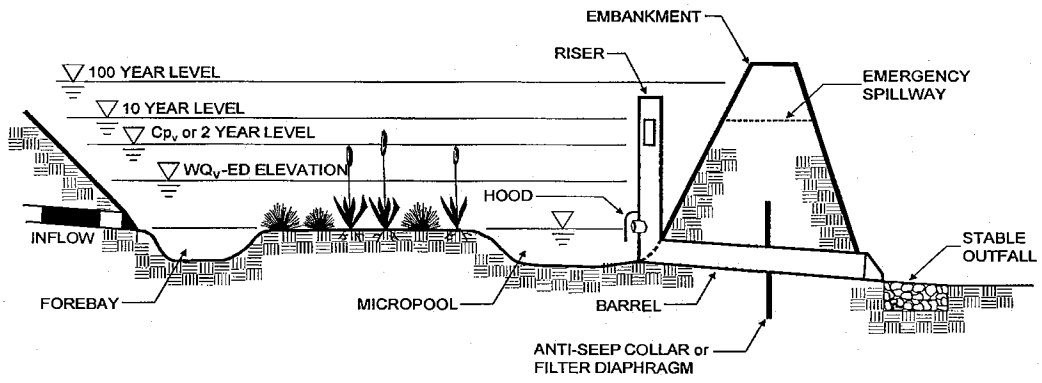


PLAN VIEW



PROFILE

Schematic of an Extended Detention Basin (MDE, 2000)

Drain Inserts MP-52

Description

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

California Experience

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

Advantages

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

Limitations

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

Design and Sizing Guidelines

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

Design Considerations

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

Targeted Constituents

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

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

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

Construction/Inspection Considerations

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

Performance

Few products have performance data collected under field conditions.

Siting Criteria

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

Additional Design Guidelines

Follow guidelines provided by individual manufacturers.

Maintenance

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

Cost

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

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