

CAMPUS PARK WEST PROJECT

APPENDIX M

**PRELIMINARY MAJOR STORMWATER
MANAGEMENT PLAN**

SPA05-001, GPA05-003, REZ05-005,
TM 5424, LOG NO. 05-02-009

for the

**DRAFT SUBSEQUENT
ENVIRONMENTAL IMPACT REPORT**

August 2013

**PRELIMINARY MAJOR STORMWATER
MANAGEMENT PLAN**

**CAMPUS PARK WEST
TM TRACT 5424
COUNTY OF SAN DIEGO, CA
APRIL 16, 2013**



PROJECT DESIGN CONSULTANTS

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GPA05-003; SPA05-001; REZ05-005; ER05-02-009

Prepared For:

Pappas Investments

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Prepared By:



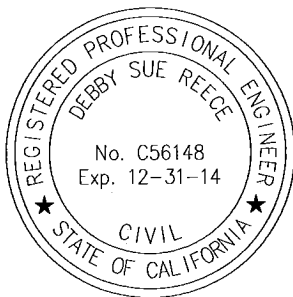
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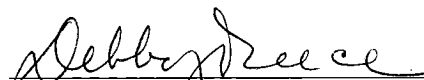
PDC Job No. 3631.10

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. Pack, P.E.

Under the supervision of


Debby Reece, PE RCE 56148

Registration Expires 12/31/14

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ATTACHMENTS

- A. PROJECT LOCATION MAP
- B. SOURCE CONTROL EXHIBIT
- C. DRAINAGE MANAGEMENT AREA (DMA) EXHIBIT
- D. BMP SIZING DESIGN CALCULATIONS (WATER QUALITY AND HYDROMODIFICATION) AND TC-BMP/IMP DESIGN DETAILS
- E. GEOTECHNICAL CERTIFICATION SHEET
- F. MAINTENANCE PLAN
- G. TREATMENT CONTROL BMP CERTIFICATION
- H. HMP EXEMPTION DOCUMENTATION

Storm Water Management Plan For Priority Projects (Major SWMP)

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:	Campus Park West
Permit Number (Land Development Projects):	TM Tract 5424; GPA05-003; SPA05-001; REZ05-005; ER05-02-009
Work Authorization Number (CIP only):	N/A
Applicant:	Pappas Investments
Applicant's Address:	2020 L Street, 5 th Floor, Sacramento, CA 95811
Plan Prepared By (<i>Leave blank if same as applicant</i>):	Project Design Consultants 701 B Street, Suite 800, San Diego, CA 92101
Date:	April 16, 2013
Revision Date (If applicable):	Nov. 3, 2008, April 2010, November 2012

The County of San Diego Watershed Protection, Storm Water Management, and Discharge Control Ordinance (WPO) (Ordinance No. 9424) requires all applications for a permit or approval associated with a Land Disturbance Activity must be accompanied by a Storm Water 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. 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	√		Nov 2012
Tentative Map	√		April 2010
Tentative Map	√		11/3/08

Latitude 33 prepared the initial SWMP in March of 2005. Due to extensive changes in SUSMP requirements, County template format, and available information, PDC has prepared a new report without relying on information contained in the previous report; therefore, the June 2005 comments prepared by the County are no longer applicable.

Instructions for a Major SWMP can be downloaded at
<http://www.sdcountry.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?

PRIORITY DEVELOPMENT PROJECT	YES	NO
Residential development of more than 10 units	√	
Commercial developments with a land area for development of greater than 100,000 square feet	√	
Heavy industrial development with a land area for development of greater than 1 acre		√
Automotive repair shops		√
Restaurants, where the land area for development is greater than 5,000 square feet	√	
Hillside development, in an area with known erosive soil conditions, where there will be grading on any natural slope that is twenty-five percent or greater, if the development creates 5,000 square feet or more of impervious surface	√	
Environmentally Sensitive Areas (ESA): 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.		√
Parking Lots 5,000 square feet or more or with 15 parking spaces or more and potentially exposed to urban runoff	√	
Streets, roads, highways, and freeways which would create a new paved surface that is 5,000 square feet or greater	√	
Retail Gasoline Outlets (RGO) that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.	√ (maybe)	

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 SUSMP.

STEP 2

PROJECT STORMWATER QUALITY DETERMINATION

Total Project Site Area 116.5 acres (total project ownership)

Estimated amount of disturbed acreage: 114.9 acres (includes offsite improvements)

(If >1 acre, you must also provide a WDID number from the SWRCB) WDID: TBD

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: 116.5 acres (total project ownership)

B. Total impervious area (including roof tops) before construction approximately 4.7 acres

C. Total impervious area (including roof tops) after construction approximately 76.3 acres

Calculate percent impervious before construction: $B/A = 4\%$ (onsite)

Calculate percent impervious after construction: $C/A = 65\%$ (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 project is located in the County of San Diego within the Fallbrook Community Planning Area. The site is 116.6 acres in size and is located east of Interstate 15, with the majority of the site located north of State Route 76 (SR 76), adjacent to Interstate 15, and the remaining property is located south of SR 76 on either side of Pankey Road. The proposed project consists of building a mixed-use planned community comprised of multi-family residential, light industrial, and commercial components. The proposed northern development includes multi-family residential, light industrial, and commercial land uses, and two parcels in the southern development will be solely commercial, while the final southerly parcel will be undisturbed and will remain as open space. Project street improvements include, but are not limited to, the extension of Pankey Road north of SR 76. This extension includes replacement of the Pankey Road bridge over Horse Ranch Creek north of SR 76. Street improvements south of SR 76 consist of realigning Pankey Road and building a new intersection with Shearer Crossing. (Refer to Project Location Map in Attachment A). The Tentative Map shows the proposed project design plus one alternative design for the westerly pad located to the southwest of the SR 76/Pankey Road intersection. Grading Alternative #1 is the grading alternative that, if selected, would expand the development footprint to the north closer to SR 76 for the westerly pad. This alternative is dependent on whether the Caltrans Decertification process is achieved. If the process to acquire additional right-of-way from Caltrans is not successful, the "Grading Alternative #1" would be eliminated. The site currently consists of undeveloped land with the following exceptions: a portion of the site on the southeast corner of SR 76 and Pankey Road is currently being used for agriculture; and an area in the central part of the site is being used by a radio controlled model airplane flying club (this land use was not approved by the County). The surrounding land is either undeveloped or being used for agriculture (orchards). Campus Park West will include parking lots, streets, restaurants, and retail gas outlets, as well as

	associated hardscape, landscaping, open space, and utilities. Slopes within the project adjacent to the creek as well as the onsite area north of the river will be preserved, protected in place as buffer zones for the adjacent water bodies.
2.	Describe the current and proposed zoning and land use designation.
	The current zoning for the majority of the project is "S90 Holding Area." The proposed zoning for the project is "S88 Specific Plan Area." Refer to the Existing and Proposed Zoning Exhibit located in Attachment A. According to the County General Plan, the existing General Plan land use designations for the site include Limited Impact Industrial, General Commercial, Village Residential (VR-7.3), and Specific Plan Area. According to the project General Plan Amendment, the proposed land use designations include Limited Impact Industrial, General Commercial, Village Residential (VR-20), and Rural Lands (RL-40) (Open Space). Refer to the Existing and Proposed General Plan Land Use Designations located in Attachment A. For more information on land use, refer to the Specific Plan document.
3.	Describe the pre-project and post-project topography of the project. (Show on Plan)
	Topography within the project site is characterized by generally level alluvial areas along the portions of the property associated with the San Luis Rey River, Horse Ranch Creek, and their associated tributaries, with these areas flanked by gentle to steep slopes. These natural slopes are covered with native and non-native vegetation, mostly shrubs with some areas of dense trees. The areas at the top of the slopes are relatively flat; all of the construction will be clustered near these mesas.
4.	Describe the soil classification, permeability, erodibility, and depth to groundwater for LID and Treatment BMP consideration. (Show on Plan) If infiltration BMPs are proposed, a Geotechnical Engineer must certify infiltration BMPs in Attachment E.
	Hydrologic Soil Group B has been identified onsite per USDA soil survey. The soil map included in Attachment A shows fine sandy loam along the creek and Riverwash and sand along the river, while the rest of the site consists of Ramona and Visalia sandy loam. Groundwater near the creek and the river is likely to be within 8 feet of the surface.
5.	Describe if contaminated or hazardous soils are within the project area. (Show on Plan)
	According to the geotechnical reconnaissance performed by Geotechnics Incorporated in February 2004, no contaminated or hazardous soils are known to exist within the project area at this time.
6.	Describe the existing site drainage and natural hydrologic features. (Show on Plan).
	The project is located in the San Luis Rey Watershed (Hydrologic Unit 903) and discharges to Horse Ranch Creek prior to entering the San Luis Rey River. Overall, the project area represents 0.03% of the San Luis Rey Watershed (433,873 acres) ¹ and 0.18%

¹ http://www.Projectcleanwater.org/html/ws_san_luis_rey.html

	of the Bonsall HSA (65,493 acres).² Drainage within the San Luis Rey HU is predominantly through the San Luis Rey River and associated tributaries, which includes Horse Ranch Creek in the project area. Horse Ranch Creek extends generally north-south along the eastern perimeter of the site, crossing over to the western perimeter of the project south of SR 76. Horse Ranch Creek discharges into the San Luis Rey River at the southwest corner of the site. The San Luis Rey River continues west and south from the noted confluence, and enters the Pacific Ocean in the City of Oceanside approximately 20 miles southwest of the site. Surface drainage from the entire project and adjacent off-site facility areas flows to Horse Ranch Creek, with runoff directions locally variable with topography. The five existing culverts that run underneath Interstate 15 will continue to convey offsite runoff from areas west of Interstate 15 to Horse Ranch Creek. Currently, flows discharge onsite into well-defined drainage channels; therefore piping the flows to Horse Ranch Creek will not change the overall drainage patterns or the concentration at the discharge point. The project area south of the Pankey Road/Shearer Crossing intersection sheet flows to the southwest and into the San Luis Rey River; this area will be preserved as open space that will act as a buffer zone to protect the river. Construction BMPs will be implemented and maintained during construction in accordance with the erosion control plans and the NPDES permit and post-construction BMPs will be implemented and maintained as necessary into perpetuity. Water quality basins will mitigate for the vast majority of the site; therefore, there should be no adverse effects on the creek or the river. There are five existing culverts underneath Interstate 15 that convey offsite runoff from areas west of Interstate 15 onto the property. The northern portion of the site, north of SR 76, consists of gently rolling hills covered mostly with grasses, which generally slope south and east towards Horse Ranch Creek with multiple discharge points. Medium to large trees are located mostly within the low lying areas (natural drainage channels). The southwestern portion of the site, north of SR 76, discharges to an existing natural sump area between the project and SR 76. This basin area is equipped with a 72 inch culvert as an emergency overflow, which runs under SR 76, but the basin is large enough to contain some storm events without discharge, and the soil (Hydrologic Soil Group type B) allows for good infiltration. Since both Horse Ranch Creek and the San Luis Rey River are intermittent streams, any dry weather flows are likely the result of discharges from upstream developments and agriculture.
7.	Describe site features and conditions that constrain, or provide opportunities for stormwater control, such as LID features.
	Some of the LID concepts included in this project include minimizing the disturbance to natural drainages and conserving natural areas, soils, and vegetation. The proposed land plan clusters development such that natural spaces are preserved. Some of the areas within the site boundary will be left undisturbed and some areas will be re-graded and then re-vegetated and designated as open space. Portions of the project site are surrounded by Multiple Species Conservation Plan (MSCP) land. The project proposes buffers to protect

² <http://www.ice.ucdavis.edu/newcara/calwater.asp?cu=18070303>

	adjacent wetland areas along the eastern project boundary. In addition, the most southerly parcel is designated to remain as open space. Minimizing disturbances to natural drainages is just one of the many LID features proposed for the Campus Park West development. During the future site planning stages for the development pads, additional opportunities and constraints will be analyzed for additional LID options.
8.	Is this project within the environmentally sensitive areas as defined on the maps in Appendix A of the <i>County of San Diego Standard Urban Storm Water Mitigation Plan for Land Development and Public Improvement Projects</i> ?
	No
9.	Is this an emergency project?
	No

CHANNELS & DRAINAGES

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

TABLE 3: PROJECT SPECIFIC STORMWATER 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 ³ .	√			

³ Proposed basins are for water quality and hydromodification criteria only and are not proposed to detain the 100-year storm event.

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 used. The BMPs selected are those that will be implemented during construction of the project. The applicant is responsible for the placement and maintenance of the BMPs selected.

- | | |
|---|--|
| ☒ Silt Fence | ☒ Desilting Basin |
| ☒ Fiber Rolls | ☒ Gravel Bag Berm |
| ☒ Street Sweeping and Vacuuming | ☐ Sandbag Barrier |
| ☒ Storm Drain Inlet Protection | ☒ Material Delivery and Storage |
| ☒ Stockpile Management | ☒ Spill Prevention and Control |
| ☒ Solid Waste Management | ☒ Concrete Waste Management |
| ☒ Stabilized Construction Entrance/Exit | ☒ Water Conservation Practices |
| ☒ Dewatering Operations | ☒ Paving and Grinding Operations |
| ☒ Vehicle and Equipment Maintenance | |

☒ 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.

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 303d list may be obtained from the following site: http://www.swrcb.ca.gov/tmdl/docs/303dlists		√	If YES, continue to 2. If NO, go to 5.

	2006/approved/r9_06_303d_reqtdmlds.pdf			
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?			If YES, continue to 6. If NO, go to 5.
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 hydromodification management plan (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

	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?	√ (For Outfall I)		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.
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.	√ (Rest of project)		Reference Appendix G "Hydromodification Management Plan" of the County SUSMP.
7.	Project is not required to manage hydromodification impacts.	√ (Outfall I)		Hydromodification Exempt. Keep on file.

For more information regarding how the project complies with the hydromodification requirements, refer to the Preliminary Hydromodification Management Study prepared by Project Design Consultants.

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
903.12	Bonsall HSA

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

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

SURFACE WATERS (river, creek, stream, etc.)	Hydrologic Unit Basin Number	Impairment(s) listed [303(d) listed waters or waters with established TMDLs]. List the impairments identified in Table 7.	Distance to Project
San Luis Rey River, Upper	903.12	Nutrients	~ 700' to 5800' downstream
San Luis Rey River, Lower	903.11	Chloride, Bacteria, Nutrients, Total Dissolved solids, Toxicity	~ 0.8 to 20 miles downstream
Pacific Ocean Shoreline, San Luis Rey River mouth	903.11	Bacteria	~ 20 miles downstream

http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303dlists2006/epa/r9_06_303d_reqtmlds.pdf

GROUND WATERS

Ground Waters	Hydrologic Unit Basin Number	MUN	AGR	IND	PROC	GWR	FRESH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Lower San Luis	903.10	●	●	●												

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

+ Excepted from Municipal

● Existing Beneficial Use

○ Potential Beneficial Use

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

<i>PDP Categories</i>	<i>General Pollutant Categories</i>								
	Sediment	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Attached Residential Development	X	X			X	p ⁽¹⁾	p ⁽²⁾	P	X
Commercial Development 1 ac or greater	p ⁽¹⁾	p ⁽¹⁾		p ⁽²⁾	X	p ⁽⁵⁾	X	p ⁽³⁾	p ⁽⁵⁾
Heavy Industry/ Industrial Development	X		X	X	X	X	X		
Restaurants					X	X	X	X	
Parking Lots	p ⁽¹⁾	p ⁽¹⁾	X		X	p ⁽¹⁾	X		p ⁽¹⁾
Retail Gasoline Outlets			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 on-site. (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. For projects where no primary pollutants of concern exist, those pollutants identified as anticipated shall be considered secondary pollutants of concern.

TABLE 7: PROJECT POLLUTANTS OF CONCERN

Pollutant Category	Anticipated (X)	Potential (P)	Surface Water Impairments
Sediments	X	P	None.
Nutrients	X	P	Impairment in Upper SLR river ~700' to 5800' downstream
Heavy Metals	X		(Toxicity) ~ 0.8 to 20 miles downstream
Organic Compounds	X	P	None.
Trash & Debris	X		None.
Oxygen Demanding Substances	X	P	None.
Oil & Grease	X	P	None.
Bacteria & Viruses	X	P	Impairment in Lower SLR river ~ 0.8 to 20 miles downstream and at SLR river mouth ~20 miles downstream
Pesticides	X	P	None.

According to the 2010 303(d) list, the Lower San Luis Rey River is 303(d) listed for Chloride, Bacteria, Nutrients, Total Dissolved solids, and Toxicity. The Upper San Luis Rey River is 303(d) listed for nutrients. The San Luis Rey River mouth is listed for bacteria.

According to the San Luis Rey River Watershed Urban Runoff Management Program FY 2005-06 Annual Report, the frequency of occurrence of total dissolved solids (TDS), ammonia/nitrate and total coliform exceedances remained unchanged for the San Luis Rey River. Fecal coliform bacteria changed status from low to high frequency of occurrence because fecal coliform exceeded the water quality objectives in the last six storm events of 2006. High concentration of dissolved solids appears to characterize water quality in the watershed and the river was no exception, having a high frequency of occurrence for total dissolved solids. TDS have exceeded basin plan water quality objectives in the watershed during all tested storm events (15). The San Luis Rey had a low frequency of occurrence for total coliform, phosphorus, and ammonia/nitrates. In addition, the high priority constituents/stressor groups for the Lower San Luis HA were dissolved minerals, nutrients, bacteria, and benthic alterations (heavy metals and organic compounds). Due to the San Luis Rey River's current 303(d) listing, chloride, magnesium, phosphorus, nutrients, and oxygen demanding substances will be taken into account as well.

Based on the Watershed pollutants of concern, the proximity of the impaired water body, and the potential pollutants from the proposed development, the primary target pollutants for this project are nutrients, bacteria and viruses, and heavy metals. Secondary pollutants of concern include the rest of the anticipated and potential pollutants as identified in Table 7 above, which are sediment,

organic compounds, pesticides, oil and grease, oxygen demanding substances, and trash and debris.

In accordance with Stormwater Standards, BMPs are required to remove pollutants contained in storm water runoff. BMPs to be implemented onsite are 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 greenroof, which, should be delineated in the Drainage Management Area map 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: Preserve land near creek and river to provide natural buffer zone
☐ 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 (see 5)
☒ Clustered Lot Design
☒ Items checked in 5
☐ Other. Description:
☐ 3. Not feasible. State Reason:
4. Minimize Soil Compaction
☒ 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
<u>LID Street & Road Design</u>
☐ Curb-cuts to landscaping

☐ Rural Swales
☐ Concave Median
☐ Cul-de-sac Landscaping Design
☐ Other. Description:
<u>LID Parking Lot Design</u>
☒ Permeable Pavements <i>(Potential option to be considered for future site planning)</i>
☒ Curb-cuts to landscaping <i>(Potential option to be considered for future site planning)</i>
☐ Other. Description:
<u>LID Driveway, Sidewalk, Bike-path Design</u>
☒ Permeable Pavements <i>(Potential option to be considered for future site planning)</i>
☒ Pitch pavements toward landscaping <i>(Potential option to be considered for future site planning)</i>
☐ Other. Description:
<u>LID Building Design</u>
☒ Cisterns & Rain Barrels <i>(Potential option to be considered for future site planning)</i>
☒ Downspout to swale or landscaping <i>(Potential option to be considered for future site planning)</i>
☒ Vegetated Roofs <i>(Potential option to be considered for future site planning)</i>
☐ Other. Description:
<u>LID Landscaping Design</u>
☒ 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, B, C, D1, D2, E, F, G, I, J, K, L, M, N, O, P	See table below.	See table below.

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 will be revegetated/stabilized as soon as possible. The permanent vegetation will consist of deep-rooted, drought tolerant plant species selected for erosion control and compatibility with the surrounding ecosystem. In addition, all disturbed slopes will be stabilized with temporary erosion control measures as soon as possible to allow the permanent vegetation time to get established. Concentrated runoff will be directed away from slopes.

It is unknown at this time what type of businesses will occupy the spaces in the commercial and light industrial areas; therefore, it is not known if there will be any outdoor storage areas,

maintenance bays, vehicle or equipment wash areas, outdoor processing areas, or non-retail fueling areas. The commercial and light industrial areas are not being designed with these components, but should a business require one of these components, they will be held responsible for complying with the storm water standards as set forth in this report.

Source control BMPs will consist of measures to prevent storm water from contacting pollutants. This program will include an educational component directed at each home and business owner. They will receive a set of brochures developed by the County's Environmental Health Department. The sets will include the following:

For Home Owners

- Clean Water Toolbox Information Sheets - Clean Up Regularly Using Dry Clean Methods; Protect Storm Drain Inlets; Proper Disposal of Household Hazardous Waste;
- Properly Collect and Dispose of Water;
- Storm water Pollution Prevention Pet Waste; and
- Integrated Pest Management (IPM) education materials.

For Business Owners

- General Stormwater BMP Brochure;
- Pollutant Impacts on Water Quality;
- Clean Water Toolbox Information Sheets - Develop a Stormwater Pollution Prevention Plan; Train Employees; Properly Handle Solid Waste; Proper Materials Storage; Provide Secondary Containment; 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);
- The Green Wrench Guide;
- What's Cookin' – Eating and Drinking Establishments: Stormwater BMPs;
- Integrated Pest Management (IPM) education materials.

In addition, the need for pesticide and fertilizers will be reduced to the maximum extent practicable by including pest-resistant or well-adapted native plant varieties. Pesticides will be used as a last resort and application of pesticides within HOA/BOA maintained areas will only be done by professional pest controllers. Pet waste bags will be provided at trailheads.

... 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. On-site 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.	

... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs				
IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	1	2	3	4
Potential Sources of Runoff Pollutants - List in Table 9	Permanent Controls—Show on Source Control Exhibit, Attachment B	Permanent Controls—List in Table 9 and Narrative	Operational BMPs—Include in Table 9 and Narrative	
☒ D2. Landscape/ Outdoor Pesticide Use <u>Note: Should be consistent with project landscape plan (if applicable).</u>	☐ 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	

... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs				
IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	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 runoff 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 on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	

... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs				
IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	1	2	3	4
	Potential Sources of Runoff Pollutants – List in Table 9	Permanent Controls—Show on Source Control Exhibit, Attachment B	Permanent Controls—List in Table 9 and Narrative	Operational BMPs—Include in Table 9 and Narrative
☐ H. Industrial processes.		☐ Show process area.	☐ If industrial processes are to be located on site, 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 runoff 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

☒ 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 on-site 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 on-site car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): ☒ Wastewater 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
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☒ 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 rinsewater 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.
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☒ L. Fuel Dispensing Areas	☒ Fueling areas⁴ 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 area⁴.] 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
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⁴ 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.

☒ 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

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 on-site 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. Washwater 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 and/or LID facility must be selected to treat the project pollutants of concern 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 will 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? <i>(If yes, please document in Attachment D following the steps in Chapter 4 of the County SUSMP)</i>	
Yes X	No
If this project is not utilizing the unified LID design procedure, please describe how the alternative treatment facilities will comply with applicable LID criteria, stormwater treatment criteria, and hydromodification management criteria.	
N/A	

➤ Indicate the project pollutants of concern (POCs) from Table 7 in Column 2 below.

TABLE 10: GROUPING OF POTENTIAL POLLUTANTS of Concern (POCs) by fate during stormwater treatment

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	
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- 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 & Hydrodynamic 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 TC-BMPS

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

☐ Cistern with Bioretention		
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 <u>Curb or grate inlet filter (Bioclean or</u>	Yes, (Pankey	No

<u>similar)</u>	Road)	
Hydrodynamic Separator Systems		
☐ Swirl Concentrator		
☐ Cyclone Separator		
☐ Baffle Separator		
Trash Racks		
☐ Catch Basin Insert		
☐ Catch Basin Insert w/ Hydrocarbon boom		
☐ Other _____		

⁽¹⁾ Must be designed per SUSMP "Vegetated Swales" design criteria for LID credit (p. 65).

The BMPs selected in the table above represent the BMPs identified in the preliminary design for the entire development. The water quality/hydromodification basins are the primary BMPs selected to treat the runoff from the majority of the development. As final design progresses, the developer may elect to utilize alternative treatment control BMPs in lieu of basins that better suit the constraints of each site plan. This report represents the maximum anticipated site area that would need to be set aside to meet both the County HMP and the MS4 Permit.

Other additional LID and/or treatment control BMPs (besides those identified in Table 12) may be included in future site plans, but selection of any potential additional BMPs will depend on the future developers and future site plan constraints. For example, the site development may be able to incorporate LID BMPs upstream and in addition to the regional BMPs. At this stage in the project design for entitlement, a menu of potential BMPs has been identified for additional potential BMPs. See below for a description of the potential alternatives.

MENU OF ADDITIONAL POTENTIAL BMPs

Bioretention Facilities (LID) – Bioretention areas utilize natural treatment processes for stormwater treatment. They can either be designed as shallow vegetated basins (lined or unlined) to treat surface runoff, or they can be designed as flow-through planter boxes adjacent to buildings to treat roof runoff.

Infiltration Devices (LID) – Infiltration devices utilize natural infiltration to treat and minimize surface runoff since the majority of the runoff is infiltrated into the soil rather than discharged to a surface water body. Although geotechnical issues will need to be evaluated, it is possible that the site's soils have sufficient infiltration capabilities to make

infiltration devices a feasible BMP alternative.

Wet Ponds and Constructed Wetlands – Wet ponds and constructed wetlands are basins that temporarily retain storm water runoff and maintain a permanent pool. Due to size and location constraints as well as vector control concerns, wet ponds or wetlands are not recommended.

Vegetated Swales (LID) – Vegetated swales are LID BMPs that achieve pollutant reduction primarily through sedimentation and infiltration via shallow sheet flow through vegetation. They are typically used in locations where sheet flow predominates and where space is not at a premium.

Media Filters or Higher-rate Media Filters – Filtration devices contain filter media that removes pollutants from runoff through absorption or adsorption.

Higher-rate Biofilters – High-rate biofilters are similar to bioretention areas, but are specifically designed with media that rapidly filters runoff while removing pollutants. These types of devices typically can only treat small areas.

The above list may be utilized to identify opportunities for runoff treatment from offsite improvements as well. The offsite improvements include, but are not limited to, Old Highway 395 widening near the Pala Mesa Drive intersection, widening of SR 76, and realignment of the Shearer Crossing/Pankey Road intersection. Note that the future site planning process for the two commercial lots south of SR76 will determine the most appropriate BMP(s) (per the menu of BMPs listed above) to treat the runoff from those two pads. If the lots are developed together or in partnership, one regional BMP can treat both pads, otherwise, each pad will be designed such that the drainage will be treated onsite before entering the public 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:

- 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.**

Stormwater Treatment Control and LID BMPs			
Description / Type	Sheet	Maintenance Category	Revisions
Water Quality/ Hydromodification Basin #1		2	
Water Quality/ Hydromodification Basin #2		2	
Water Quality/ Hydromodification Basin #3		2	
Water Quality/ Hydromodification Basin #4		2	
Curb or grate inlet filter – Pankey Road (Bioclean Round GISB Media Filters (with BioMediaGREEN) or similar)		4	

* BMP's approved as part of Stormwater Management Plan (SWMP) dated xx/xx/xx on file with DPW. Any changes to the above BMP's 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, bacteria and viruses, and heavy metals. Secondary pollutants of concern include sediment, organic compounds, pesticides, oil and grease, oxygen demanding substances, and trash and debris. Therefore, pollutants of concern fall into all three categories of pollutants of concern in Table 11. Therefore, extended/dry detention basins have been selected for pollutant removal for the vast majority of the project area.

Water quality basins will be used to treat runoff prior to discharge to the creek and the river. Caltrans has high confidence in a water quality basin/unlined detention basin's

medium removal efficiency for total suspended solids and total metals. In addition, Caltrans has medium confidence in an unlined detention basin's high removal efficiency for litter, its medium removal efficiency for total phosphorus, and its low removal efficiency for total nitrogen and dissolved metals.

Some of the runoff from proposed roadways could not be directed into a water quality basin due to grading constraints. Part of the street area of Pankey Road near the SR 76 intersection (which represents a small portion of the overall site plan) will be treated by media filtration devices such as Bioclean Round GISB Media Filters (with BioMediaGREEN) Curb Inlet Filters. There is currently only one stretch of roadway, from the north and south sides of the SR 76 intersection along Pankey Road that will require such treatment (six curb inlets). Potential pollutants from this stretch of roadway include sediment, heavy metals, organic compounds, trash and debris, and oil and grease, all of which are covered under the first two categories in Table 11. Since the County has accepted the Bioclean Round GISB Media Filters under the category of filtration system, these high-rate curb inlet media filters will provide medium to high pollutant removal efficiency for the pollutants of concern in this area.

The BMPs to treat the runoff from the two commercial pads south of SR-76 will be determined by future site planning. Specifically, this would include BMPs to provide medium or high removal efficiencies for the project's priority pollutants of concern. Future site planning will dictate the types of BMPs proposed on-lot, but options include any of the BMPs discussed on page 29 under "MENU OF ADDITIONAL POTENTIAL BMPs". These include, but are not limited to, bioretention facilities, infiltration devices, vegetated swales, media filters, and/or higher-rate biofilters.

Please provide the sizing design calculations for each Drainage Management Area 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	√		Water Quality/Hydromodification basins
Third ³			
Fourth ⁴	√		Inlet inserts

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 small detention basins as second category improvements; therefore on-going maintenance needs to be assured. Accordingly, monitoring/maintenance for the water quality basins will be implemented by entering into a BMP Maintenance Agreement with the County. This agreement will: commit the areas associated with the basins 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 will 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.

- Please list all individual LID and Treatment Control BMPs (TC-BMPs) incorporated into 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 project and amend the Major SWMP where appropriate. For each type of LID or TC-BMP provide an inspection sheet in Attachment F “Maintenance Plan”.

TABLE 14: PROJECT SPECIFIC LID AND TC-BMPS

BMP Identifier*: (Identifier to match TC- BMPS on TC-BMP Table.)	Type	Record Plan for TC-BMP	BMP Pollutant of Concern Efficiency (H,M,L)
Basin 1	Water Quality/Hydromodification basin		H
Basin 2	Water Quality/Hydromodification basin		H
Basin 3	Water Quality/Hydromodification basin		H
Basin 4	Water Quality/Hydromodification basin		H
Insert #1 West Curb Inlet (N Pankey)	Media (inlet insert, Bioclean or equiv)		H
Insert #2 East Curb Inlet (N Pankey)	Media (inlet insert, Bioclean or equiv)		H
Insert #3 West Curb Inlet (S Pankey)	Media (inlet insert, Bioclean or equiv)		H
Insert #4 East Curb Inlet (S Pankey)	Media (inlet insert, Bioclean or equiv)		H
Insert #5 East Curb Inlet (S Pankey)	Media (inlet insert, Bioclean or equiv)		H
Insert #6 East Curb Inlet (S Pankey)	Media (inlet insert, Bioclean or equiv)		H

* For location of BMP's, see approved Record Plan dated __XX/XX/XX__, plan (TYPE) sheet _ (#) _.

➤ Responsible Party for Long-term Maintenance:

Identify the parties responsible for long-term maintenance of the BMPs identified above and Source Controls specified in Attachment B. Include the appropriate written

agreement with the entities responsible for O&M in Attachment F. Please see Chapter 5 "Stormwater Facility Maintenance" of the County SUSMP for appropriate maintenance mechanisms.

Representative Name: Thad Johnson
Company Name: Pappas Investments
Phone Number: (916) 447-7100
Street Address: 2020 L Street, 5th Floor
City/State/Zip: Sacramento, CA 95811
Email Address: Thad@pappasinvestments.com

➤ 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 will be transferred to future owners.

The applicant (Pappas Investments) 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 HOA/BOA for Campus Park West will be responsible for the perpetual maintenance, repair, and/or replacement of the on-site post-construction BMPs in accordance with the County of San Diego Watershed Protection, Storm Water Management, and Discharge Control Ordinance.

Since the single storm drain inserts are located within the public right-of-way on Pankey Road offsite BMPs are deemed a fourth category improvement; therefore, after initial installation, they will be under County ownership and the County will be responsible for the maintenance.

ATTACHMENTS

Please include the following attachments.

ATTACHMENT		COMPLETED	N/A
A	Project Location Map	√	
B	Source Control, LID, & TC BMP Exhibit	√	
C	Drainage Management Area (DMA) Exhibit	√	
D	BMP Sizing Design Calculations (Water Quality and Hydromodification) and TC- BMP/IMP Design Details	√	
E	Geotechnical Certification Sheet		√
F	Maintenance Plan		√
G	Treatment Control BMP Certification		√
H	HMP Exemption Documentation	√	
I	Addendum		√

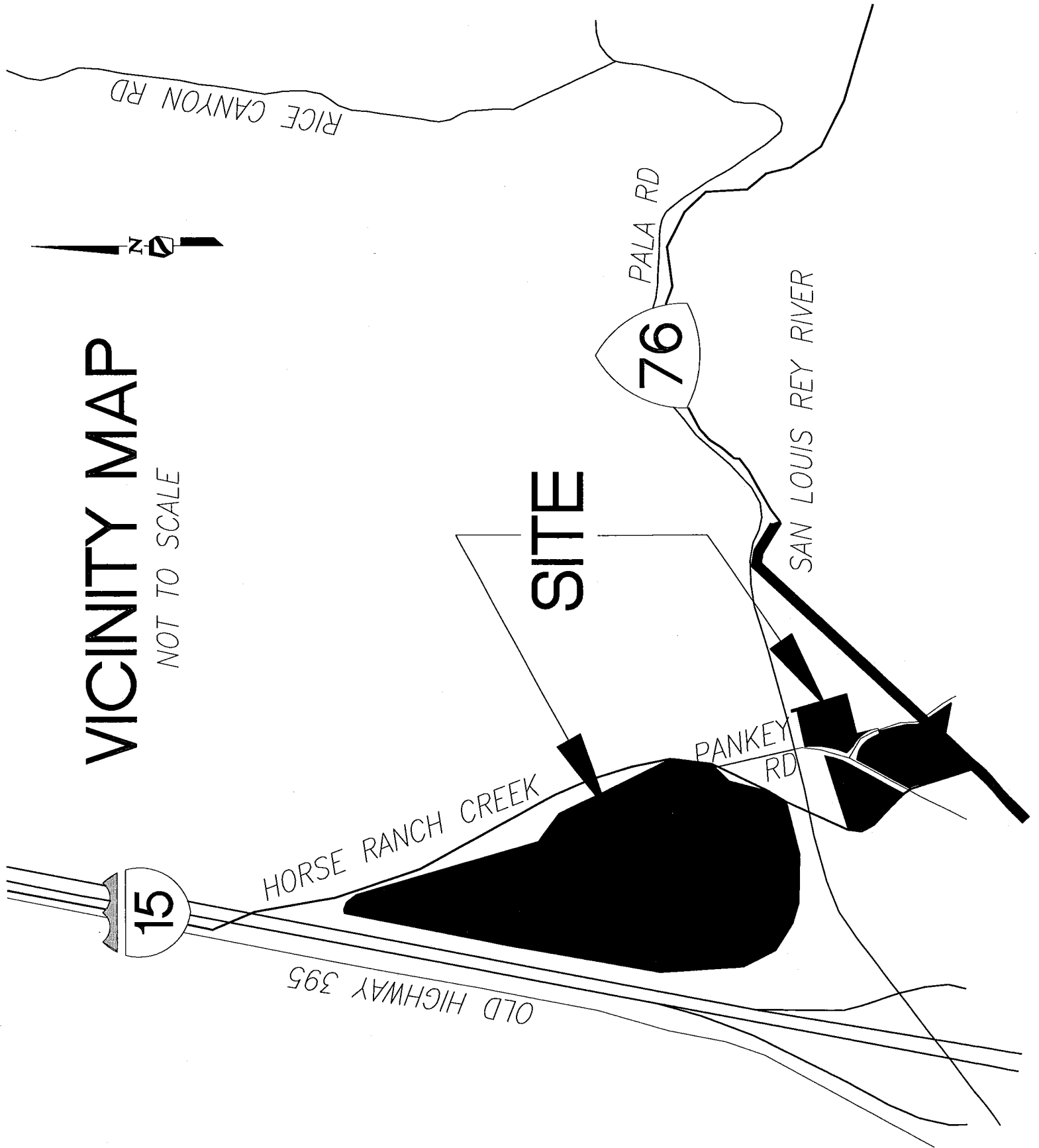
Note: Attachments B and C may be combined.

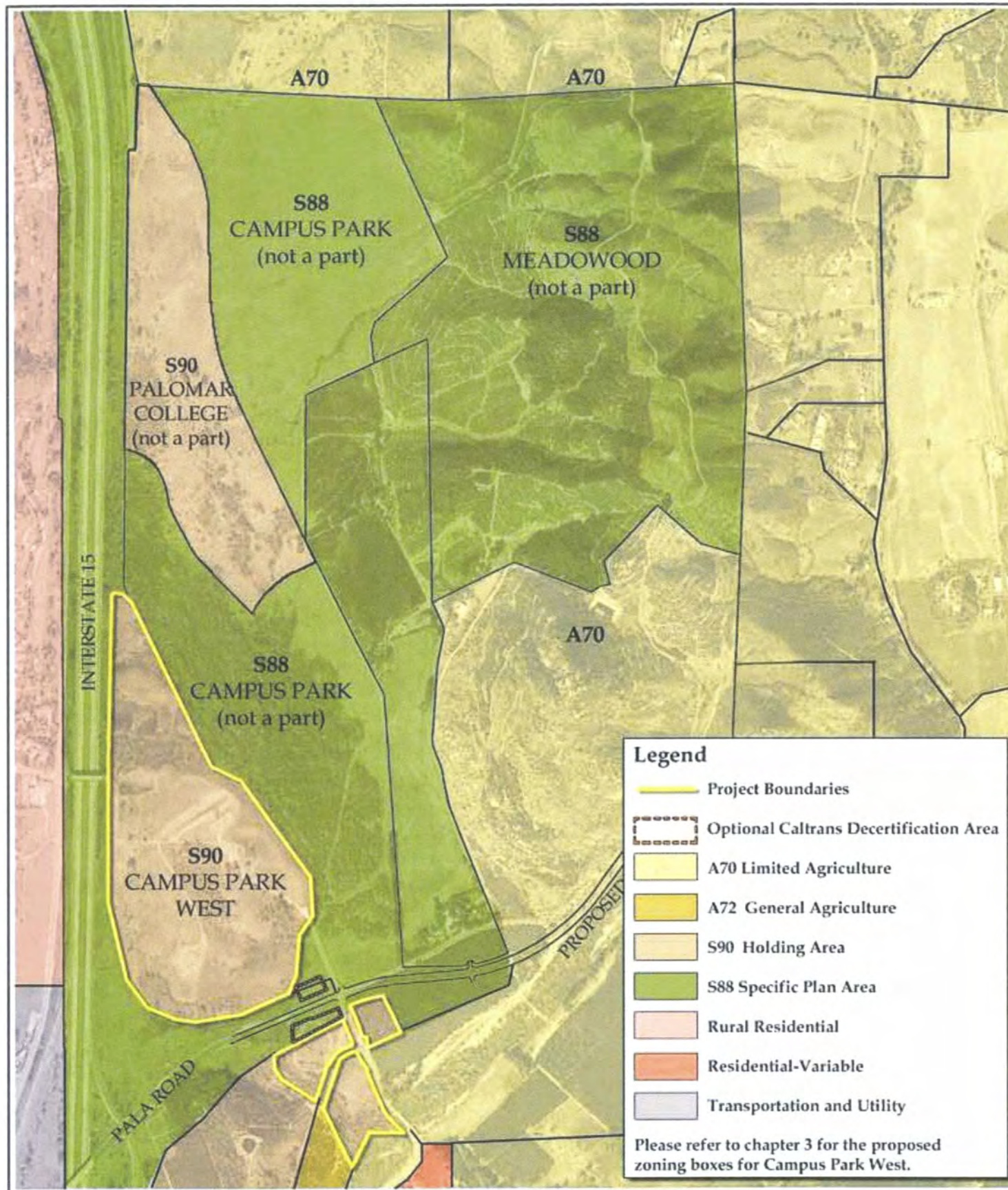
ATTACHMENT A

PROJECT LOCATION MAP

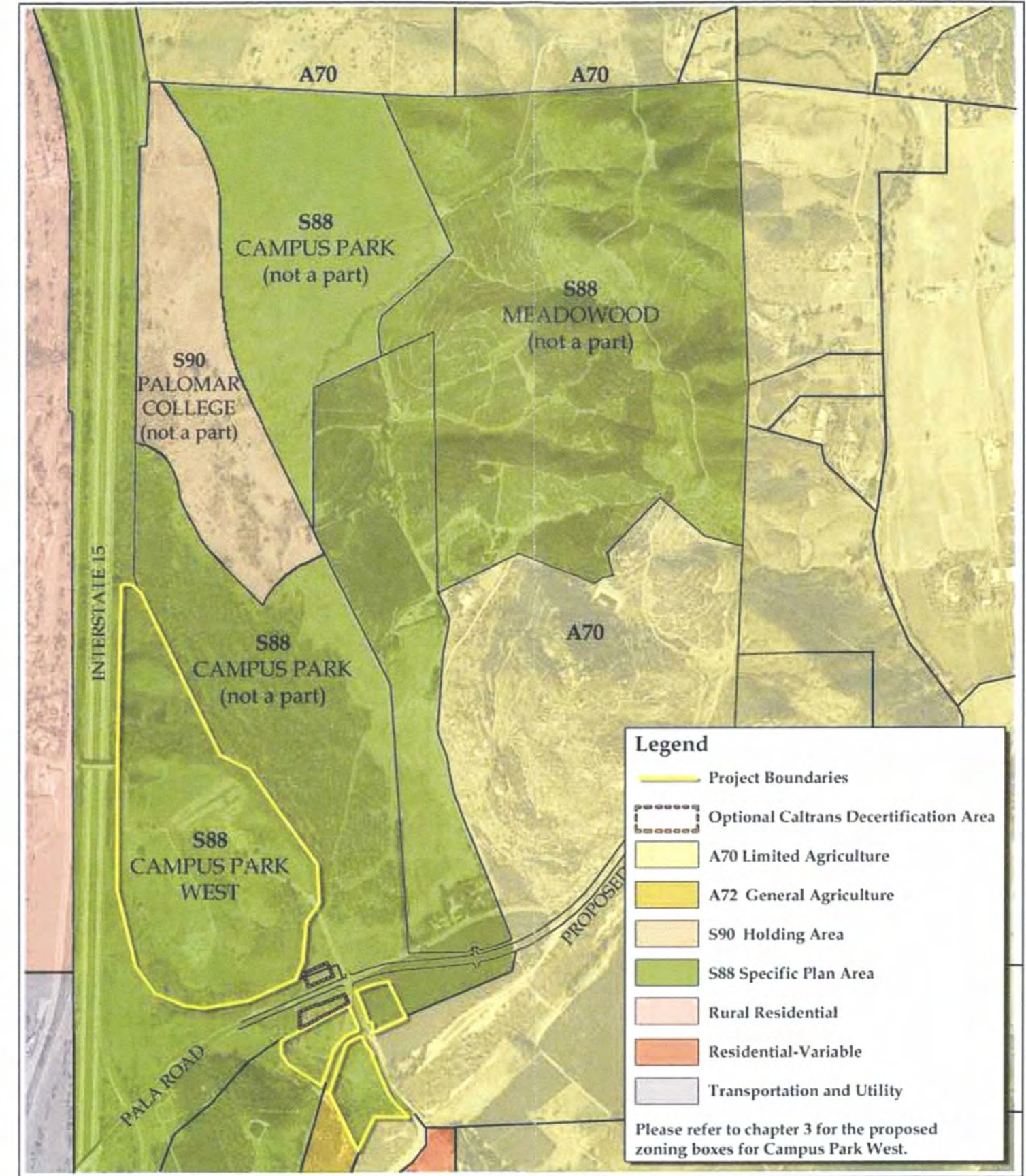
VICINITY MAP

NOT TO SCALE





EXISTING ZONING

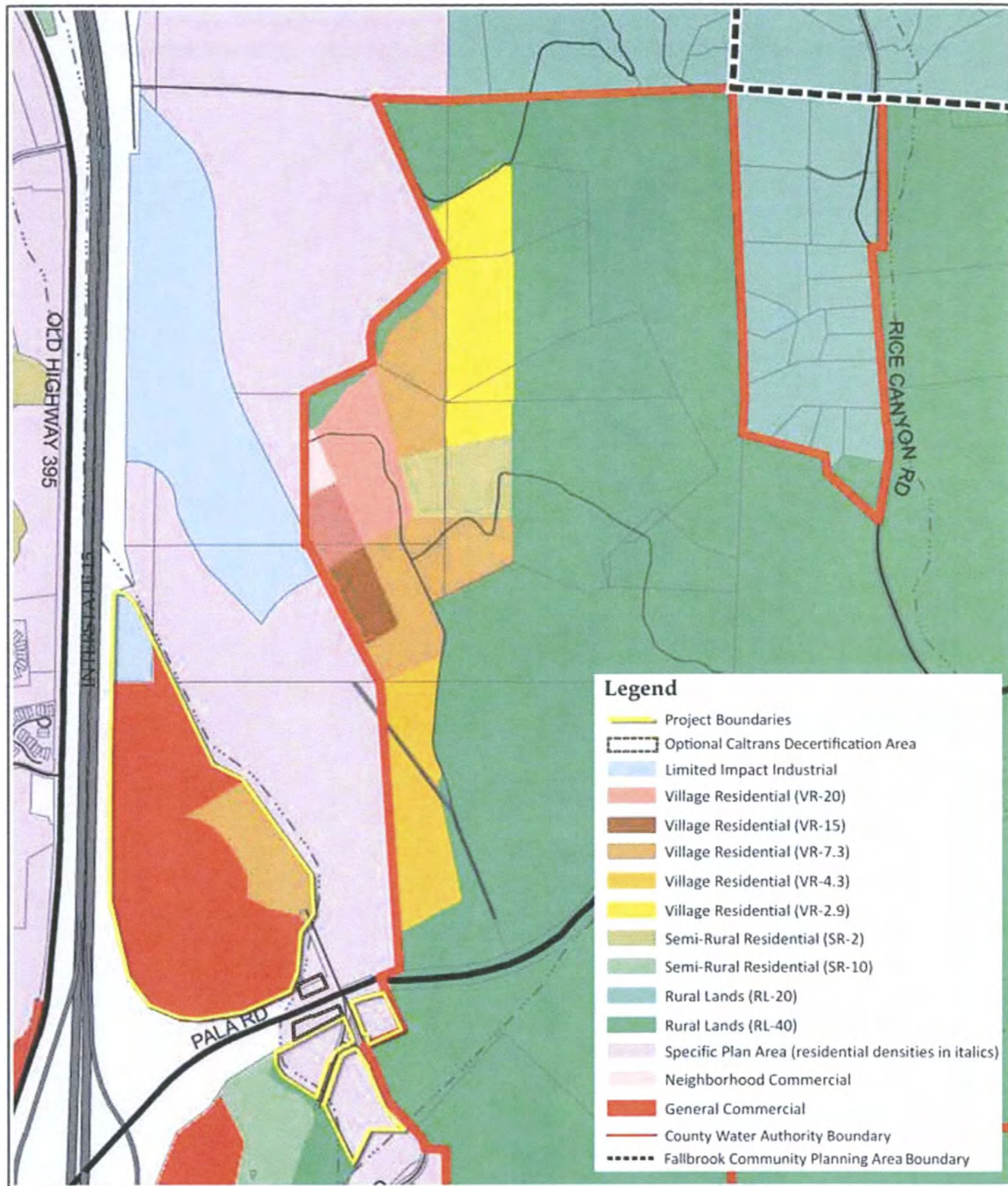


PROPOSED ZONING

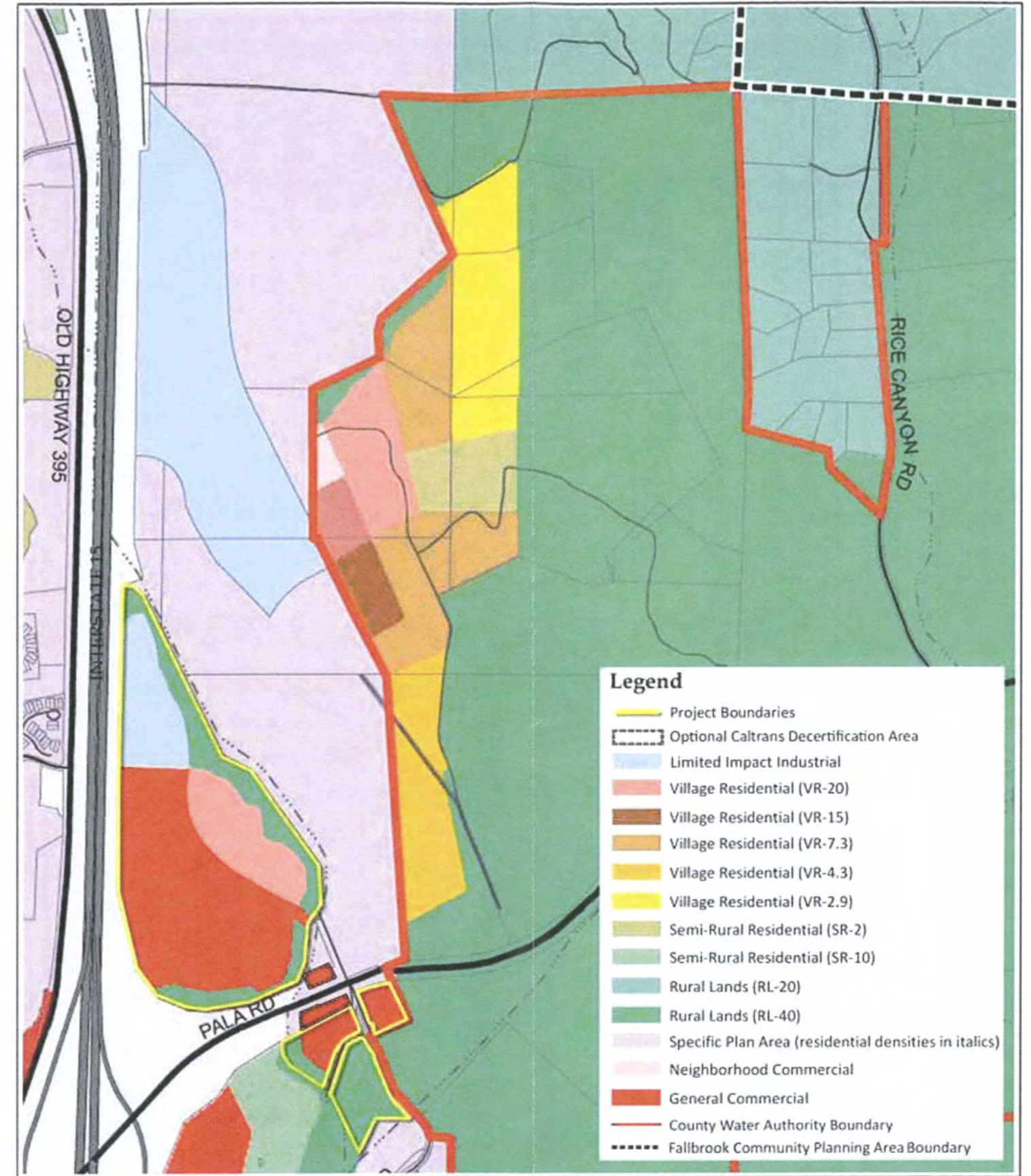
Figure II-4

Campus Park West Specific Plan

Existing and Proposed Zoning



EXISTING GENERAL PLAN LAND USE



PROPOSED GENERAL PLAN LAND USE

Figure II-3



Hydrologic Unit 903.11 - 903.32

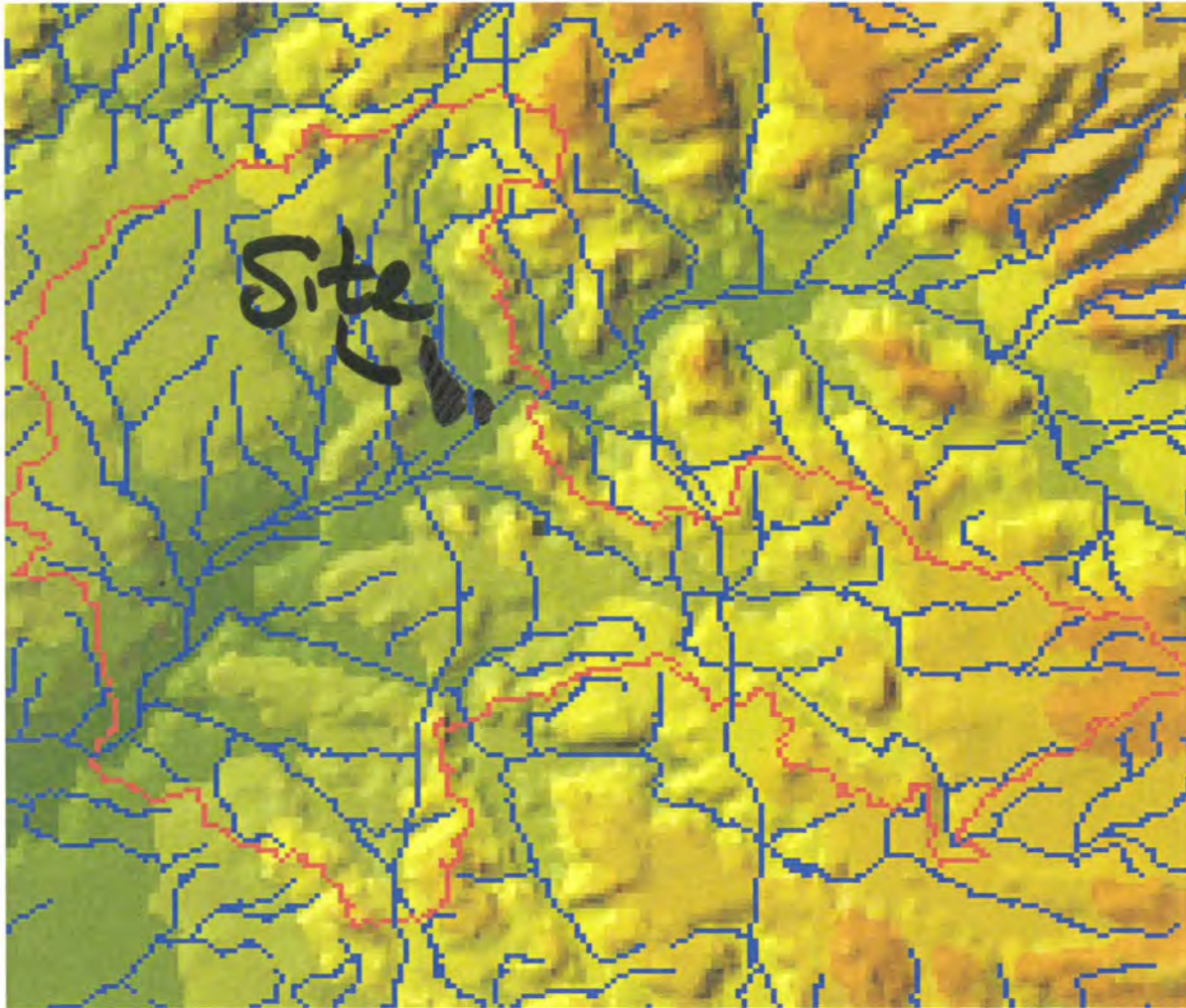
Hydrologic Areas:	Lower San Luis 903.1 Monserate 903.2 Warner Valley 903.3
Major Water Bodies:	San Luis Rey River and Lake Henshaw
CWA 303(d) List:	Pacific Ocean at the San Luis Rey River mouth: coliform bacteria
Major Impacts:	Surface water quality degradation, habitat loss, invasive species, channel bed erosion
Constituents of Concern:	Coliform bacteria, nitrate, sediment, and pesticides
Sources / Activities:	agricultural / orchards, livestock / domestic animals, urban runoff, sand mining, and septic systems

The San Luis Rey River watershed is located east of the City of Oceanside in the northwestern portion of San Diego County. The 558 square mile drainage is the largest hydrologic unit in the San Diego region. The watershed drains to the Pacific Ocean to the west and is bounded by the Moserate Mountains to the north, the Cleveland National Forest and Camp Pendleton to the northwest, and Escondido, San Diego, and other cities to the south. The basin is roughly 50 miles long by 16 miles wide, and is divided into two hydrologic units by Henshaw Dam. The areas above and below the dam encompass 206 and 354 square miles, respectively (USACOE, 1977).

Approximately 92.5% of the San Luis Rey River watershed is located in unincorporated areas of San Diego County. Roughly one-fourth of the land area in the watershed is located west of Interstate 15 including portions of the cities of Oceanside and Vista, the communities of Fallbrook and Bonsall, and the southwestern portion of Camp Pendleton. The land west of I-15 has multiple uses including open space/ undeveloped, residential, commercial/ industrial, and agricultural. East of Interstate 15, most of the land is owned and managed by government agencies (county, state, and federal), special districts, and Native American bands. The predominant land uses are open space/ undeveloped and agricultural.

Unlike most major rivers in Southern California, the San Luis Rey River has undergone relatively little channelization. The only significant segment of the river that has been channelized is within the City of Oceanside. However, the cumulative impacts of various land use practices in the basin appear to be degrading the river's environmental value. For example, an increased rate of bed erosion attributable to sand mining operations has been observed in the central reaches of the river.

San Luis Rey River



Water Quality Control Board Region:	9
Hydrologic Units:	903.12
Caltrans District:	11

Waterbody Beneficial Uses	
RWQCB Beneficial Use	Use Status
Click on the beneficial use for the beneficial use code and description.	Potential or Existing
Agricultural Supply	Existing
Industrial Service Supply	Existing
Rare, Threatened or Endangered Species	Existing
Water Contact Recreation	Existing
Non-Contact Water Recreation	Existing
Warm Freshwater Habitat	Existing
Wildlife Habitat	Existing

Water Quality Narrative Constituents

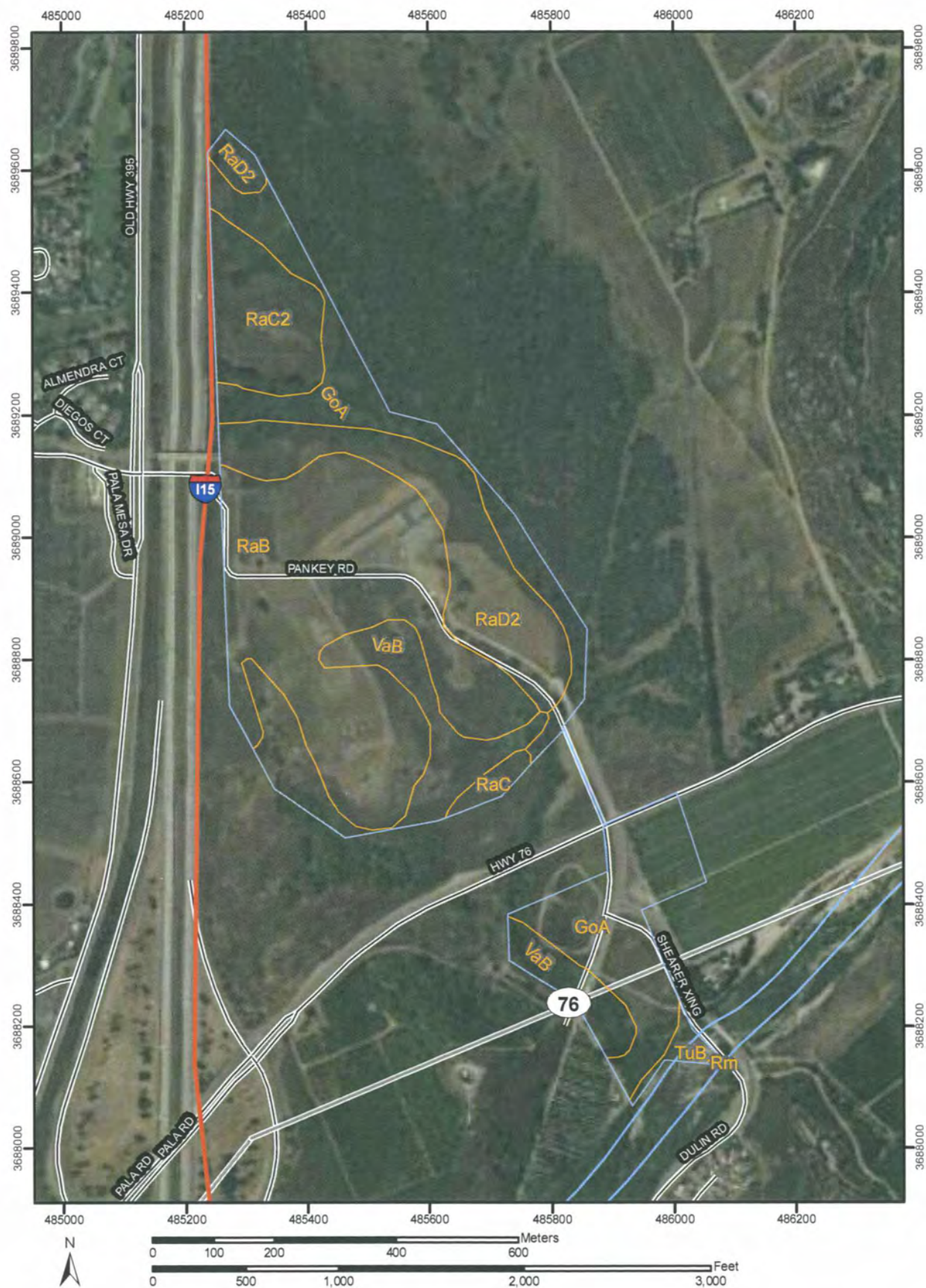
Constituent Name	Constituent Description
Biostimulatory Substances	Inland surface waters, bays and estuaries and coastal lagoon waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growths cause nuisance or adversely affect beneficial uses.
Color	Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses. The natural color of fish, shellfish or other resources in inland surface waters, coastal lagoon or bay and estuary shall not be impaired.
DO	The dissolved oxygen concentration in ocean waters shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste materials.
Floating Material	Waters shall not contain floating material, including solids, liquids, foams, and scum in concentrations which cause nuisance or adversely affect beneficial uses.
Oil and Grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations which result in a visible film or coating on the surface of the water or on objects in the water, or which cause nuisance or which otherwise adversely affect beneficial uses.
pH	The pH value shall not be changed at any time more than 0.2 pH units from that which occurs naturally. Changes in normal ambient pH levels shall not exceed 0.2 units in waters with designated marine (MAR), or estuarine (EST), or saline (SAL) beneficial uses. Changes in normal ambient pH levels shall not exceed 0.5 units in fresh waters with designated cold freshwater habitat (COLD) or warm freshwater habitat (WARM) beneficial uses. In bays and estuaries the pH shall not be depressed below 7.0 nor raised above 9.0. In inland surface waters the pH shall not be depressed below 6.5 nor raised above 8.5.
Radioactivity	Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life nor that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal or aquatic life.
Sediment	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
Suspended Solids	Waters shall not contain suspended and settleable solids in concentrations of solids that cause nuisance or adversely affect beneficial uses.
Toxicity	All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board. The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge or, when necessary, for other control water that is consistent with requirements specified in US EPA, State Water Resources Control Board. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour acute bioassay. In addition, effluent limits based upon acute bioassays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged.
Temperature	The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses. At no time or place shall the temperature of any COLD water be increased more than 5F above the natural receiving water temperature.
Taste and Odor	Waters shall not contain taste or odor producing substances at concentrations which cause a nuisance or adversely affect beneficial uses. The natural taste and odor of fish, shellfish or other Regional water resources used for human consumption Shall not be impaired in inland surface waters and bays and estuaries.
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.

Water Quality Numeric Criteria						
Beneficial Use	Numeric Constituent Name	Numeric Constituent Detail	Numeric Constituent Maximum	Numeric Constituent Units	Numeric Constituent Comments	Numeric Constituent Reference
WARM	Dissolved Oxygen	-	-5	mg/L		
AGR	Boron	-	0.75	mg/L		Quality Criteria for Water, 1986 - Gold Book.

Water Quality Ammonia Criteria						
Beneficial Use	Constituent Name	Constituent pH	Constituent Temperature	Constituent Time Duration	Constituent Concentration	Constituent Units
AGR	Ammonia as N	-	-	-	0.025	mg/L
IND	Ammonia as N	-	-	-	0.025	mg/L
RARE	Ammonia as N	-	-	-	0.025	mg/L
REC1	Ammonia as N	-	-	-	0.025	mg/L
REC2	Ammonia as N	-	-	-	0.025	mg/L
WARM	Ammonia as N	-	-	-	0.025	mg/L
WILD	Ammonia as N	-	-	-	0.025	mg/L

Water Quality Bacteria Criteria						
Beneficial Use	Constituent Name	Constituent Concentration Details	Constituent Concentration	Constituent Units	Constituent Comments	Constituent Reference
REC1	Fecal Coliform	Log Mean-10% of Samples for 30 day	400	Count per 100 ml	Log mean value. Based on more than 10 percent of total samples during any 30-day period.	
REC1	Fecal Coliform	Log Mean-5 Samples for 30 day	200	Count per 100 ml	Log mean value. Based on a minimum of not less than five samples for any 30-day period.	
REC2	Fecal Coliform	Average-10% of Samples for 30 day	4000	Count per 100 ml	Average value. Based on more than 10 percent of total samples during any 30-day period.	
REC2	Fecal Coliform	Average-for 30 day	2000	Count per 100 ml	Average value. Based on samples for a 30-day period.	

Soil Map-San Diego County Area, California



Natural Resources
Conservation Service

Web Soil Survey 2.0
National Cooperative Soil Survey

11/3/2008
Page 1 of 3

MAP LEGEND

	Area of Interest (AOI)		Very Stony Spot
	Area of Interest (AOI)		Wet Spot
	Soils		Other
	Soil Map Units		Special Line Features
	Special Point Features		Gully
	Blowout		Short Steep Slope
	Borrow Pit		Other
	Clay Spot		Political Features
	Closed Depression		Municipalities
	Gravel Pit		Cities
	Gravelly Spot		Urban Areas
	Landfill		Water Features
	Lava Flow		Oceans
	Marsh		Streams and Canals
	Mine or Quarry		Transportation
	Miscellaneous Water		Rails
	Perennial Water		Roads
	Rock Outcrop		Interstate Highways
	Saline Spot		US Routes
	Sandy Spot		State Highways
	Severely Eroded Spot		Local Roads
	Sinkhole		Other Roads
	Slide or Slip		
	Sodic Spot		
	Spoil Area		
	Stony Spot		

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 11N

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 6, Dec 17, 2007

Date(s) aerial images were photographed: 6/1/1994

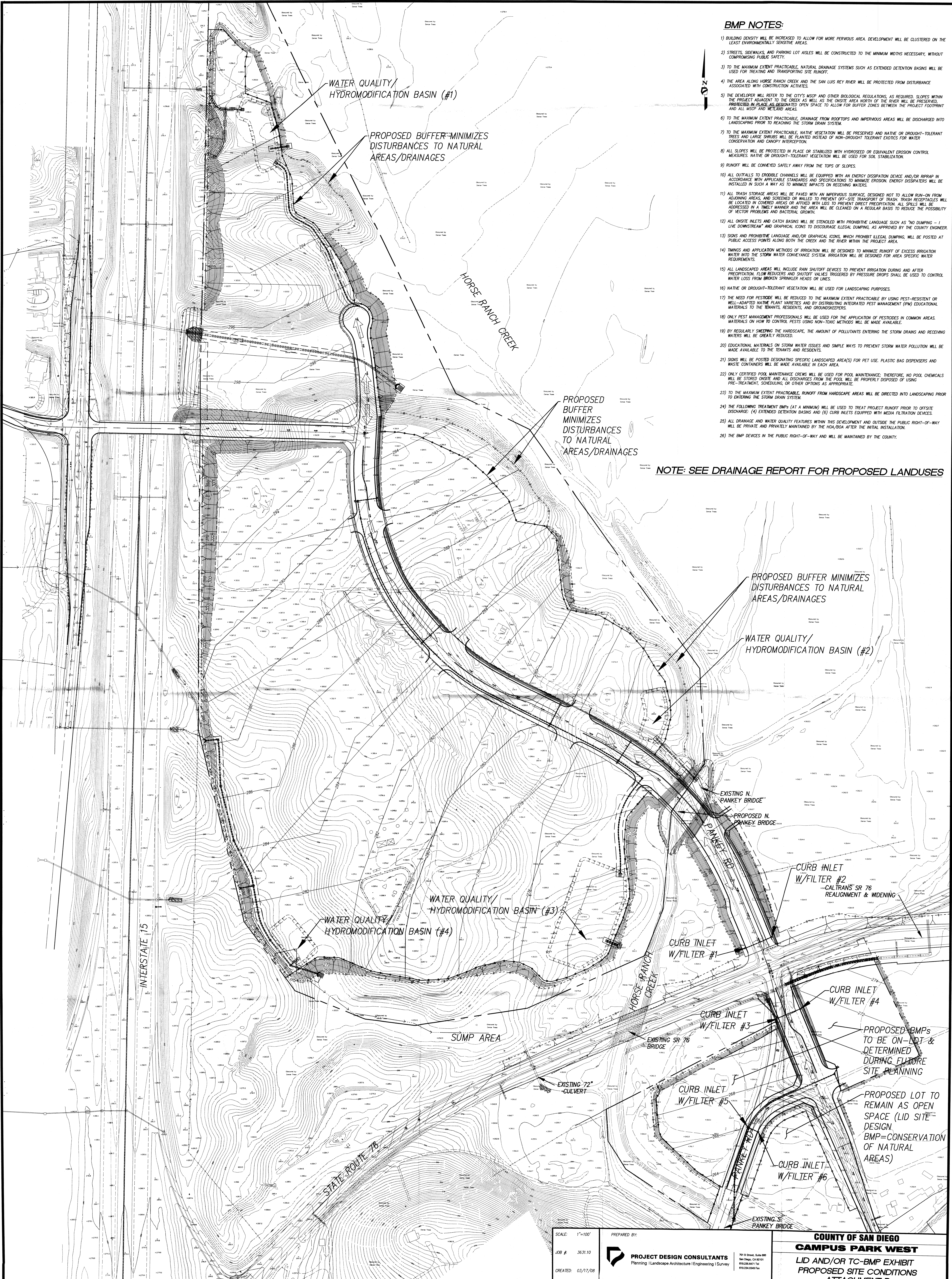
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

San Diego County Area, California (CA638)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GoA	Grangeville fine sandy loam, 0 to 2 percent slopes	29.2	24.4%
RaB	Ramona sandy loam, 2 to 5 percent slopes	42.8	35.8%
RaC	Ramona sandy loam, 5 to 9 percent slopes	1.3	1.1%
RaC2	Ramona sandy loam, 5 to 9 percent slopes, eroded	10.0	8.4%
RaD2	Ramona sandy loam, 9 to 15 percent slopes, eroded	18.9	15.8%
Rm	Riverwash	0.1	0.1%
TuB	Tujunga sand, 0 to 5 percent slopes	1.2	1.0%
VaB	Visalia sandy loam, 2 to 5 percent slopes	16.2	13.5%
Totals for Area of Interest (AOI)		119.7	100.0%

ATTACHMENT B

Source Control, LID, & TC BMP Exhibit



BMP NOTES:

- 1) BUILDING DENSITY WILL BE INCREASED TO ALLOW FOR MORE PERVIOUS AREA. DEVELOPMENT WILL BE CLUSTERED ON THE LEAST ENVIRONMENTALLY SENSITIVE AREAS.
- 2) STREETS, SIDEWALKS, AND PARKING LOT AISLES WILL BE CONSTRUCTED TO THE MINIMUM WIDTHS NECESSARY, WITHOUT COMPROMISING PUBLIC SAFETY.
- 3) TO THE MAXIMUM EXTENT PRACTICABLE, NATURAL DRAINAGE SYSTEMS SUCH AS EXTENDED DETENTION BASINS WILL BE USED FOR TREATING AND TRANSPORTING SITE RUNOFF.
- 4) THE AREA ALONG HORSE RANCH CREEK AND THE SAN LUIS REY RIVER WILL BE PROTECTED FROM DISTURBANCE ASSOCIATED WITH CONSTRUCTION ACTIVITIES.
- 5) THE DEVELOPER WILL REFER TO THE CITY'S MSCP AND OTHER BIOLOGICAL REGULATIONS, AS REQUIRED. SLOPES WITHIN THE PROJECT ADJACENT TO THE CREEK AS WELL AS THE ONSITE AREA NORTH OF THE RIVER WILL BE PRESERVED, PROTECTED IN PLACE, AND DESIGNATED OPEN SPACE TO ALLOW FOR BUFFER ZONES BETWEEN THE PROJECT FOOTPRINT AND ALL ACED AND WETLAND AREAS.
- 6) TO THE MAXIMUM EXTENT PRACTICABLE, DRAINAGE FROM ROOFTOPS AND IMPERVIOUS AREAS WILL BE DISCHARGED INTO LANDSCAPING PRIOR TO REACHING THE STORM DRAIN SYSTEM.
- 7) TO THE MAXIMUM EXTENT PRACTICABLE, NATIVE VEGETATION WILL BE PRESERVED AND NATIVE OR DROUGHT-TOLERANT TREES AND LARGE SHRUBS WILL BE PLANTED INSTEAD OF NON-DROUGHT TOLERANT EXOTICS FOR WATER CONSERVATION AND CANOPY INTERCEPTION.
- 8) ALL SLOPES WILL BE PROTECTED IN PLACE OR STABILIZED WITH HYDROSEED OR EQUIVALENT EROSION CONTROL MEASURES. NATIVE OR DROUGHT-TOLERANT VEGETATION WILL BE USED FOR SOIL STABILIZATION.
- 9) RUNOFF WILL BE CONVEYED SAFELY AWAY FROM THE TOPS OF SLOPES.
- 10) ALL OUTFALLS TO ERODIBLE CHANNELS WILL BE EQUIPPED WITH AN ENERGY DISSIPATION DEVICE AND/OR RIPRAP IN ACCORDANCE WITH APPLICABLE STANDARDS AND SPECIFICATIONS TO MINIMIZE EROSION. ENERGY DISSIPATORS WILL BE INSTALLED IN SUCH A WAY AS TO MINIMIZE IMPACTS ON RECEIVING WATERS.
- 11) ALL TRASH STORAGE AREAS WILL BE PAVED WITH AN IMPERVIOUS SURFACE, DESIGNED NOT TO ALLOW RUN-ON FROM ADJOINING AREAS, AND SCREENED OR WALLED TO PREVENT OFF-SITE TRANSPORT OF TRASH. TRASH RECEPTACLES WILL BE LOCATED IN COVERED AREAS OR ATTACHED WITH LIDS TO PREVENT DIRECT PRECIPITATION. ALL SPILLS WILL BE ADDRESSED IN A TIMELY MANNER AND THE AREA WILL BE CLEANED ON A REGULAR BASIS TO REDUCE THE POSSIBILITY OF VECTOR PROBLEMS AND BACTERIAL GROWTH.
- 12) ALL ONSITE INLETS AND CATCH BASINS WILL BE STENOED WITH PROHIBITIVE LANGUAGE SUCH AS "NO DUMPING - 1 LINE DOWNSTREAM" AND GRAPHICAL ICONS TO DISCOURAGE ILLEGAL DUMPING, AS APPROVED BY THE COUNTY ENGINEER.
- 13) SIGNS AND PROHIBITIVE LANGUAGE AND/OR GRAPHICAL ICONS, WHICH PROHIBIT ILLEGAL DUMPING, WILL BE POSTED AT PUBLIC ACCESS POINTS ALONG BOTH THE CREEK AND THE RIVER WITHIN THE PROJECT AREA.
- 14) TIMINGS AND APPLICATION METHODS OF IRRIGATION WILL BE DESIGNED TO MINIMIZE RUNOFF OF EXCESS IRRIGATION WATER INTO THE STORM WATER CONVEYANCE SYSTEM. IRRIGATION WILL BE DESIGNED FOR AREA SPECIFIC WATER REQUIREMENTS.
- 15) ALL LANDSCAPED AREAS WILL INCLUDE RAIN SHUTOFF DEVICES TO PREVENT IRRIGATION DURING AND AFTER PRECIPITATION. FLOW REDUCERS AND SHUTOFF VALVES TRIGGERED BY PRESSURE DROPS SHALL BE USED TO CONTROL WATER LOSS FROM BROKEN SPRINKLER HEADS OR LINES.
- 16) NATIVE OR DROUGHT-TOLERANT VEGETATION WILL BE USED FOR LANDSCAPING PURPOSES.
- 17) THE NEED FOR PESTICIDE WILL BE REDUCED TO THE MAXIMUM EXTENT PRACTICABLE BY USING PEST-RESISTANT OR WELL-ADAPTED NATIVE PLANT VARIETIES AND BY DISTRIBUTING INTEGRATED PEST MANAGEMENT (IPM) EDUCATIONAL MATERIALS TO THE TENANTS, RESIDENTS, AND GROUNDSKEEPERS.
- 18) ONLY PEST MANAGEMENT PROFESSIONALS WILL BE USED FOR THE APPLICATION OF PESTICIDES IN COMMON AREAS. MATERIALS ON HOW TO CONTROL PESTS USING NON-TOXIC METHODS WILL BE MADE AVAILABLE.
- 19) BY REGULARLY SWEEPING THE HARDSCAPE, THE AMOUNT OF POLLUTANTS ENTERING THE STORM DRAINS AND RECEIVING WATERS WILL BE GREATLY REDUCED.
- 20) EDUCATIONAL MATERIALS ON STORM WATER ISSUES AND SIMPLE WAYS TO PREVENT STORM WATER POLLUTION WILL BE MADE AVAILABLE TO THE TENANTS AND RESIDENTS.
- 21) SIGNS WILL BE POSTED DESIGNATING SPECIFIC LANDSCAPED AREA(S) FOR PET USE, PLASTIC BAG DISPENSERS AND WASTE CONTAINERS WILL BE MADE AVAILABLE IN EACH AREA.
- 22) ONLY CERTIFIED POOL MAINTENANCE CREWS WILL BE USED FOR POOL MAINTENANCE. THEREFORE, NO POOL CHEMICALS WILL BE STORED ONSITE AND ALL DISCHARGES FROM THE POOL WILL BE PROPERLY DISPOSED OF USING PRE-TREATMENT, SCHEDULING, OR OTHER OPTIONS AS APPROPRIATE.
- 23) TO THE MAXIMUM EXTENT PRACTICABLE, RUNOFF FROM HARDSCAPE AREAS WILL BE DIRECTED INTO LANDSCAPING PRIOR TO ENTERING THE STORM DRAIN SYSTEM.
- 24) THE FOLLOWING TREATMENT BMPs (AT A MINIMUM) WILL BE USED TO TREAT PROJECT RUNOFF PRIOR TO OFFSITE DISCHARGE: (4) EXTENDED DETENTION BASINS AND (6) CURB INLETS EQUIPPED WITH MEDIA FILTRATION DEVICES.
- 25) ALL DRAINAGE AND WATER QUALITY FEATURES WITHIN THIS DEVELOPMENT AND OUTSIDE THE PUBLIC RIGHT-OF-WAY WILL BE PRIVATE AND PRIVATELY MAINTAINED BY THE HOA/BOA AFTER THE INITIAL INSTALLATION.
- 26) THE BMP DEVICES IN THE PUBLIC RIGHT-OF-WAY AND WILL BE MAINTAINED BY THE COUNTY.

NOTE: SEE DRAINAGE REPORT FOR PROPOSED LANDUSES

SCALE: 1"=100'		PREPARED BY:	
JOB #: 3631.10		PROJECT DESIGN CONSULTANTS	
CREATED: 03/17/08		Planning Landscape Architecture Engineering Survey	
		701 B Street, Suite 800 San Diego, CA 92101 619.235.6471 FAX 619.235.0485 FAX	
COUNTY OF SAN DIEGO			
CAMPUS PARK WEST			
LID AND/OR TC-BMP EXHIBIT			
PROPOSED SITE CONDITIONS			
ATTACHMENT B			

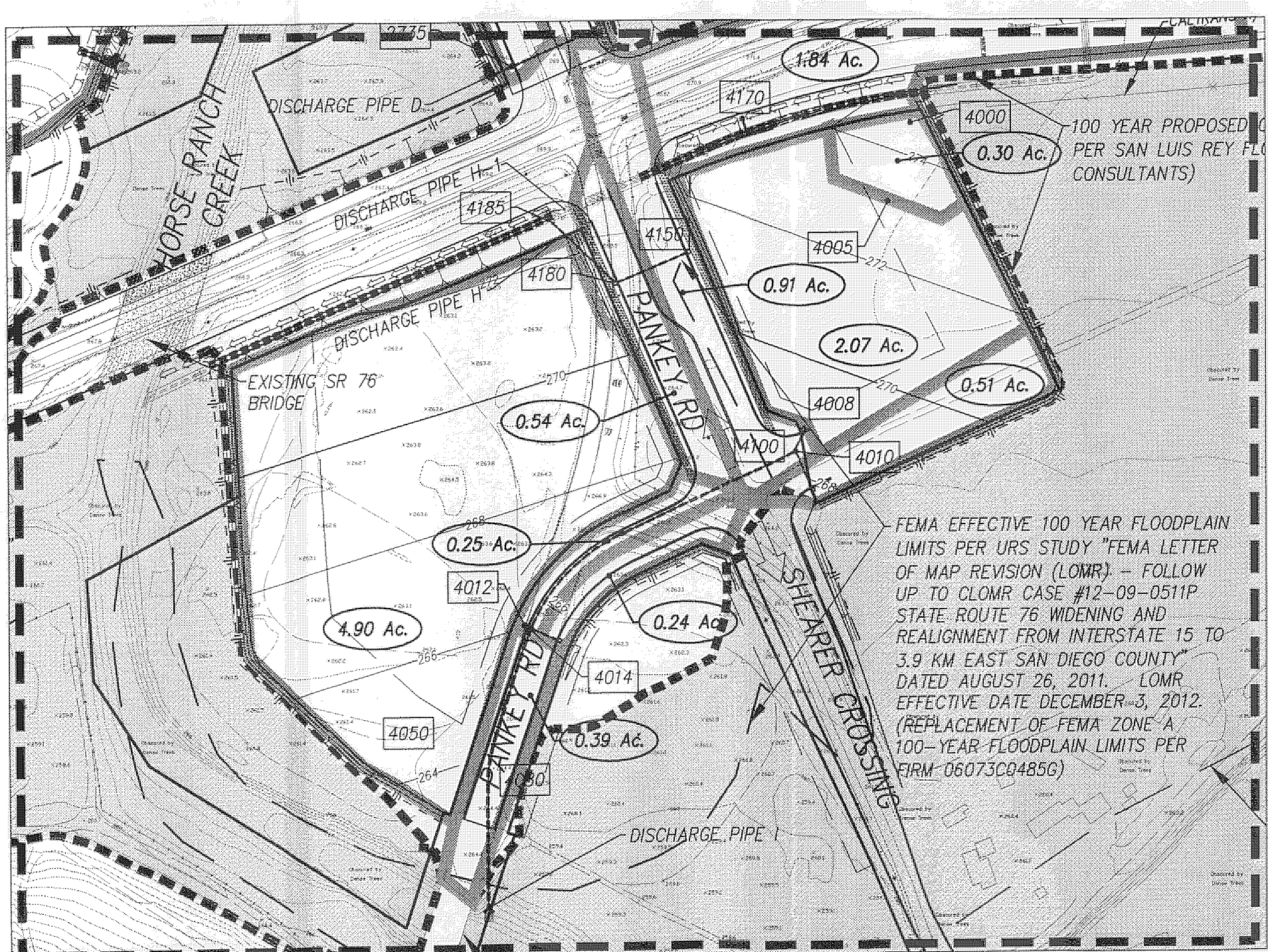
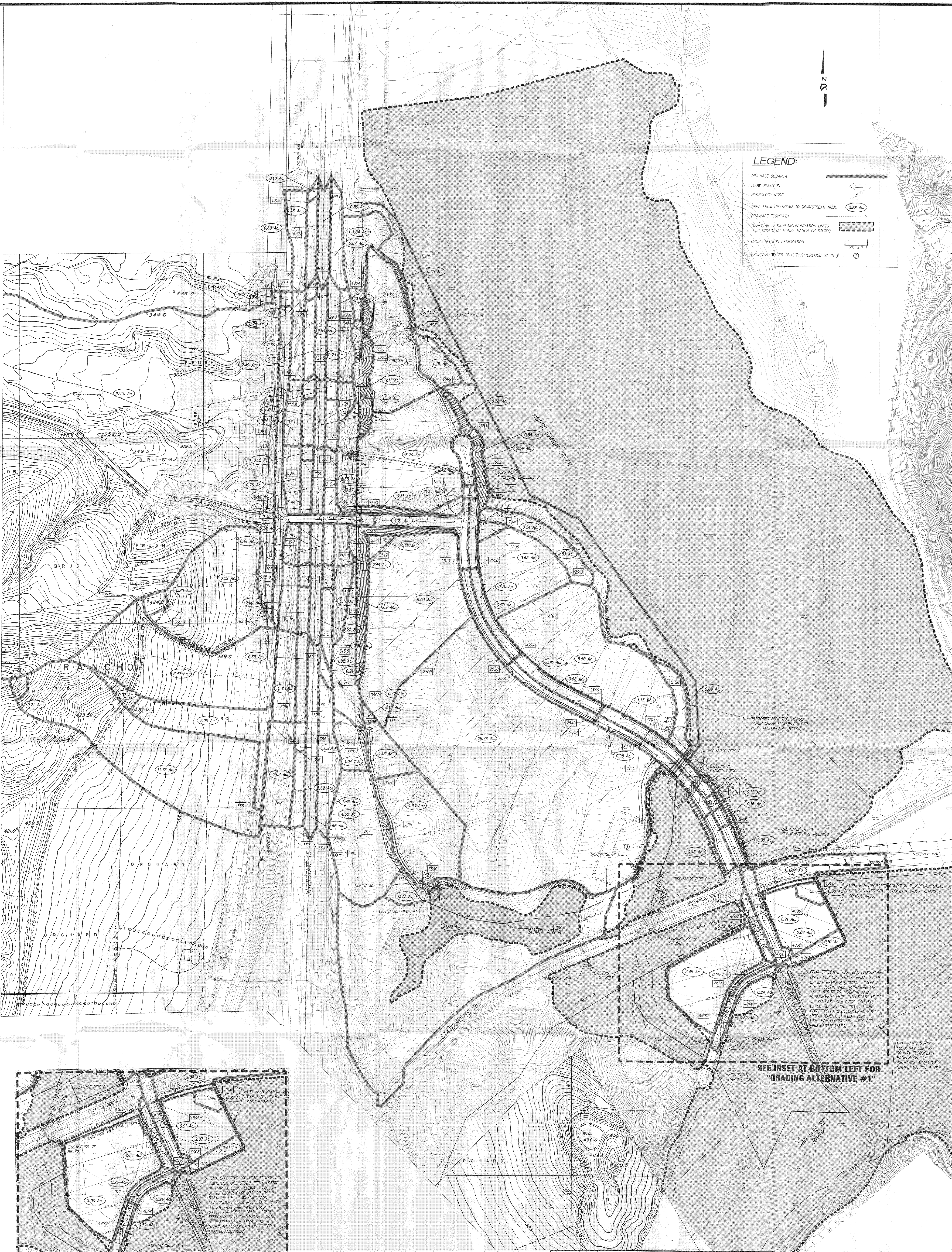
ATTACHMENT C

Drainage Management Area (DMA) Exhibit

SEE EXHIBIT A-1 FOR CONTINUATION

LEGEND:

- DRAINAGE SUBAREA
- FLOW DIRECTION
- HYDROLOGY NODE
- AREA FROM UPSTREAM TO DOWNSTREAM NODE
- DRAINAGE FLOWPATH
- 100-YEAR FLOODPLAIN/INUNDATION LIMITS (PER QDOT OR HORSE RANCH C&S STUDY)
- CROSS SECTION DESIGNATION
- PROPOSED WATER QUALITY/HYDROMOD BASIN #



GRADING ALTERNATIVE #1

SEE INSET AT BOTTOM LEFT FOR "GRADING ALTERNATIVE #1"

SCALE: 1"=50'	PREPARED BY:		PROJECT DESIGN CONSULTANTS Planning Landscape Architecture Engineering Survey	1001 W. Street, Suite 200 San Diego, CA 92101 619.594.6471 619.594.6472
JOB # 363110				
CREATED: 03/17/08				
COUNTY OF SAN DIEGO CAMPUS PARK WEST			DRAINAGE MAP PROPOSED CONDITIONS EXHIBIT B	

ATTACHMENT D

Sizing Design Calculations and TC-BMP/LID Design Details

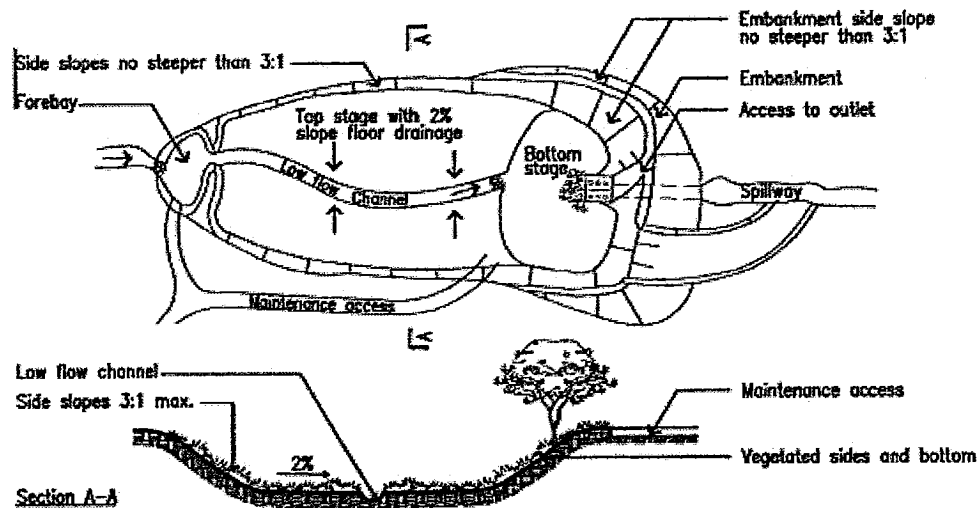
**(Provide BMP Sizing Calculator results and/or continuous simulation modeling
results, if applicable)**

*(NOTE: See hydromodification report for hydromodification continuous
simulation modeling results.)*

CAMPUS PARK WEST WATER QUALITY BASIN SUMMARY & VOLUME ESTIMATES

Basin #	Type of Basin	System	WQ 85th Percentile depth=			Proposed Basin Volume (Minimum to also address Hydromod Volume) (AF)	0.83 in
			Drainage Area (AC)	C(WQ)	WQ Vol (AF)		
1	WQ/Hydromod	1000	21.46	0.63	0.93	2	
2	WQ/Hydromod	2000	14.78	0.62	0.63	1.3	
3	WQ/Hydromod	2000	47.64	0.86	2.83	7.4	
4	WQ/Hydromod	3000	5.93	0.86	0.35	1.4	

Fact Sheet 3. Extended detention (dry) ponds



Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Extended detention (dry) ponds store water during storms for a short period of time (from a few hours up to three days), and discharge water to adjacent surface waters. Stormwater design volumes are designed to be stored in such basins for more than 1 day to provide adequate settling time and maximize pollutant removal. The basins are dry between storms, and do not have a permanent pool of water. This tool is best suited for use as part of a treatment train in conjunction with other LID techniques.

CHARACTERISTICS

- If properly designed, ponds can have a lifetime of 50 years.
- Clay or impervious soils should not affect pollutant removal effectiveness, as the main removal mechanism is settling.
- Pollutants removed primarily through gravitational settling of suspended solids, though a small portion of the dissolved pollutant load may be removed by contact with the pond bottom sediments and/or vegetation, and through infiltration.
- Moderate removal of suspended solids (sediment) and heavy metals.
- Low to moderate removal of nutrients and Biological Oxygen Demand (B.O.D.).
- Pollutant removal can be maximized by increasing residence time; two-stage pond design, with the addition of wetland vegetation to lower stages of the pond; sediment trapping forebay to allow efficient maintenance; regular maintenance and sediment cleanout; installing adjustable gate valves to achieve target detention times; designing pond outlet to detain smaller treatment volumes (less than two-year storm event).

APPLICATION

- May be initially used as construction settling basins, but must be re-graded and cleaned out before used as a post-construction pond.
- May be designed for both pollutant removal and flood control.
- May be appropriate for developments of 10 acres or larger.

- Potential for multiple uses including flood control basins; parks, playing fields, and tennis courts; open space; overflow parking lots.

DESIGN

- Coordinate pond design, location, and use with local municipal public works department and/or county flood control department to reduce potential downstream flooding.
- Default conditions for safety have been to fence basins with chain link. Consider aesthetic design elements with safety analyst to address pond barriers, such as fencing and/or vegetation, and shallow side slopes (8:1 to 12:1).
- See County of San Diego Drainage Design Manual

MAINTENANCE

- Regular inspection during wet season for sediment buildup and clogging of inlets and outlets (designing a forebay to trap sediment can decrease frequency of required maintenance, as maintenance efforts are concentrated towards a smaller area of the basin and less disruptive than complete basin cleaning).
- Clean inlet trash rack and outlet standpipe as necessary.
- Clean out basin sediment approximately once per year (this may vary depending on pond depth and design, and if forebay is used).
- Mow and maintain pond vegetation, replant or reseed as necessary to control erosion.

LIMITATIONS

- Limitation of available space.
- Dry detention ponds have only moderate pollutant removal when compared to some other structural treatment controls and are relatively ineffective at removing soluble pollutants.
- Basins must be designed with vector control (max 72 hour residence time), sediment and vegetation removal/maintenance considerations in mind.
- Not suitable on sites with steep slopes.

ECONOMICS

- Least expensive stormwater quality pond option available. 0-25% additional cost when added to conventional stormwater detention facilities.
- Construction cost \$0.10-\$5.00 per cubic foot of storage (savings from preparing silt basins used during construction for use as extended detention ponds).
- Maintenance cost 3-5% of construction cost annually.

REFERENCES

- California Stormwater Quality Association. (2003, January) California Stormwater BMP Handbook: New Development and Redevelopment.
- For additional information pertaining to extended detention ponds, see the works cited in the San Diego County LID Literature Index.

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.

CHARACTERISTICS

- 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.

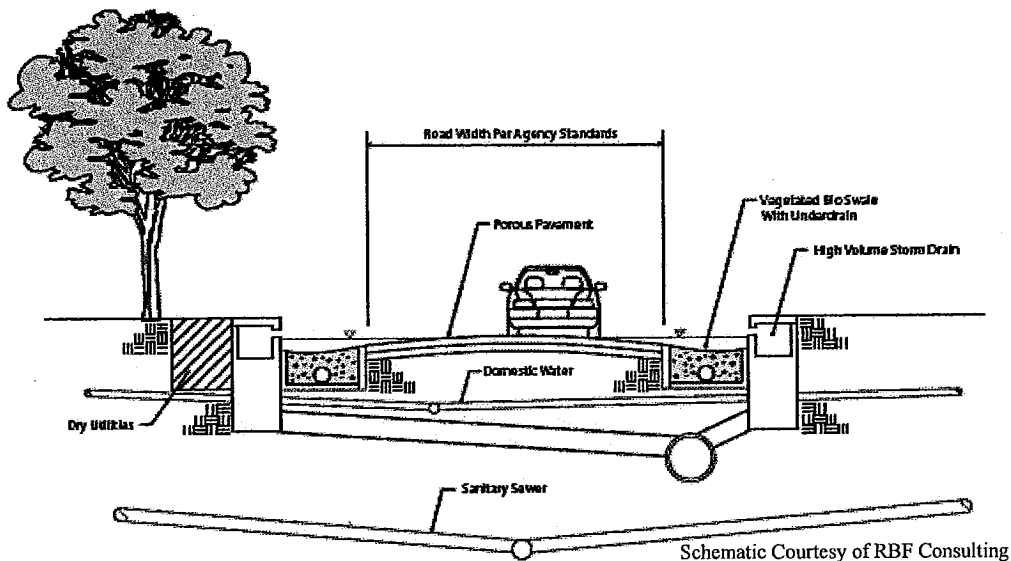
ECONOMICS

- 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.html>
- 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



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

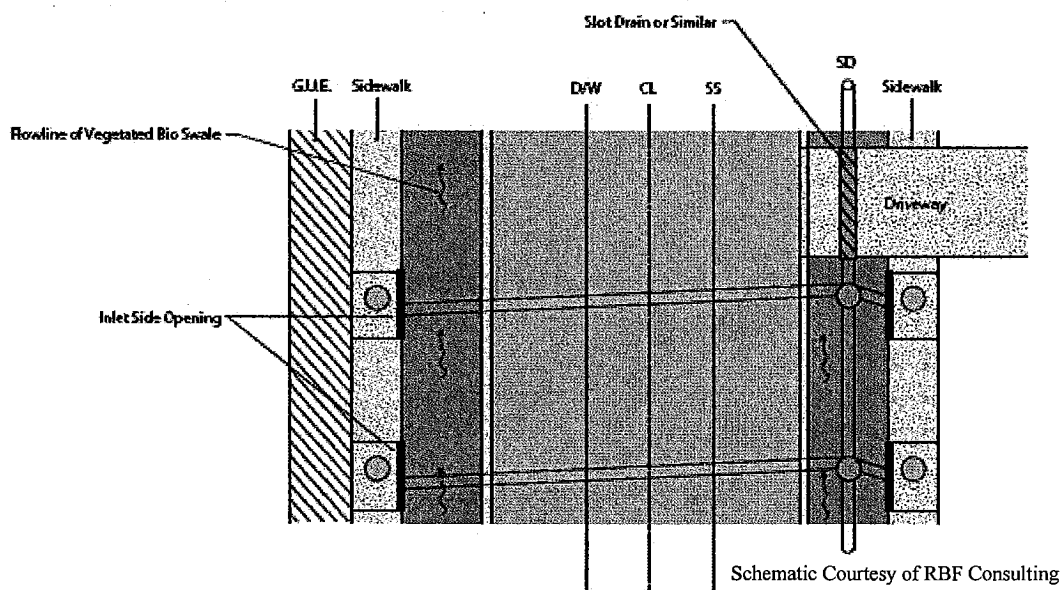
- Feasibility and amount of application is dependant upon local zoning standards
- May not be appropriate for long cul-de-sac streets or hillside sites with high fire risks (because of the potential of shared moving space to be blocked by a single vehicle, with no alternate emergency route).

ECONOMICS

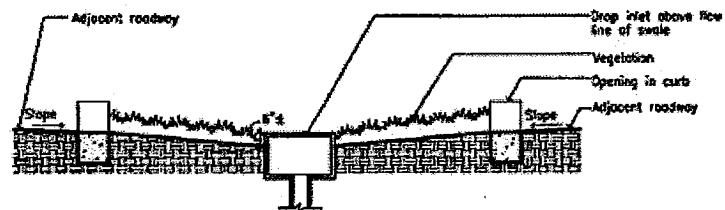
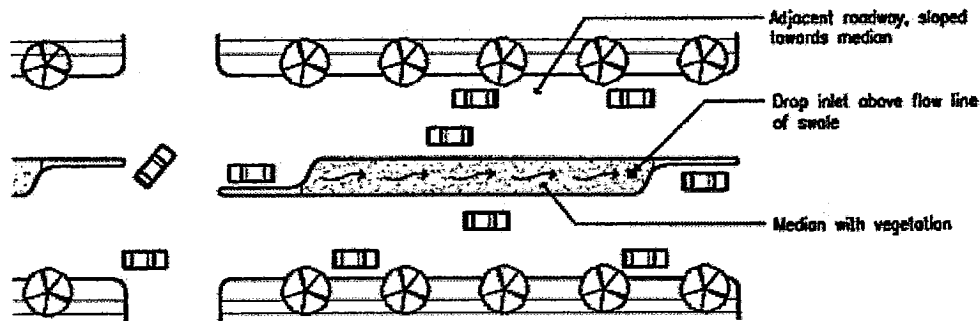
- Narrower street section reduces initial construction costs.
- Increased parkway adds additional landscape maintenance cost, especially compared with conventional street section without a parkway strip.
- Properties on narrower streets with tree-lined landscaped parkways typically command higher values 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 19. Concave Median



Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Conventional medians are normally designed as a convex surface to shed water onto adjacent pavement and into a curb and gutter system. Concave medians reverse this relationship by depressing the median surface slightly depressed below the adjacent pavement section and designing the median to receive runoff.

CHARACTERISTICS

- Provides safety and aesthetic functions of traditional convex medians while accommodating stormwater infiltration.
- Helps to disconnect impervious street surface from storm drain system by directing street runoff into landscaped or aggregate-filled median for infiltration.
- Can be designed as a landscaped swale or turf-lined biofilter to treat first-flush runoff, which carries a high concentration of oils and other pollutants off the street.

APPLICATION

- Can be applied where new roads are being constructed or current roads can be retrofitted.
- Applicable on roadways where a traditional median might normally occur

DESIGN

- Adjacent roadway design must provide cross-slope into medians.
- Runoff from street can be directed into swale by sheet flow or curb inlets.
- Concave medians must be sized to accommodate the water quality volume, and planting must be designed to withstand periodic inundation.
- For steeper slopes, concave medians should be protected to minimize erosion.

- Catch basin and underground storm drain system may be required for high flows, depending on the available area for infiltration and retention.
- Set catch basin rim elevations just below the pavement elevation, but above the flow line of the infiltration area so that the water quality volume will collect in the swale before overflowing into the underground system.
- Can be constructed in either natural or amended soils, depending on the infiltration rate provided by the natural condition versus the rate needed to reduce surface runoff sufficiently.

MAINTENANCE

- Landscaped concave medians have maintenance requirements similar to landscaped convex medians.
- Some maintenance staff retraining may be required to facilitate maintenance of swales or other stormwater detention elements.

LIMITATIONS

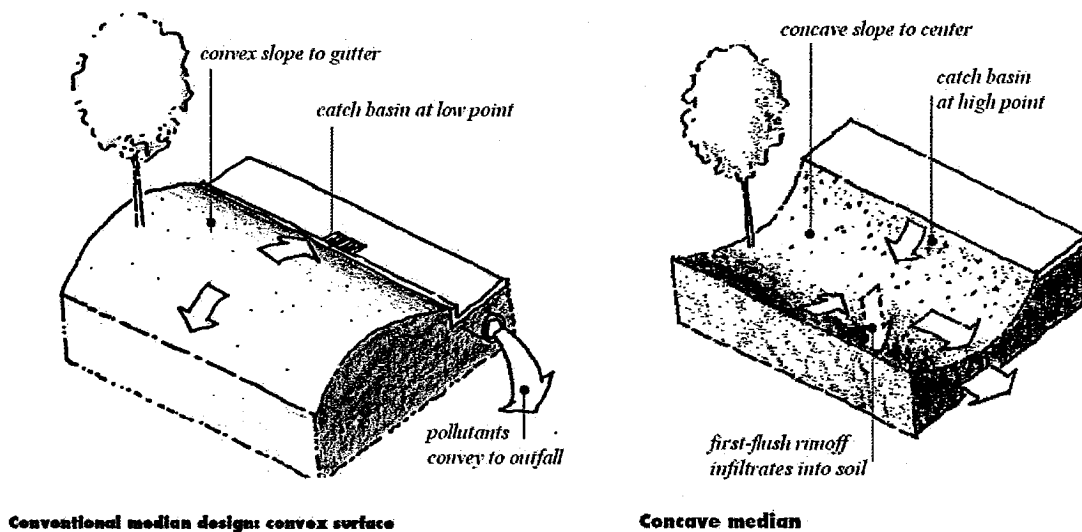
- Plant species suited for concave medians depends upon water availability and frequency of rainfall and tend to be similar to those used for other vegetated swales.
- Irrigated vegetation may not be appropriate in certain sites. Xeriscape techniques, natural stone and rock linings can be used as an alternative to turf.

ECONOMICS

- Costs are similar to convex landscaped medians.

REFERENCES

- For additional information pertaining to Concave Medians, see the works cited in the San Diego County LID Literature Index.



Fact Sheet 28. Downspout to Swale

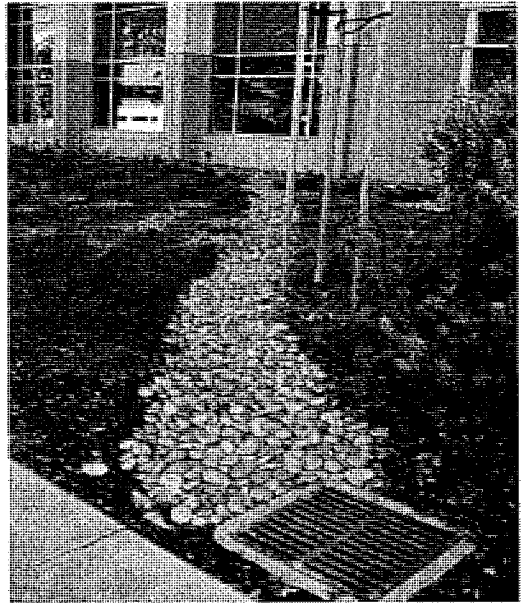
Discharging a roof downspout to landscaped areas via swales allows for polishing and infiltration of the runoff.

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.



Photograph Courtesy of BOA, Inc.

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 species.

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).

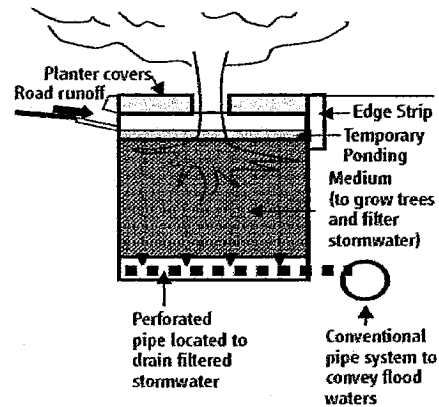
REFERENCES

- 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.

Fact Sheet 31. Street Trees



Photograph Courtesy of EOA, Inc.



Tree planter schematic

Photograph from Water Sensitive Urban Design Guidelines, Melbourne, Australia (2005)

Trees can be used as a stormwater management tool in addition to providing the more commonly recognized benefits of energy conservation, air quality improvement, and aesthetic enhancement.

CHARACTERISTICS

- Tree surfaces (roots, foliage, bark, and branches) intercept, evaporate, store or convey precipitation to the soil before it reaches surrounding impervious surfaces.
- In bioretention cells or swales, tree roots build soil structure that enhances infiltration capacity and reduces erosion.

APPLICATION

- Using modified planter boxes as opposed to the tradition approach can provide stormwater filtration in an otherwise impervious urban environment.
- Modified street tree planters are appropriate for use along streets, sidewalks, driveways and other urban settings.
- Medians and traffic calming bays can also be utilized as bioretention systems using systems such as street trees.

DESIGN

- Appropriate placement and selection of tree species is important to achieve desired benefits and reduce potential problems such as pavement damage by surface roots and poor growth performance.
- Check with local community planning guidelines for the type and location of trees planted along public streets or rights-of-way.
- The extent and growth pattern of the root structure must be considered when trees are planted in bioretention areas or other stormwater facilities with under-drain structures or near paved areas such as driveways, sidewalks or streets. Root barrier devices can be utilized where applicable.

- Available growing space must also be considered in site planning.
- Soil type and water availability must be considered in species choice and placement.
- Underground utilities and overhead wires must be circumvented.
- Additional functions desired, such as shade, aesthetics, windbreak, privacy screening, should impact species choice and placement as well
- Other important tree characteristics to consider when making a selection include: Longevity or life-span, Tolerance for urban pollutants, Growth Rate, Tolerance to drought, seasonally saturated soils, and poor soils, Canopy spread and density, Foliage texture and persistence

MAINTENANCE

- In general, maintenance includes annual routine inspection and maintenance activities.
- These would include removal of trash, debris and sediment, replenishment of the mulch, and care or replacement of plants.
- During extreme droughts the plants may need to be watered in the same manner as any other landscape material.

LIMITATIONS

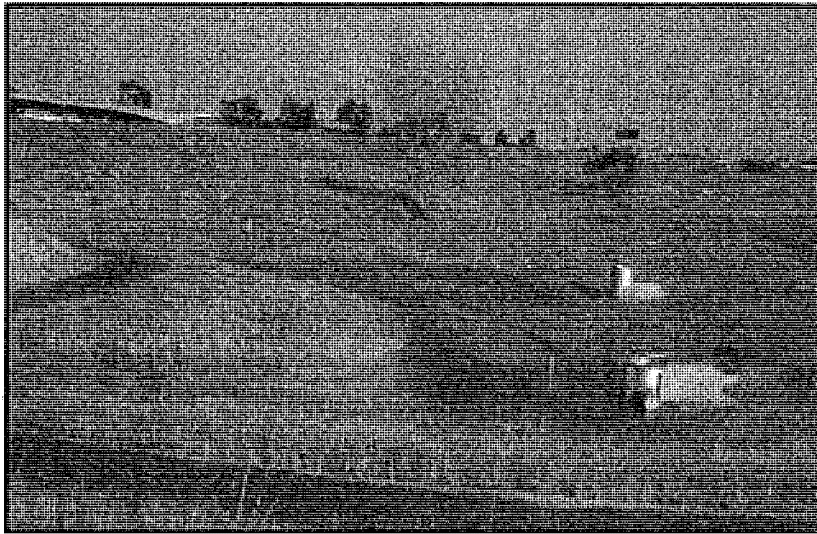
- Local planning guidelines and zoning provisions for the permissible species and placement of trees along public streets or rights-of-way must be consulted.
- Vehicle and pedestrian sight lines; proximity to paved areas and underground utilities; proximity to neighbors, buildings, and other vegetation; prevailing wind direction; and sun exposure all must be considered in street tree placement.
- Species appropriate is dependant upon the available space for root and foliage growth, location of utilities such as water pipes and power lines, available water (irrigation should be limited as much as possible) and tolerance to pollutants.

ECONOMICS

- Accurate economic data pertaining to the use of subsurface reservoir beds is currently unavailable, however, site specific cost records can be found in the LID Literature Index.

REFERENCES

- City of LA, Bureau of Street Services, Street Tree Division
<http://lacity.org/boss/streettree/treeguide.htm>
- Street Tree Seminar, Inc. (1999), *Street Trees Recommended for Southern California*. Anaheim, California.
- Low Impact Development Center, Inc. (n.d.). *Maintenance of Tree Box Filters*.
http://www.lid-stormwater.net/treebox/treeboxfilter_maintain.htm
- For additional information pertaining to Street Trees see the works cited in the San Diego County LID Literature Index.
- City of Melbourne, Australia. (2005). *Water Sensitive Urban Design Guidelines*.
http://www.melbourne.vic.gov.au/rsr/PDFs/Water/WSUD_part1.pdf



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.

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.

Targeted Constituents

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

Legend (Removal Effectiveness)

- Low
- High
- ▲ Medium



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.

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

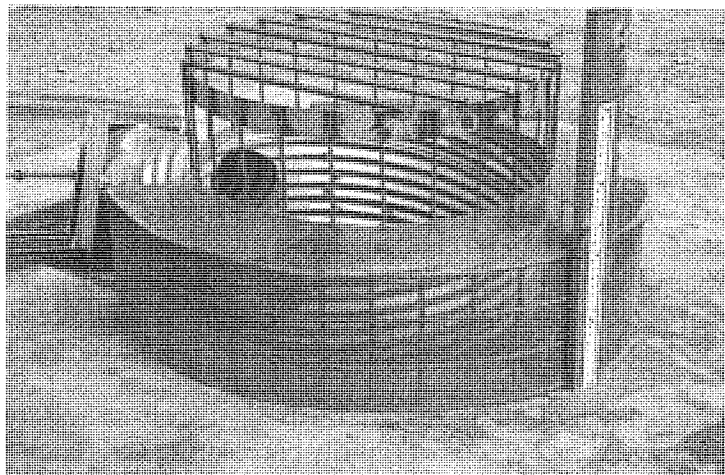


Figure 1
Example of Extended Detention Outlet Structure

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 (ft³/s)
 C = orifice coefficient
 A = area of the orifice (ft²)
 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 dewaterers 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 (ft³).

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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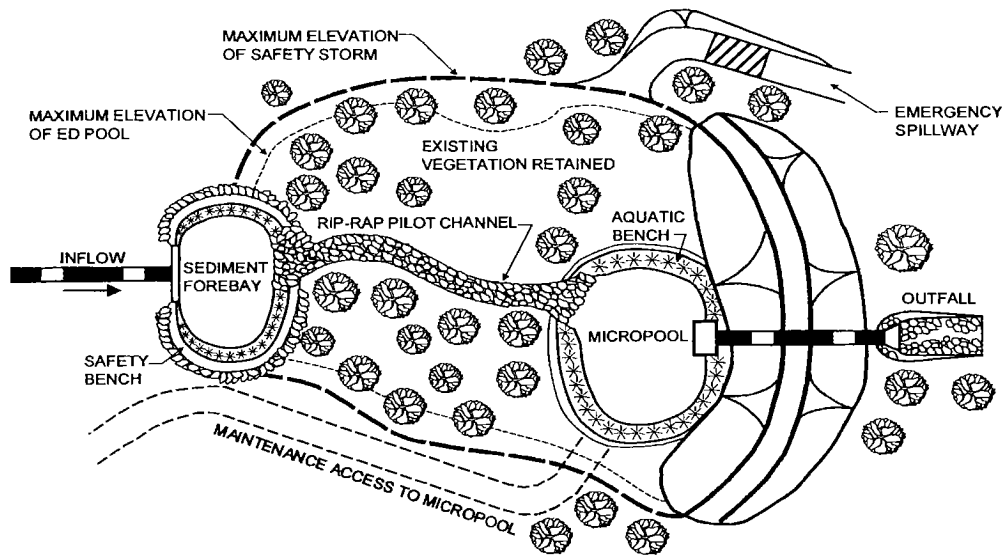
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Information Resources

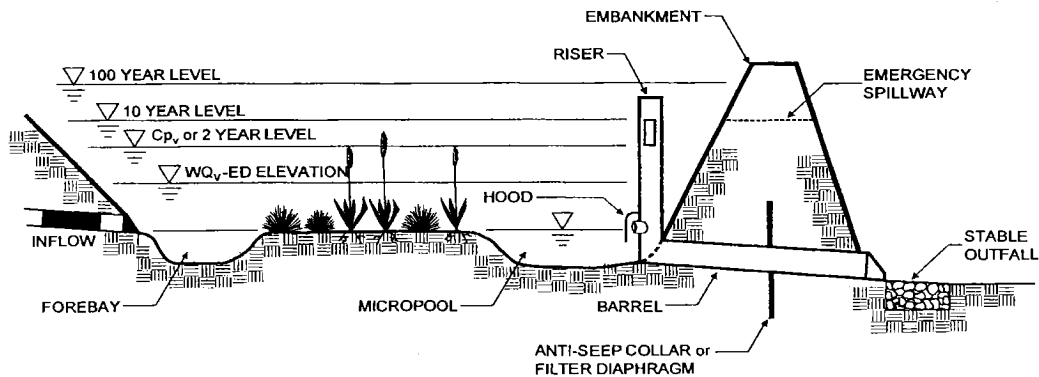
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PLAN VIEW



PROFILE

Schematic of an Extended Detention Basin (MDE, 2000)

ROUND GISB MEDIA FILTER WITH EASY MAINTENANCE SHELF SYSTEM

FOR USE IN CURB INLETS

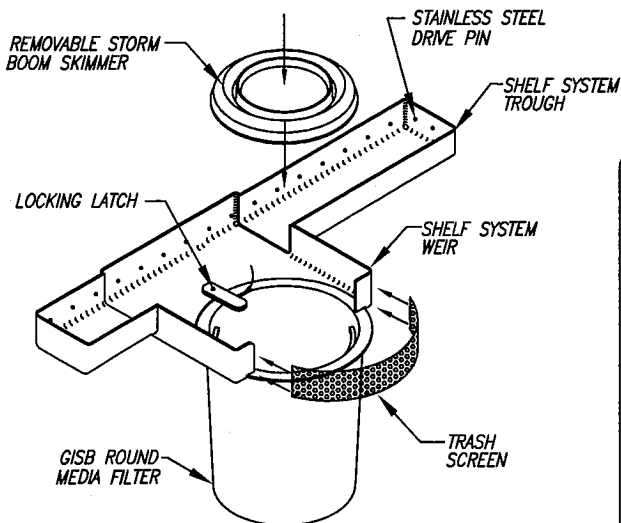


FIGURE 1:
DETAIL OF PARTS

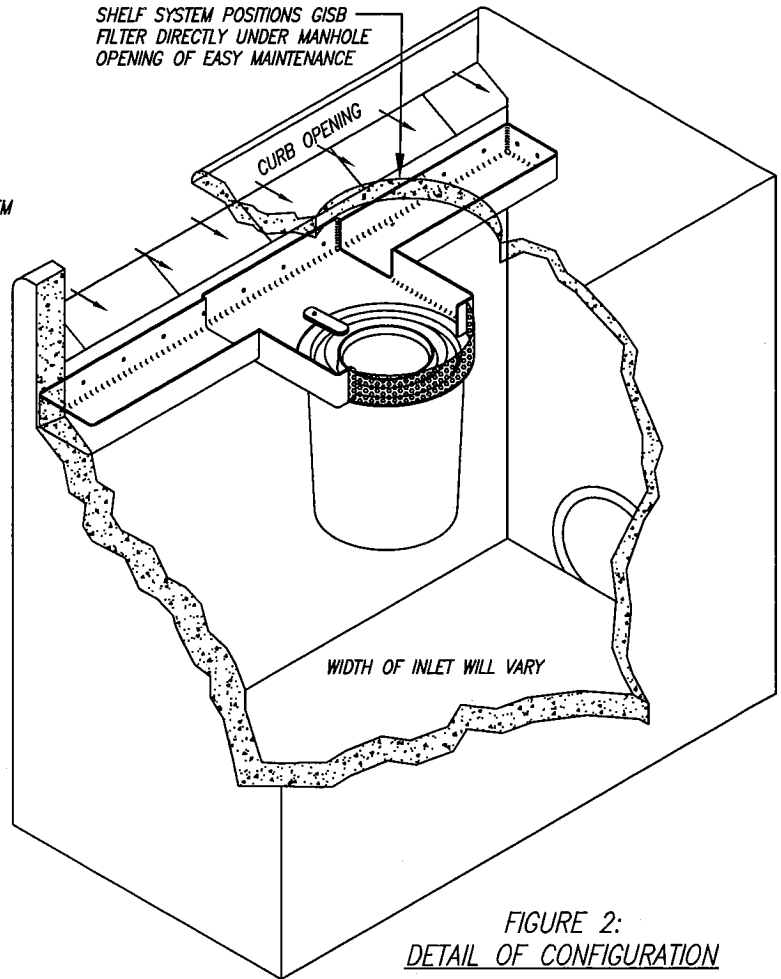


FIGURE 2:
DETAIL OF CONFIGURATION

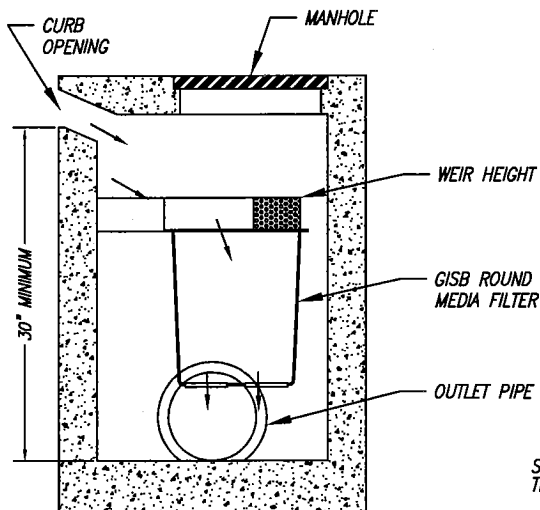


FIGURE 4:
DETAIL OF PROFILE

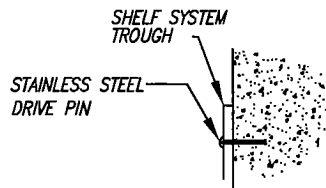


FIGURE 3:
DETAIL OF MOUNTING

NOTES:

1. SHELF SYSTEM PROVIDES FOR ENTIRE COVERAGE OF INLET OPENING SO TO DIVERT ALL FLOW TO BASKET.
2. SHELF SYSTEM MANUFACTURED FROM MARINE GRADE FIBERGLASS, GEL COATED FOR UV PROTECTION.
3. SHELF SYSTEM ATTACHED TO THE CATCH BASIN WITH NON-CORROSIVE HARDWARE.
4. FILTRATION BASKET STRUCTURE MANUFACTURED OF MARINE GRADE FIBERGLASS, GEL COATED FOR UV PROTECTION.
5. FILTRATION BASKET FINE SCREEN AND COARSE CONTAINMENT SCREEN MANUFACTURED FROM STAINLESS STEEL.
6. FILTRATION BASKET HOLDS BOOM OF ABSORBENT MEDIA TO CAPTURE HYDROCARBONS. BOOM IS EASILY REPLACED WITHOUT REMOVING MOUNTING HARDWARE.
7. FILTRATION BASKET LOCATION IS DIRECTLY UNDER MANHOLE FOR EASY MAINTENANCE.
8. LENGTH OF TROUGH CAN VARY FROM 2' TO 30'

DRAWING: GISB MEDIA FILTER SYSTEM		PATENTED	
TREATMENT FLOW RATE: 0.19 CFS		MODEL #: GISB-22-24 RND HC MF	
WARRANTY: 5 YEAR MANUFACTURERS		PROJECT:	
BIO CLEAN ENVIRONMENTAL SERVICES, INC. PO BOX 869 OCEANSIDE, CA 92049 PHONE: 760-433-7640 FAX: 760-433-3176		REVISIONS:	DATE:
		REVISIONS:	DATE:
DATE:	SCALE: SF = 15	REVISIONS:	DATE:
DRAFTER: J.R.H.	UNITS = INCHES	REVISIONS:	DATE:

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MODEL # GISB-22-24 ROUND HIGH CAPACITY MEDIA FILTER

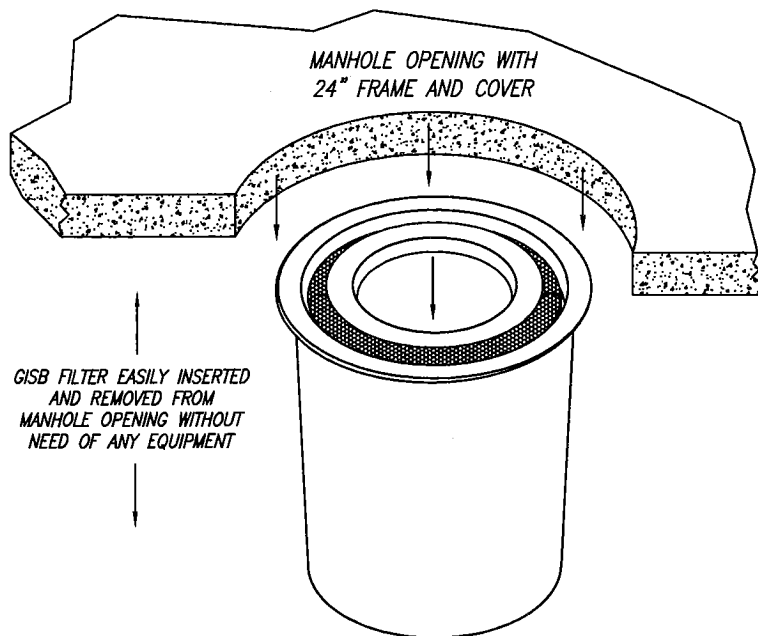


FIGURE 1:
DETAIL OF INSTALLATION

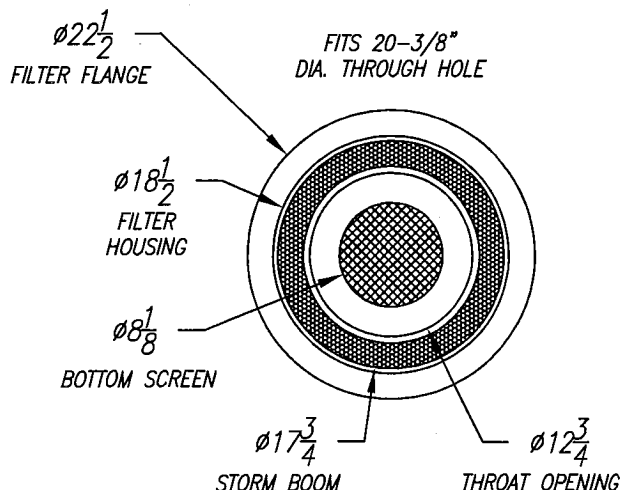


FIGURE 2:
DETAIL OF DIAMETERS

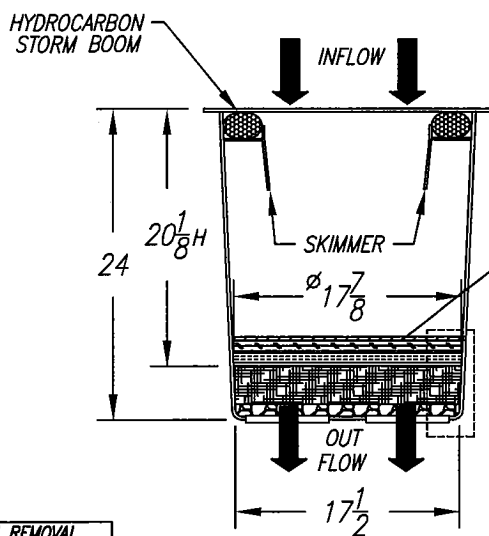


FIGURE 3:
DETAIL OF PARTS

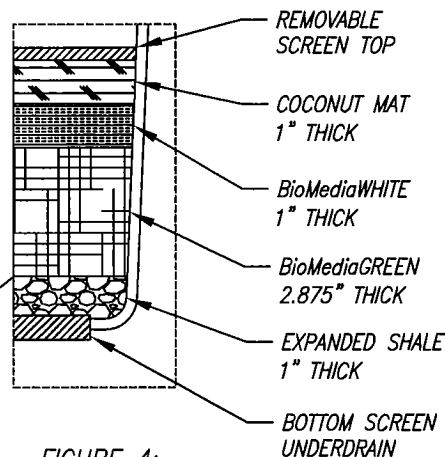


FIGURE 4:
DETAIL OF MEDIA PACK

BioMediaGREEN REMOVAL EFFICIENCIES	
TOTAL SUSPENDED SOLIDS "SIL-CO-SIL 106"	85%
TOTAL PHOSPHORUS	69%
ORTHO PHOSPHORUS	41%
DISSOLVED COPPER	79%
DISSOLVED LEAD	98%
DISSOLVED ZINC	78%
FECAL COLIFORM BACTERIA	68%
TPH	99%

FLOW RATES - GISB MEDIA FILTER

*MEDIA PACK TREATMENT FLOW RATE					.19 CFS
SURFACE AREA	MAX HEAD	BMG MEDIA THICKNESS	HYDRAULIC CONDUCTIVITY		
$\pi \cdot .76^2 = 1.76 \text{ SF}$	20.125 IN	2.875 IN	363 M/D		
**TRASH SCREEN TREATMENT FLOW RATE					.88 CFS
SURFACE AREA	MAX HEAD	OPEN AREA	ORIFICE SHAPES		
$2.17 \cdot 0.36 = .78 \text{ SF}$	4.5 IN	49%	ROUND		
BMG DENOTES BioMediaGREEN					
*FILTER FLOW RATE CALCULATED USING A HYDRAULIC-CONDUCTIVITY FLOW CALCULATOR (DARCIAN FLOW). HYDRAULIC CONDUCTIVITY OF BioMediaGREEN VERIFIED IN LABORATORY EVALUATION. VARIABLES LISTED ABOVE					
**SCREEN FLOW RATE CALCULATED USING THE FOLLOWING EQUATION $Q = 50 \cdot c_d \cdot A \cdot \sqrt{2 \cdot g \cdot h}$ $c_d = \text{COEFFICIENT OF DISCHARGE} = .67$					

DRAWING: GISB MEDIA FILTER DETAILS		PATENTED		SEE PAGE 1 FOR NOTES	
TREATMENT FLOW RATE: 0.19 CFS		MODEL #: GISB-22-24 RND HC MF		BIO CLEAN[®] ENVIRONMENTAL SERVICES, INC. WWW.BIOCLEANENVIRONMENTAL.COM	
WARRANTY: 5 YEAR MANUFACTURERS		PROJECT:			
BIO CLEAN ENVIRONMENTAL SERVICES, INC. PO BOX 869 OCEANSIDE, CA 92049 PHONE: 760-433-7640 FAX: 760-433-3176		REVISIONS:	DATE:		
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DRAFTER: J.R.H.	UNITS = INCHES	REVISIONS:	DATE:	PAGE 2	

DOUBLE ROUND GISB MEDIA FILTER WITH EASY MAINTENANCE SHELF SYSTEM

FOR USE IN CURB INLETS

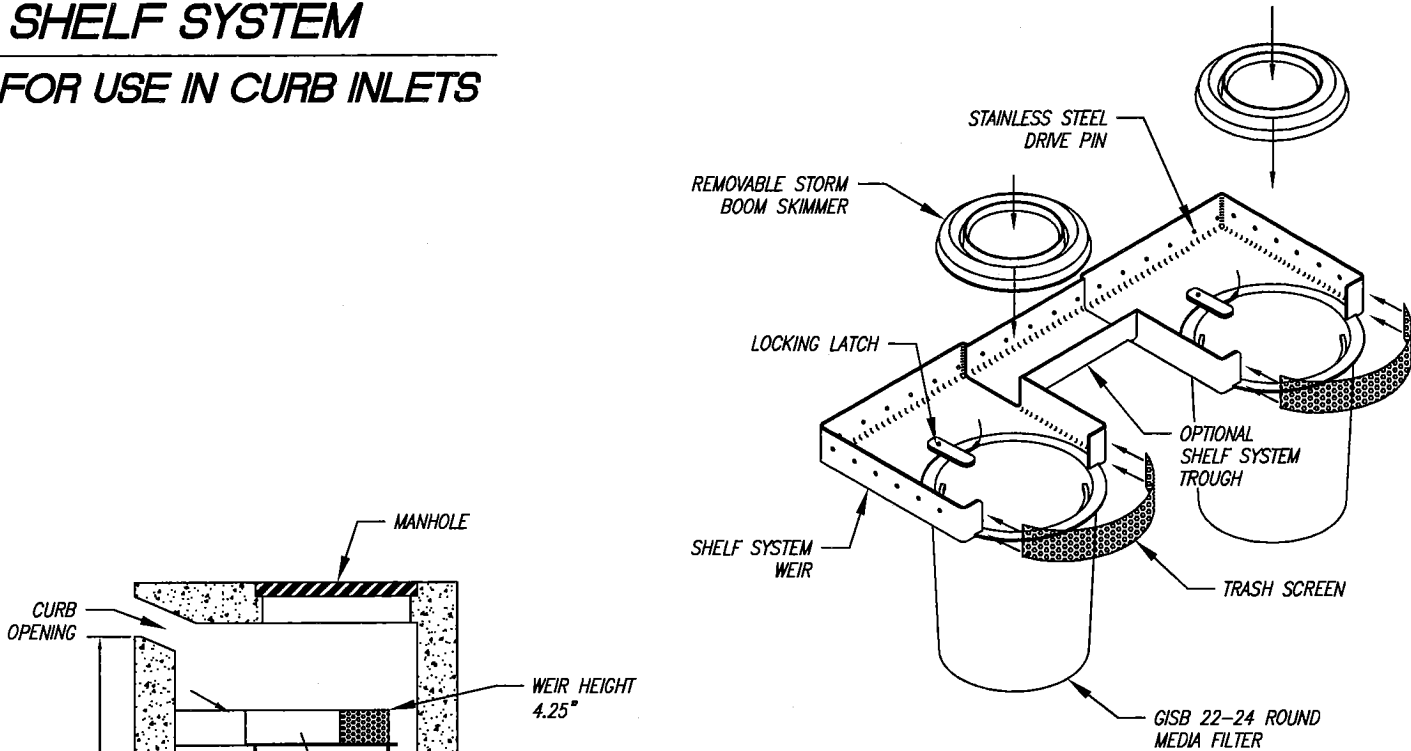


FIGURE 1:
DETAIL OF PARTS

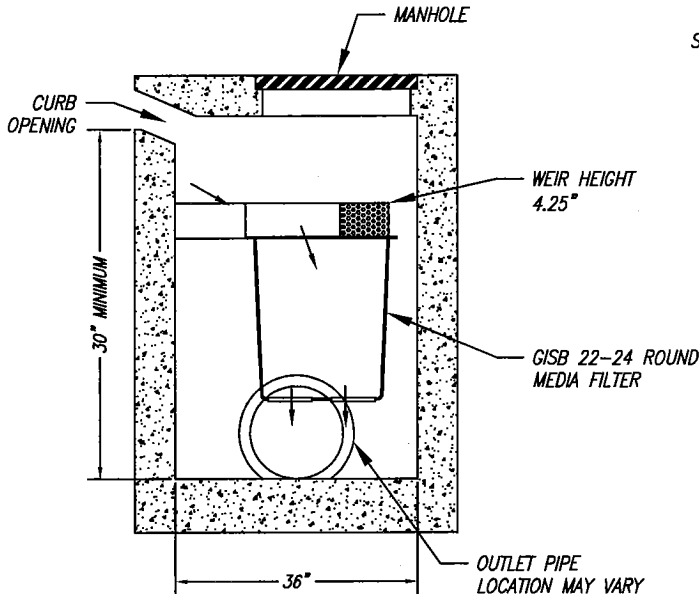


FIGURE 4:
DETAIL OF PROFILE

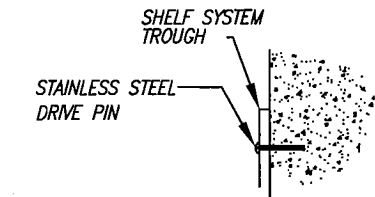


FIGURE 3:
DETAIL OF MOUNTING

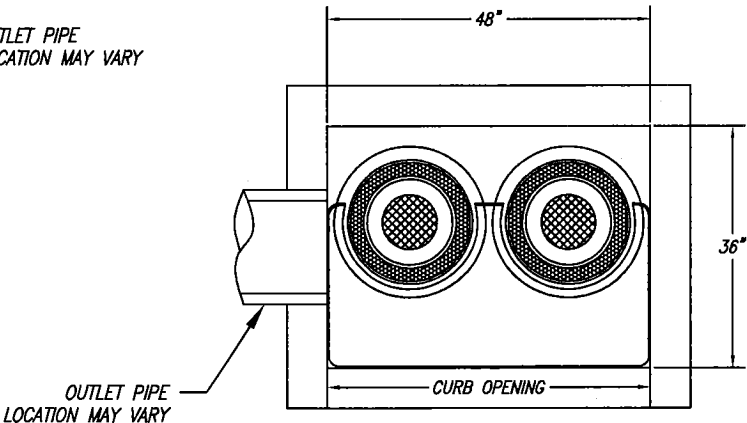


FIGURE 2:
DETAIL OF CONFIGURATION

DRAWING: DOUBLE GISB MEDIA FILTER SYSTEM		PATENTED		SEE PAGE 1 FOR NOTES	
TREATMENT FLOW RATE: 0.38 CFS		MODEL #: GISB-22-24 RND HC MF		 WWW.BIOCLEANENVIRONMENTAL.COM	
WARRANTY: 5 YEAR MANUFACTURERS		PROJECT:			
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		REVISIONS:	DATE:		
DATE:	SCALE: SF = 15	REVISIONS:	DATE:		
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ROUND GISB MEDIA FILTER WITH EASY MAINTENANCE SHELF SYSTEM

**FOR USE IN CURB INLETS
WITH WINGS**

**SIZED FOR CITY OF TUSTIN
STANDARD INLET TYPE OL**

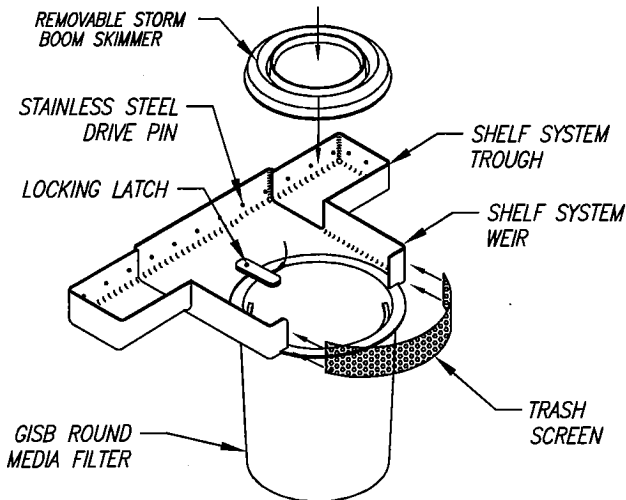


**FIGURE 1:
DETAIL OF PARTS**

SHELF SYSTEM POSITIONS GISB
FILTER DIRECTLY UNDER MANHOLE
OPENING OF EASY MAINTENANCE

FIBERGLASS DIVERTER
TO CHANNEL ALL WATER
FROM WING TO TROUGH

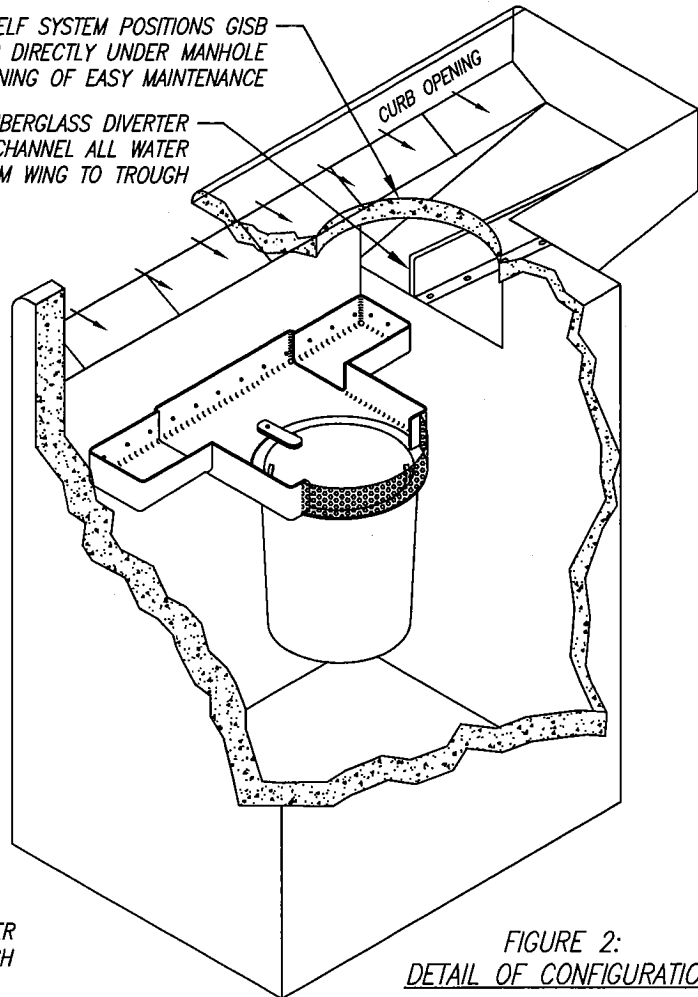


**FIGURE 2:
DETAIL OF CONFIGURATION**

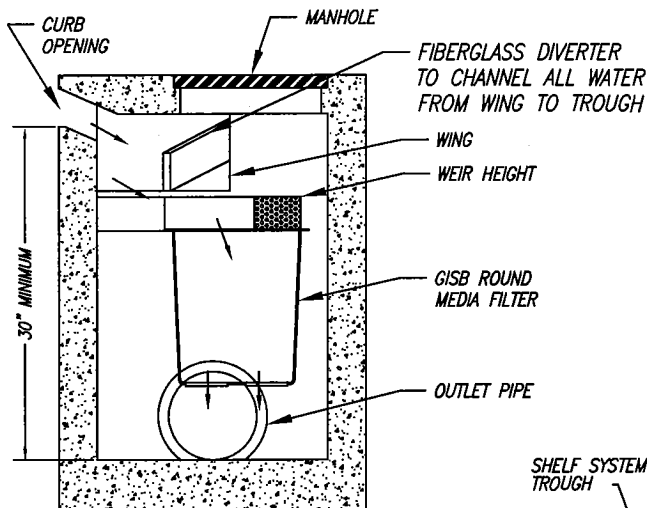


**FIGURE 4:
DETAIL OF PROFILE**

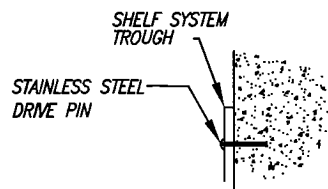


**FIGURE 3:
DETAIL OF MOUNTING**

NOTES:

1. SHELF SYSTEM PROVIDES FOR ENTIRE COVERAGE OF INLET OPENING SO TO DIVERT ALL FLOW TO BASKET.
2. SHELF SYSTEM MANUFACTURED FROM MARINE GRADE FIBERGLASS, GEL COATED FOR UV PROTECTION.
3. SHELF SYSTEM ATTACHED TO THE CATCH BASIN WITH NON-CORROSIVE HARDWARE.
4. FILTRATION BASKET STRUCTURE MANUFACTURED OF MARINE GRADE FIBERGLASS, GEL COATED FOR UV PROTECTION.
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7. FILTRATION BASKET LOCATION IS DIRECTLY UNDER MANHOLE FOR EASY MAINTENANCE.
8. LENGTH OF TROUGH CAN VARY FROM 2' TO 30'

DRAWING: GISB MEDIA FILTER SYSTEM

PATENTED

TREATMENT FLOW RATE: 0.19 CFS

MODEL #: GISB-22-24 RND HC MF

WARRANTY: 5 YEAR MANUFACTURERS

PROJECT:

BIO CLEAN ENVIRONMENTAL SERVICES, INC.
PO BOX 869 OCEANSIDE, CA 92049
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Hydraulic-Conductivity Flow Calculator

Calculates vertically downward flow rates given hydraulic conductivity, media thickness, and water head.

1. Enter the Hydraulic Conductivity (k) of the Filter Material:

Value accepted.

ft/day

2. Select the Units for the Hydraulic Conductivity entered in step 1:

(Enter "M" for Metric or "E" for English units.)

English
Selection accepted.

Hydraulic-Conductivity Conversions

Meters per Day:	363	m/day
Meters per Hour:	15.1	m/hr
Meters per Minute:	0.252	m/min
Meters per Second:	0.0042	m/s
Feet per Day:	1,190	ft/day
Feet per Hour:	49.6	ft/hr
Feet per Minute:	0.826	ft/min
Feet per Second:	0.0138	ft/s

3. Enter the Thickness of the Filter Media in inches:

Value accepted.

inches

4. Enter the Water Depth above the Media Surface:

Value accepted.

inches

5. Enter the Horizontal Surface Area in square feet:

Value accepted.

sqft

Calculated Flow Rates

Gallons per Minute: **84.1** gpm

Cubic Feet per Second: **0.187** cfs

Optional Reynolds Number Check (Verifies Darcian Flow)

6. Enter the D30 representative grain diameter for the porous media:

Value accepted.

um

Calculated Reynolds Number (Should be less than approximately 10):

0.045

Notes:

1. Values of hydraulic conductivity greater than 10,000 meters per day (and the equivalent in feet per day) will provide a warning that flow may be exceeding Darcian flow. This warning has no effect on calculator operation. Accordingly, check the Reynolds Number using the provided option.

2. Values of filter media thickness and water depth above media greater than 100 inches will provide a warning. As with several other warnings, this warning was provided to identify a possible incorrect value entry and does not affect the calculator operation.

3. Values of horizontal surface area that are greater than 10,000 square feet will provide a warning. Again, as with the other warnings, the warning was provided to identify possible incorrect value entries and does not affect calculator operation.

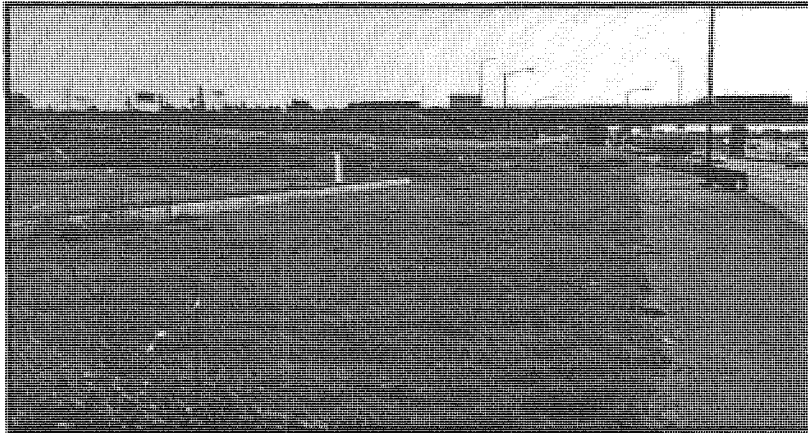
4. The D30 representative grain diameter (often stated d_{30}) is the grain diameter that allows 30 percent passing as determined by performing a sieve analysis.

R-CIB or GISB Media Filter with Shelf System

Maintenance Schedule

R-GISB Media Filter	Cleaning Required	Est. Cleaning Time
Year 1	1) Vacuum Out Accumulated Debris & Sediment from R-CIB/GISB (3-6 Month Intervals) 2) Replace BioSorb Hydrocarbon Boom (6-12 Month Intervals) 3) Replace BioMediaGREEN + Perlite Filter Media (6-12 month Intervals)	18 Minutes 5 Minutes 20 minutes
Year 2	1) Vacuum Out Accumulated Debris & Sediment from R-CIB/GISB (3-6 Month Intervals) 2) Replace BioSorb Hydrocarbon Boom (6-12 Month Intervals) 3) Replace BioMediaGREEN + Perlite Filter Media (6-12 month Intervals)	18 Minutes 5 Minutes 20 minutes
Year 3	1) Vacuum Out Accumulated Debris & Sediment from R-CIB/GISB (3-6 Month Intervals) 2) Replace BioSorb Hydrocarbon Boom (6-12 Month Intervals) 3) Replace BioMediaGREEN + Perlite Filter Media (6-12 month Intervals)	18 Minutes 5 Minutes 20 minutes
Year 4	1) Vacuum Out Accumulated Debris & Sediment from R-CIB/GISB (3-6 Month Intervals) 2) Replace BioSorb Hydrocarbon Boom (6-12 Month Intervals) 3) Replace BioMediaGREEN + Perlite Filter Media (6-12 month Intervals)	18 Minutes 5 Minutes 20 minutes
Year 5	1) Vacuum Out Accumulated Debris & Sediment from R-CIB/GISB (3-6 Month Intervals) 2) Replace BioSorb Hydrocarbon Boom (6-12 Month Intervals) 3) Replace BioMediaGREEN + Perlite Filter Media (6-12 month Intervals)	18 Minutes 5 Minutes 20 minutes
Year 6	1) Vacuum Out Accumulated Debris & Sediment from R-CIB/GISB (3-6 Month Intervals) 2) Replace BioSorb Hydrocarbon Boom (6-12 Month Intervals) 3) Replace BioMediaGREEN + Perlite Filter Media (6-12 month Intervals)	18 Minutes 5 Minutes 20 minutes
Year 7	1) Vacuum Out Accumulated Debris & Sediment from R-CIB/GISB (3-6 Month Intervals) 2) Replace BioSorb Hydrocarbon Boom (6-12 Month Intervals) 3) Replace BioMediaGREEN + Perlite Filter Media (6-12 month Intervals)	18 Minutes 5 Minutes 20 minutes
Year 8	1) Vacuum Out Accumulated Debris & Sediment from R-CIB/GISB (3-6 Month Intervals) 2) Replace BioSorb Hydrocarbon Boom (6-12 Month Intervals) 3) Replace BioMediaGREEN + Perlite Filter Media (6-12 month Intervals)	18 Minutes 5 Minutes 20 minutes
Year 9	1) Vacuum Out Accumulated Debris & Sediment from R-CIB/GISB (3-6 Month Intervals) 2) Replace BioSorb Hydrocarbon Boom (6-12 Month Intervals) 3) Replace BioMediaGREEN + Perlite Filter Media (6-12 month Intervals)	18 Minutes 5 Minutes 20 minutes
Year 10	1) Vacuum Out Accumulated Debris & Sediment from R-CIB/GISB (3-6 Month Intervals) 2) Replace BioSorb Hydrocarbon Boom (6-12 Month Intervals) 3) Replace BioMediaGREEN + Perlite Filter Media (6-12 month Intervals)	18 Minutes 5 Minutes 20 minutes
Procedure 1 Vacuum Out Accumulated Debris & Sediment from R-GISB	Bio Clean Environmental Services, Inc. recommends the R-CIB/GISB Media Filter with Shelf System be inspected and cleaned every 3 to 6 months. Replacement of hydrocarbon boom, BioMediaGREEN, and perlite is recommended every 6 to 12 months. The procedure is easily done with the use of any standard vacuum truck. 1) Identify catch basin. Set up traffic control if required and cone off the working area. 2) Remove grate, hatch or manhole lid. Visually, inspect the filter to assess loading and condition of filter components. Because of the shelf system the R-CIB/GISB (filter basket) is located directly under the manhole. No entry is required to clean the system. Note: entry into an underground stormwater vault such as catch basins requires certification in confined space training. If the basin is less than 4 feet are not classified as confined space (applies on in some area based upon local regulations). 3) Reach into catch basin and remove the deflector shield located on the top portion of the filter basket. The deflector shield holds the hydrocarbon boom in place and is easily removable. Removing this allows for easy access to the accumulated debris inside the basket. 4) Remove all trash, debris, organics, and sediments collected by the filter basket either manually by hand or with the use of a vacuum truck. If the basket is full debris and sediments the shelf system (trough and weir) may accumulate debris and sediments as a secondary storage mechanism. If this occurs use a broom or pressure washer to push the accumulated debris into the basket and then repeat cleaning of the filter basket. 5) If hydrocarbon boom, perlite and BioMediaGREEN are in good condition then replace the deflector shield back into filter basket. Replace grate, hatch, or manhole lid in proper position. Service is complete. If hydrocarbon boom and/or BioMediaGREEN/perlite are saturated or clogged see procedure 2 for hydrocarbon boom replacement and procedure 3 for BioMediaGREEN/perlite replacement.	18 Minutes

Procedure 2 Replace BioSorb Hydrocarbon Boom	Bio Clean Environmental Services, Inc. recommends the replacement of hydrocarbon boom every 6 to 12 months. Replacement will require a new hydrocarbon boom, a pair of scissors to cut off zip ties, and new zip ties to secure boom in place. 1) Follow steps 1, 2, and 3 in procedure 1. 2) Evaluate hydrocarbon boom. If the boom is filled with hydrocarbons and oils it should be replaced. 3) To remove cut off zip ties which hold the hydrocarbon boom in place on the deflector shield. The boom lies horizontally around the perimeter of the deflector shield. Properly dispose of old boom. (The hydrocarbon boom may be classified as hazardous material and will have to be picked up and disposed of as hazardous waste). 3) Attach new boom to deflector shield with plastic zip ties through pre-drilled holes in deflector shield. Place the deflector shield back into the filter basket. 4) Refer to step 5 in procedure 1.	5 Minutes
Procedure 3 Replace BioMediaGREEN + Perlite Filter Media	Bio Clean Environmental Services, Inc. recommends the replacement of BioMediaGREEN and perlite every 6 to 12 months. Replacement will require new blocks of BioMediaGREEN and manufacture specified perlite. Quantities required can be provided by the manufacture. A serrated knife at least 10 inches long may be required to cut the BioMediaGREEN to the appropriate shape and size. 1) Follow steps 1, 2, 3 and 4 in procedure 1. 2) Evaluate perlite (top layer) and BioMediaGREEN. If the media appears very dark in color or clogged it will need to be replaced. 3) To replace the filter media first use the basket handle to lift the entire filter basket out of manhole. All baskets are easily removable. Place filter basket on ground to start media replacement process. 4) Reach into basket and lift the removable screen inside the bottom of the filter basket. The removable screen holds the filter media in place. This will expose the media. 5) By hand or with a vacuum truck remove the perlite. Under the perlite is the BioMediaGREEN. Remove BioMediaGREEN filter blocks. They are tightly fitted and may require to be removed by hand. Under the BioMediaGREEN is the under drain media, BioSorb. This media will not need to be replaced. (The BioMediaGREEN and perlite may be classified as hazardous material and will have to be picked up and disposed of as hazardous waste). 6) Use the serrated knife to cut the BioMediaGREEN filter blocks to the appropriate size. Install the new BioMediaGREEN filter blocks. The BioMediaGREEN must fit snug into the filter without large gaps. 7) Poor the new perlite on top of the BioMediaGREEN. Fill to a level equal to the edge of where the removable screen sets. 8) Replace removable screen and secure into place. 9) Replace filter basket back into the catch basin and secure back into position. 4) Refer to step 5 in procedure 1.	20 Minutes



Design Considerations

- Tributary Area
- Slope
- Water Availability
- Aesthetics

Description

Grassed buffer strips (vegetated filter strips, filter strips, and grassed filters) are vegetated surfaces that are designed to treat sheet flow from adjacent surfaces. Filter strips function by slowing runoff velocities and allowing sediment and other pollutants to settle and by providing some infiltration into underlying soils. Filter strips were originally used as an agricultural treatment practice and have more recently evolved into an urban practice. With proper design and maintenance, filter strips can provide relatively high pollutant removal. In addition, the public views them as landscaped amenities and not as stormwater infrastructure. Consequently, there is little resistance to their use.

California Experience

Caltrans constructed and monitored three vegetated buffer strips in southern California and is currently evaluating their performance at eight additional sites statewide. These strips were generally effective in reducing the volume and mass of pollutants in runoff. Even in the areas where the annual rainfall was only about 10 inches/yr, the vegetation did not require additional irrigation. One factor that strongly affected performance was the presence of large numbers of gophers at most of the southern California sites. The gophers created earthen mounds, destroyed vegetation, and generally reduced the effectiveness of the controls for TSS reduction.

Advantages

- Buffers require minimal maintenance activity (generally just erosion prevention and mowing).
- If properly designed, vegetated, and operated, buffer strips can provide reliable water quality benefits in conjunction with high aesthetic appeal.

Targeted Constituents

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

Legend (Removal Effectiveness)

- Low
- High
- ▲ Medium



- Flow characteristics and vegetation type and density can be closely controlled to maximize BMP effectiveness.
- Roadside shoulders act as effective buffer strips when slope and length meet criteria described below.

Limitations

- May not be appropriate for industrial sites or locations where spills may occur.
- Buffer strips cannot treat a very large drainage area.
- A thick vegetative cover is needed for these practices to function properly.
- Buffer or vegetative filter length must be adequate and flow characteristics acceptable or water quality performance can be severely limited.
- Vegetative buffers may not provide treatment for dissolved constituents except to the extent that flows across the vegetated surface are infiltrated into the soil profile.
- This technology does not provide significant attenuation of the increased volume and flow rate of runoff during intense rain events.

Design and Sizing Guidelines

- Maximum length (in the direction of flow towards the buffer) of the tributary area should be 60 feet.
- Slopes should not exceed 15%.
- Minimum length (in direction of flow) is 15 feet.
- Width should be the same as the tributary area.
- Either grass or a diverse selection of other low growing, drought tolerant, native vegetation should be specified. Vegetation whose growing season corresponds to the wet season is preferred.

Construction/Inspection Considerations

- Include directions in the specifications for use of appropriate fertilizer and soil amendments based on soil properties determined through testing and compared to the needs of the vegetation requirements.
- Install strips at the time of the year when there is a reasonable chance of successful establishment without irrigation; however, it is recognized that rainfall in a given year may not be sufficient and temporary irrigation may be required.
- If sod tiles must be used, they should be placed so that there are no gaps between the tiles; stagger the ends of the tiles to prevent the formation of channels along the strip.
- Use a roller on the sod to ensure that no air pockets form between the sod and the soil.

- Where seeds are used, erosion controls will be necessary to protect seeds for at least 75 days after the first rainfall of the season.

Performance

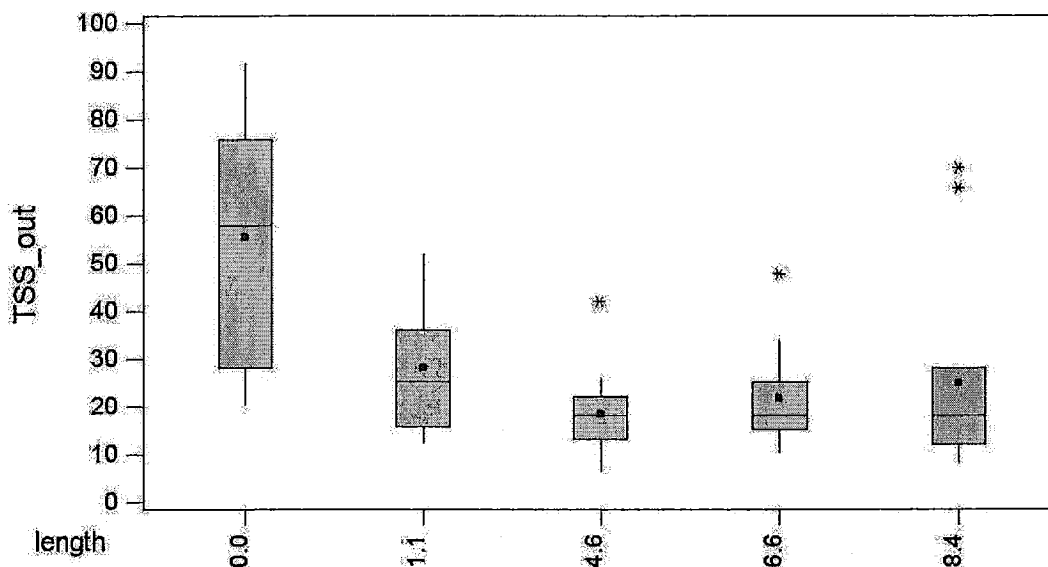
Vegetated buffer strips tend to provide somewhat better treatment of stormwater runoff than swales and have fewer tendencies for channelization or erosion. Table 1 documents the pollutant removal observed in a recent study by Caltrans (2002) based on three sites in southern California. The column labeled "Significance" is the probability that the mean influent and effluent EMCs are not significantly different based on an analysis of variance.

The removal of sediment and dissolved metals was comparable to that observed in much more complex controls. Reduction in nitrogen was not significant and all of the sites exported phosphorus for the entire study period. This may have been the result of using salt grass, a warm weather species that is dormant during the wet season, and which leaches phosphorus when dormant.

Another Caltrans study (unpublished) of vegetated highway shoulders as buffer strips also found substantial reductions often within a very short distance of the edge of pavement. Figure 1 presents a box and whisker plot of the concentrations of TSS in highway runoff after traveling various distances (shown in meters) through a vegetated filter strip with a slope of about 10%. One can see that the TSS median concentration reaches an irreducible minimum concentration of about 20 mg/L within 5 meters of the pavement edge.

Table 1 Pollutant Reduction in a Vegetated Buffer Strip

Constituent	Mean EMC		Removal %	Significance P
	Influent (mg/L)	Effluent (mg/L)		
TSS	119	31	74	<0.000
NO ₃ -N	0.67	0.58	13	0.367
TKN-N	2.50	2.10	16	0.542
Total N ^a	3.17	2.68	15	-
Dissolved P	0.15	0.46	-206	0.047
Total P	0.42	0.62	-52	0.035
Total Cu	0.058	0.009	84	<0.000
Total Pb	0.046	0.006	88	<0.000
Total Zn	0.245	0.055	78	<0.000
Dissolved Cu	0.029	0.007	77	0.004
Dissolved Pb	0.004	0.002	66	0.006
Dissolved Zn	0.099	0.035	65	<0.000



Filter strips also exhibit good removal of litter and other floatables because the water depth in these systems is well below the vegetation height and consequently these materials are not easily transported through them. Unfortunately little attenuation of peak runoff rates and volumes (particularly for larger events) is normally observed, depending on the soil properties. Therefore it may be prudent to follow the strips with another practice that can reduce flooding and channel erosion downstream.

Siting Criteria

The use of buffer strips is limited to gently sloping areas where the vegetative cover is robust and diffuse, and where shallow flow characteristics are possible. The practical water quality benefits can be effectively eliminated with the occurrence of significant erosion or when flow concentration occurs across the vegetated surface. Slopes should not exceed 15 percent or be less than 1 percent. The vegetative surface should extend across the full width of the area being drained. The upstream boundary of the filter should be located contiguous to the developed area. Use of a level spreading device (vegetated berm, sawtooth concrete border, rock trench, etc) to facilitate overland sheet flow is not normally recommended because of maintenance considerations and the potential for standing water.

Filter strips are applicable in most regions, but are restricted in some situations because they consume a large amount of space relative to other practices. Filter strips are best suited to treating runoff from roads and highways, roof downspouts, small parking lots, and pervious surfaces. They are also ideal components of the "outer zone" of a stream buffer or as pretreatment to a structural practice. In arid areas, however, the cost of irrigating the grass on the practice will most likely outweigh its water quality benefits, although aesthetic considerations may be sufficient to overcome this constraint. Filter strips are generally impractical in ultra-urban areas where little pervious surface exists.

Some cold water species, such as trout, are sensitive to changes in temperature. While some treatment practices, such as wet ponds, can warm stormwater substantially, filter strips do not

are not expected to increase stormwater temperatures. Thus, these practices are good for protection of cold-water streams.

Filter strips should be separated from the ground water by between 2 and 4 ft to prevent contamination and to ensure that the filter strip does not remain wet between storms.

Additional Design Guidelines

Filter strips appear to be a minimal design practice because they are basically no more than a grassed slope. In general the slope of the strip should not exceed 15% and the strip should be at least 15 feet long to provide water quality treatment. Both the top and toe of the slope should be as flat as possible to encourage sheet flow and prevent erosion. The top of the strip should be installed 2-5 inches below the adjacent pavement, so that vegetation and sediment accumulation at the edge of the strip does not prevent runoff from entering.

A major question that remains unresolved is how large the drainage area to a strip can be. Research has conclusively demonstrated that these are effective on roadside shoulders, where the contributing area is about twice the buffer area. They have also been installed on the perimeter of large parking lots where they performed fairly effectively; however much lower slopes may be needed to provide adequate water quality treatment.

The filter area should be densely vegetated with a mix of erosion-resistant plant species that effectively bind the soil. Native or adapted grasses, shrubs, and trees are preferred because they generally require less fertilizer and are more drought resistant than exotic plants. Runoff flow velocities should not exceed about 1 fps across the vegetated surface.

For engineered vegetative strips, the facility surface should be graded flat prior to placement of vegetation. Initial establishment of vegetation requires attentive care including appropriate watering, fertilization, and prevention of excessive flow across the facility until vegetation completely covers the area and is well established. Use of a permanent irrigation system may help provide maximal water quality performance.

In cold climates, filter strips provide a convenient area for snow storage and treatment. If used for this purpose, vegetation in the filter strip should be salt-tolerant (e.g., creeping bentgrass), and a maintenance schedule should include the removal of sand built up at the bottom of the slope. In arid or semi-arid climates, designers should specify drought-tolerant grasses to minimize irrigation requirements.

Maintenance

Filter strips require mainly vegetation management; therefore little special training is needed for maintenance crews. Typical maintenance activities and frequencies include:

- Inspect strips at least twice annually for erosion or damage to vegetation, preferably at the end of the wet season to schedule summer maintenance and before major fall run-off to be sure the strip is ready for winter. However, additional inspection after periods of heavy run-off is most desirable. The strip should be checked for debris and litter and areas of sediment accumulation.
- Recent research on biofiltration swales, but likely applicable to strips (Colwell et al., 2000), indicates that grass height and mowing frequency have little impact on pollutant removal;

consequently, mowing may only be necessary once or twice a year for safety and aesthetics or to suppress weeds and woody vegetation.

- Trash tends to accumulate in strip areas, particularly along highways. The need for litter removal should be determined through periodic inspection but litter should always be removed prior to mowing.
- Regularly inspect vegetated buffer strips for pools of standing water. Vegetated buffer strips can become a nuisance due to mosquito breeding in level spreaders (unless designed to dewater completely in 48-72 hours), in pools of standing water if obstructions develop (e.g. debris accumulation, invasive vegetation), and/or if proper drainage slopes are not implemented and maintained.

Cost

Construction Cost

Little data is available on the actual construction costs of filter strips. One rough estimate can be the cost of seed or sod, which is approximately 30¢ per ft² for seed or 70¢ per ft² for sod. This amounts to between \$13,000 and \$30,000 per acre of filter strip. This cost is relatively high compared with other treatment practices. However, the grassed area used as a filter strip may have been seeded or sodded even if it were not used for treatment. In these cases, the only additional cost is the design. Typical maintenance costs are about \$350/acre/year (adapted from SWRPC, 1991). This cost is relatively inexpensive and, again, might overlap with regular landscape maintenance costs.

The true cost of filter strips is the land they consume. In some situations this land is available as wasted space beyond back yards or adjacent to roadsides, but this practice is cost-prohibitive when land prices are high and land could be used for other purposes.

Maintenance Cost

Maintenance of vegetated buffer strips consists mainly of vegetation management (mowing, irrigation if needed, weeding) and litter removal. Consequently the costs are quite variable depending on the frequency of these activities and the local labor rate.

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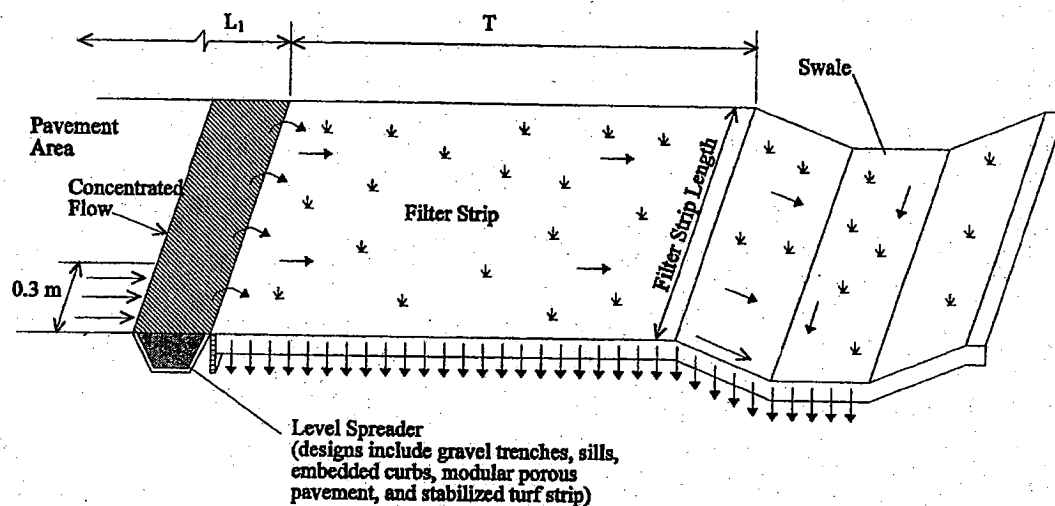
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Site Design & Landscape Planning SD-10



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

Site Design & Landscape Planning SD-10

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

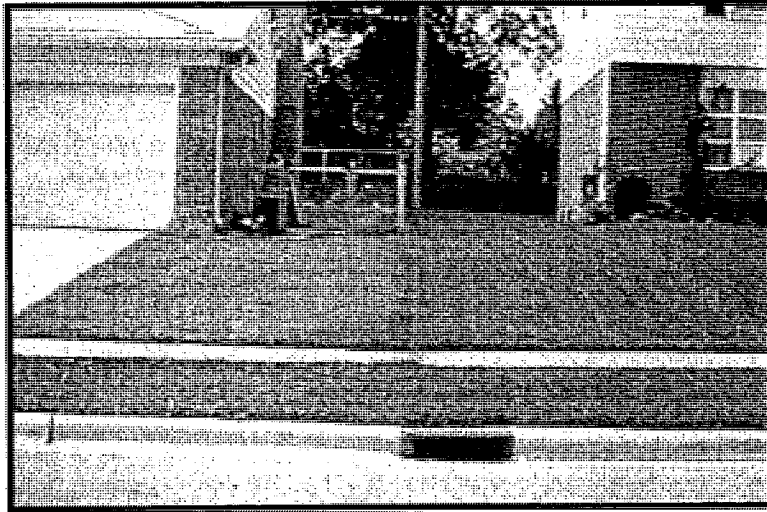
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Description

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.

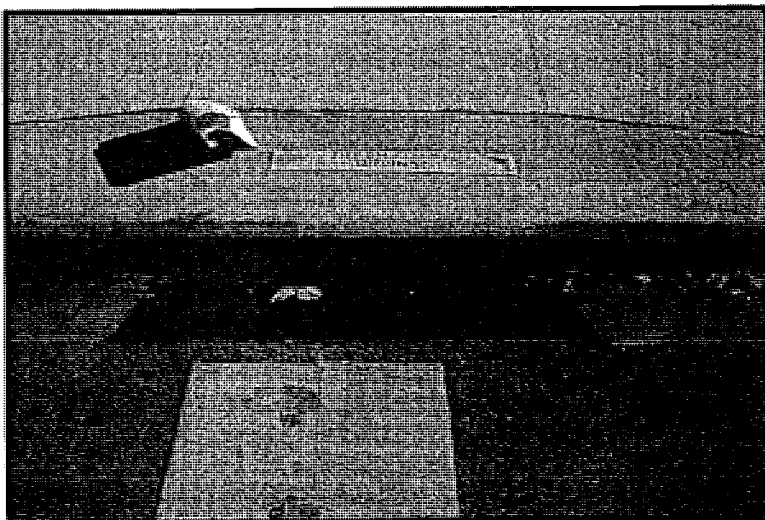
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Description

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.

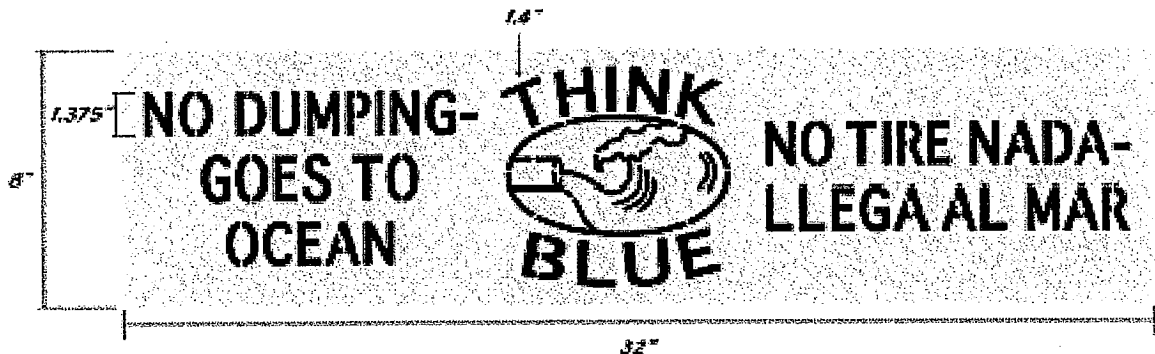
Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

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.

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.

Design Objectives

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



- 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.

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.

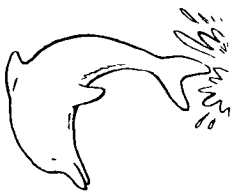
Vacuum-type street sweepers are more efficient in removing dust and dirt particles (about 90%) than mechanical broom sweepers. However, vacuum sweepers are ineffective when the pavement is wet.

Maintenance

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

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.



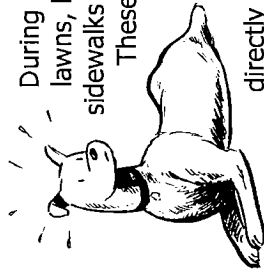
ONLY RAIN IN THE STORM DRAIN



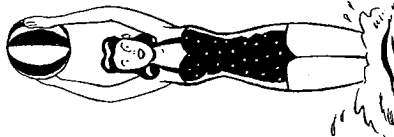
WHY IS IT SO IMPORTANT TO PICK UP AFTER YOUR PET?

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.

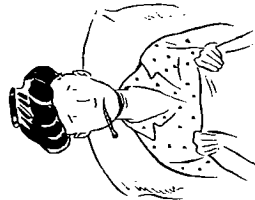


As they decompose, pet wastes demand a high level of oxygen from water. This demand can kill fish and plant life by reducing the amount of dissolved oxygen available to them.



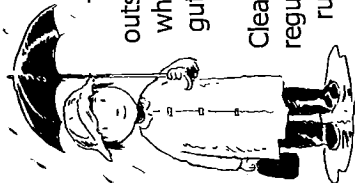
Recent studies have shown dogs and cats are sources of fecal contamination at local beaches.

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.

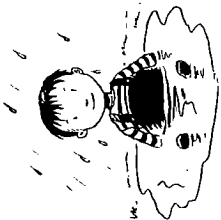
WHAT CAN I DO?



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!

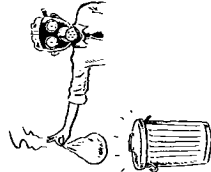
It's as easy as 1-2-3



1. Bring a bag



2. Clean it up



3. Dispose of it properly (toilet or trash)

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**



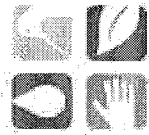
To schedule a presentation for your community group or organization

(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



*Small changes
reduce pollution.*

Printed on recycled paper

08/03

STORMWATER POLLUTION PREVENTION

PET WASTE



County of San Diego
Watershed Protection Program



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 WATER TOOLBOX - a resource for the San Diego region

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.

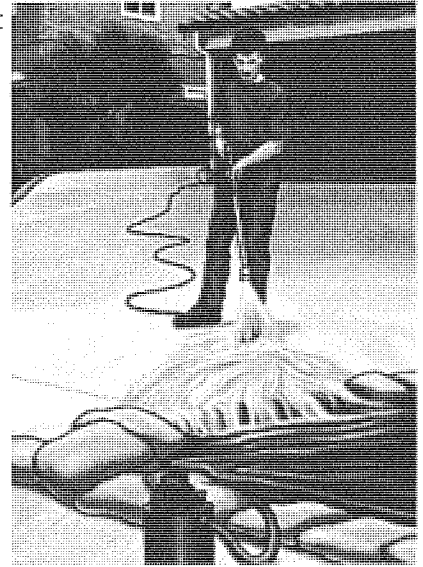
DON'T:

- 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.

■ ■ CLEAN WATER TOOLBOX - a resource for the San Diego region

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 $\frac{3}{4}$ 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	Automotive Fluids
Batteries (auto, household, rechargeable)	CRTs (cathode ray tubes, TVs and monitors)
Fertilizers	Fluorescent Lights
Household Cleaners	Mercury Items (some thermometers)
Motor Oil and Oil Filters	Paint and Stains (latex and oil)
Pesticides	Pool Chemicals
Propane	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 Marcos 760-744-1050
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.

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

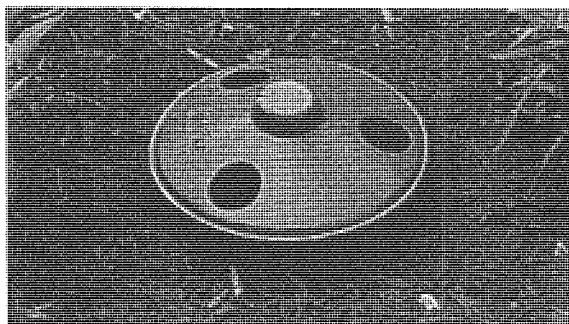
What is IPM?

[Back to Urban Water Quality](#)

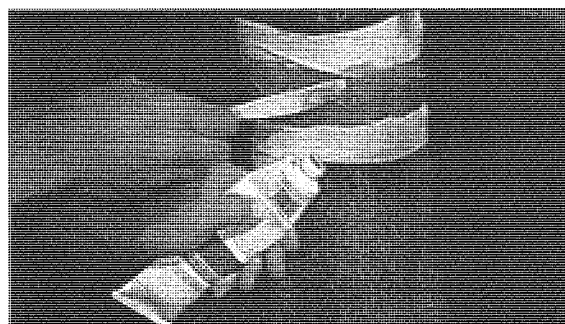
Integrated pest management (IPM) is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only 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.

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Pesticides and Water Quality

How Are Pesticides Affecting Water Quality?

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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:

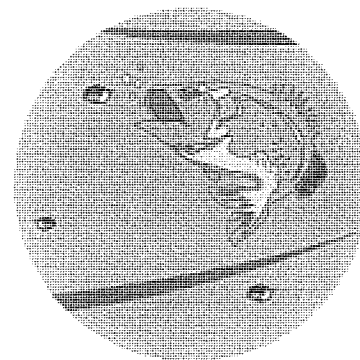
- [USGS Water Resources in California Online Reports](#)

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.

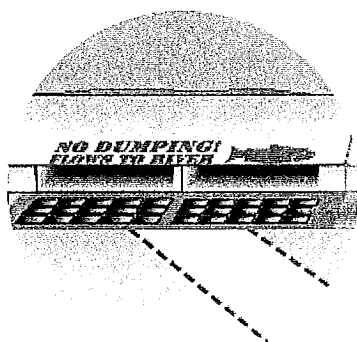
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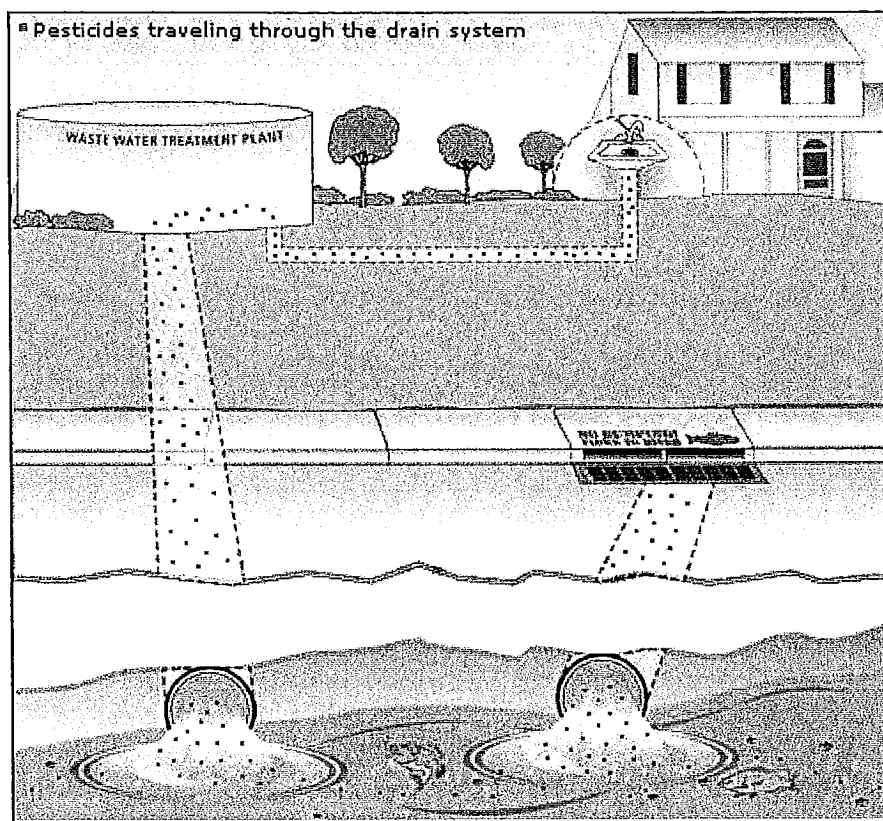
Pesticides and Water Quality

How Do Pesticides Get into Our Creeks and Rivers? [Back to Urban Water Quality](#)



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.



Illustrations by Celeste Rusconi.

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.

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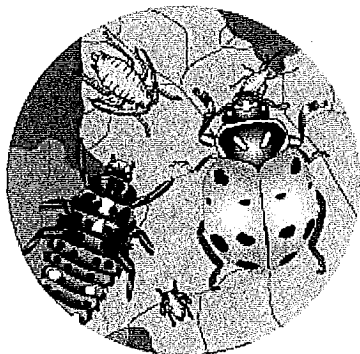
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Pesticides and Water Quality

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.

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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.

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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>

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- 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.

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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 that 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 limited time resources.

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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.

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Irrigation Controllers - Business

New irrigation controllers are available that monitor "real-time" weather data that includes solar radiation, temperature, wind and humidity through hourly downloads.

BMP Objective

The purpose of this best management practice is to utilize a "smart-irrigation" controller for the purposes of water conservation and to prevent over-watering that leads to water discharging from the landscape areas to the storm drain system.

Implementation

Many manufacturers produce the weather sensitive irrigation controllers. Often times, local water agencies offer rebates for particular models and areas – see <http://www.sdcwa.org/manage/conservation-overview.phtml#landscapeassistance> for more information on rebates and manufacturers.

The controllers can be purchased at home improvement stores as well as via the internet. Once you have purchased one, follow the detailed instructions for setup and configuration.

Be sure to monitor your system to ensure proper functioning, especially under varying weather conditions.

The use of new irrigation controller technology can reduce the amount of over-watering that is very common for homeowners, property managers and landscapers. Over-watering can lead to water leaving the landscaped areas, carrying pollutants to the sidewalks, streets, storm drains and eventually to the creeks, rivers, lagoons and the Pacific Ocean.

Limitations

The weather sensitive or "smart" irrigation controller is useful for controlling the amount of water that is used by the irrigation system. It is equally important to control the location of where the water is sprayed for irrigation. If water is sprayed onto impervious surfaces, like sidewalks, streets or parking lots, the water will runoff and carry pollutants to the storm drain system. See the [Irrigation System Maintenance](#).

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Irrigation System Maintenance - Business

Through the use of proper irrigation system management, landscape irrigation can develop healthier plants and turf AND reduce the amount of pollutants leaving landscaped areas. The common problems associated with lacking irrigation system maintenance are:

- Leaking systems
- Over-spraying onto sidewalks, streets and parking lots
- Over-watering
- "Geysers" that discharge excessive amounts of water

It is important to address all of these common problems when performing inspections and system maintenance.

BMP Objective

The purpose of this best management practice is to prevent over-watering and over-spraying that leads to water leaving the landscape areas and entering the storm drain system carrying pollutants.

Implementation

See [Irrigation Controller](#) for more information on "smart" controllers that offer water saving features.

Develop regular inspection and maintenance schedules that include all functioning parts of the irrigation system. The purpose of the inspections and maintenance is to sustain an efficient and uniform distribution of the waters without over-watering, over-spraying or leaking.

Replace any damaged or inoperative parts of the system. Additionally, adjust ALL spray heads so that their spray patterns are trained only on the landscaped areas.

Limitations

Irrigation system maintenance considers many variables including parts and equipment, watering times and durations, and spray patterns. Each of these should be carefully inspected on a periodic basis as any one of them may lead to discharges of water from the landscaped areas to the sidewalks, streets and parking lots which carries pollutants to the storm drain system.



CLEAN WATER TOOLBOX - a resource for the San Diego region

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.

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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 in 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.

PEST NOTES

February 2008

Title	Publ. Date	Publ. No.	No. Pgs.	Title	Publ. Date	Publ. No.	No. Pgs.
Annual Bluegrass.....	rev. 4/03	7464	3	Eucalyptus Longhorned Borers.....	rev. 1/00	7425	4
Anthracnose.....	rev. 10/03	7420	4	Eucalyptus Redgum Lerp Psyllid.....	rev. 1/06	7460	4
Ants.....	rev. 02/07	7411	6	Eucalyptus Tortoise Beetle.....	1/03	74104	4
Aphids.....	rev. 5/00	7404	4	Field Bindweed.....	rev. 4/03	7462	4
Apple Scab.....	rev. 8/01	7413	3	Fire Blight.....	rev. 10/03	7414	3
Avocado Lace Bug.....	3/07	74134	4	Fleas.....	rev. 11/00	7419	4
Bark Beetles.....	rev. 4/04	7421	4	Flies.....	rev. 4/04	7457	4
Bed Bugs.....	rev. 9/02	7454	2	Fruittree Leafroller on Ornamental and			
Bee and Wasp Stings.....	rev. 2/03	7449	3	Fruit Trees.....	3/00	7473	3
Bermudagrass.....	rev. 5/07	7453	4	Fungus Gnats, Shore Flies, Moth Flies,			
Biological Control & Natural Enemies.....	10/07	74140	7	and March Flies.....	rev. 8/01	7448	4
Bordeaux Mixture.....	11/00	7481	3	Giant Whitefly.....	5/06	7400	3
Boxelder Bug.....	5/04	74114	3	Glassy-winged Sharpshooter.....	2/07	7492	4
Brown Recluse and Other Recluse Spiders.....	1/08	7468	4	Grasshoppers.....	9/02	74103	2
California Ground Squirrel.....	rev. 1/02	7438	5	Green Kyllinga.....	rev. 4/03	7459	3
California Oakworm.....	rev. 6/00	7422	4	Hackberry Woolly Aphid.....	rev. 6/05	74111	3
Carpenter Ants.....	rev. 11/00	7416	2	Head Lice.....	rev. 8/01	7446	4
Carpenter Bees.....	rev. 2/04	7417	2	Hiring a Pest Control Company.....	3/06	74125	4
Carpenterworm.....	1/03	74105	4	Hobo Spider.....	5/06	7488	4
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We All Live Downstream!

Clean Water is Important to All of Us!



When rain flows over streets and other surfaces, it picks up pollutants and carries them into the stormwater conveyance "storm drain" system.

Did you know that storm drains are **NOT** connected to sanitary sewer systems and treatment plants?

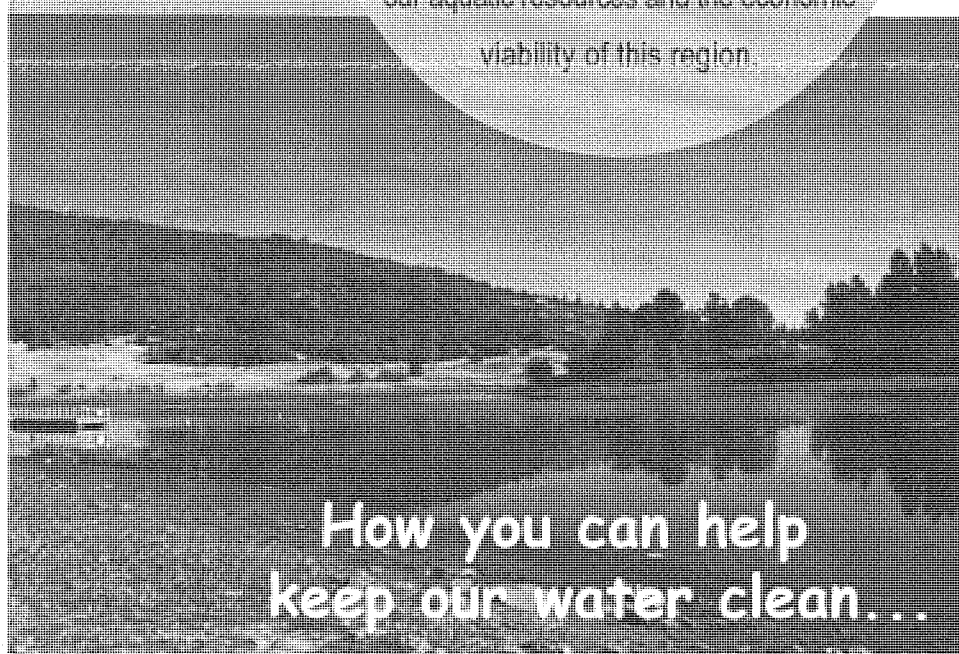
The storm drain system is designed to prevent flooding by transporting water away from developed areas.

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.

Why do we need Clean Water?

Clean water is essential for every aspect of life. In addition to sustaining our local water resources it ensures economic growth and prosperity. Population growth has impacted water quality and placed increasing pressure on supplies. Controlling pollution is critical to preserving our aquatic resources and the economic viability of this region.



How you can help keep our water clean...

Residents of San Diego County can make a difference. Becoming aware of ways to prevent stormwater pollution is the first step toward

County of San Diego, Watershed Protection Program
Stormwater HOTLINE: (888) 846-0800



project clean water

We All Live Downstream!

We All Live Downstream!

Easy Steps to Clean Water

Sweep or Rake

Conserve water.

Do not use a hose to wash off sidewalks, driveways, and patios. Sweep up debris and put it in a trash can. Rake up yard waste to compost or recycle.

Reduce the Use of Landscape Chemicals

Decrease the use of lawn and garden care products such as pesticides, weed killers, and chemical fertilizers. Consider using non-toxic pest control methods. Avoid over watering which may wash these products into the gutter and storm drains.

Buy Non-Toxic Products

When possible, use non-toxic products for household cleaning. If you must use a toxic cleaning product, buy small quantities, use it sparingly, and properly dispose of unused portions. For the Household Hazardous Waste collection facility nearest you, call 1-800 CLEANUP 1(800) 253-2687.

Recycle Used Motor Oil and Earn \$\$

Certified used oil collection centers will pay a few cents per gallon for used oil. Collect used oil in sealed containers and take it to a certified center. For the certified center nearest you, call 1-800 CLEANUP 1(800) 253-2687.

For more information on how you can prevent the pollution of our creeks, rivers, lakes, and ocean or to report a problem, please call the **Stormwater HOTLINE at (888) 846-0800** or visit **www.projectcleanwater.org**.

Dispose of Yard Waste Frequently

By disposing of grass, leaves, shrubs, and other organic matter more frequently — less will wash into storm drains. Request a green waste bin from your trash hauler, or compost your yard waste.

Clean up After Your Pets

Take a bag when you walk your pets and always clean up after them. Flush pet waste down the toilet or dispose of it in a sealed plastic bag and throw it in the trash.

Care for Your Vehicles

Change your oil routinely. Fix fluid leaks immediately. Keep your vehicles tuned-up. Wash your vehicle at home on an unpaved area, such as lawn or gravel. Use very little soap. Pour remaining soapy water to an indoor sink or toilet. Conserve water by using a shut-off nozzle. Consider using a car wash designed to collect the wash water.

Pollutant Impacts on Water Quality	
Sediment	Sediment is a common component of stormwater, and can be a pollutant. Sediment can be detrimental to aquatic life (primary producers, benthic invertebrates, and fish) by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. Sediment can transport other pollutants that are attached to it including nutrients, trace metals, and hydrocarbons. Sediment is the primary component of total suspended solids (TSS), a common water quality analytical parameter.
Nutrients	Nutrients including nitrogen and phosphorous are the major plant nutrients used for fertilizing landscapes, and are often found in stormwater. These nutrients can result in excessive or accelerated growth of vegetation, such as algae, resulting in impaired use of water in lakes and other sources of water supply. For example, nutrients have led to a loss of water clarity in Lake Tahoe. In addition, un-ionized ammonia (one of the nitrogen forms) can be toxic to fish.
Bacteria and Viruses	Bacteria and viruses are common contaminants of stormwater. For separate storm drain systems, sources of these contaminants include animal excrement and sanitary sewer overflow. High levels of indicator bacteria in stormwater have led to the closure of beaches, lakes, and rivers to contact recreation such as swimming.
Oil and Grease	Oil and grease includes a wide array of hydrocarbon compounds, some of which are toxic to aquatic organisms at low concentrations. Sources of oil and grease include leakage, spills, cleaning and sloughing associated with vehicle and equipment engines and suspensions, leaking and breaks in hydraulic systems, restaurants, and waste oil disposal.
Metals	Metals including lead, zinc, cadmium, copper, chromium, and nickel are commonly found in stormwater. Many of the artificial surfaces of the urban environment (e.g., galvanized metal, paint, automobiles, or preserved wood) contain metals, which enter stormwater as the surfaces corrode, flake, dissolve, decay, or leach. Over half the trace metal load carried in stormwater is associated with sediments. Metals are of concern because they are toxic to aquatic organisms, can bioaccumulate (accumulate to toxic levels in aquatic animals such as fish), and have the potential to contaminate drinking water supplies.
Organics	Organics may be found in stormwater at low concentrations. Often synthetic organic compounds (adhesives, cleaners, sealants, solvents, etc.) are widely applied and may be improperly stored and disposed. In addition, deliberate dumping of these chemicals into storm drains and inlets causes environmental harm to waterways.
Pesticides	Pesticides (including herbicides, fungicides, rodenticides, and insecticides) have been repeatedly detected in stormwater at toxic levels, even when pesticides have been applied in accordance with label instructions. As pesticide use has increased, so too have concerns about the adverse effects of pesticides on the environment and human health. Accumulation of these compounds in simple aquatic organisms, such as plankton, provides an avenue for biomagnification through the food web, potentially resulting in elevated levels of toxins in organisms that feed on them, such as fish and birds.
Gross Pollutants	Gross Pollutants (trash, debris and floatables) may include heavy metals, pesticides, and bacteria in stormwater. Typically resulting from an urban environment, industrial sites and construction sites, trash and floatables may create an aesthetic "eye sore" in waterways. Gross pollutants also include plant debris (such as leaves and lawn-clippings from landscape maintenance), animal excrement, street litter, and other organic matter. Such substances may harbor bacteria, viruses, vectors, and depress the dissolved oxygen levels in streams, lakes and estuaries sometimes causing fish kills.
Vector Production	Vector production (e.g., mosquitoes, flies, and rodents) is frequently associated with sheltered habitats and standing water. Unless designed and maintained properly, standing water may occur in treatment control BMP's for 72 hours or more, thus providing a source for vector habitat and reproduction (Metzger, 2002).

Source: California Stormwater Quality Association, Stormwater BMP Handbook, 2003.

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Develop a Stormwater Pollution Prevention Plan (SWPPP)

The development of a Stormwater Pollution Prevention Plan (SWPPP - pronounced "S-W-I-P") is critical in a business' efforts to reduce pollutants in its stormwater discharges. The primary purposes of the SWPPP are to:

- Identification of pollutant-generating activities
- Select and implement BMPs to address these activities
- Review and modification of the plan to ensure effective implementation

BMP Objective

The purpose is to develop a plan that is used by your business to prevent pollutant generation and discharge of the pollutants to the storm drain system.

Implementation

There are many guidelines and templates available for SWPPP development. It is important to understand what is necessary for your business. Some businesses are regulated by agencies and required to develop a SWPPP that contains specific regulatory information. If you are unsure if you need to develop a SWPPP under these regulations, please check with your local jurisdiction (city or county) or at the State of California website:

<http://www.swrcb.ca.gov/stormwtr/industrial.html>

A SWPPP should be customized to fit your business' needs. The following website has guidelines and guide sheets available to help you through the process. http://www.cabmphandbooks.com/Documents/Industrial/Section_2.pdf (see Section 2.4)

IMPORTANT: Use only what you need – it is not necessary to create a plan that does not pertain to your business.

Your businesses SWPPP should:

- Identify pollutant-generating activities (for example - hosing down parking lots, trash areas, drive-thrus, outdoor areas)
- Identify pollutants at your facility that may be discharged to the storm drain system (for example – detergents, grass clippings, fertilizers, pesticides)
- Select and implement BMPs to address these activities and prevent release of pollutants
- Review and modification of the plan to ensure effective implementation

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Train Employees

Improper handling of materials and misguided activities can allow pollutants to enter sewers and stormwater systems. Such pollution can be prevented and reduced by training staff and conducting activities in safe environments. Staff will be more likely to follow directions if they are also educated about the objectives of best management practices.

BMP Objective

This best management practice is intended to provide guidance to employers on how to motivate staff to follow best management practices.

Implementation

DO:

- Train employees upon hiring and annually thereafter about stormwater discharge prohibitions and spill prevention. Supply them with reference materials and keep a copy of these materials on site.
- Provide all training and materials in the first language of employees.
- Keep training records with date, instructor and attendee information.
- Develop a Stormwater Pollution Prevention Plan (SWPPP) and provide a copy for employee access.
- Maintain information about any toxic chemicals that employees may encounter. This should include whether a chemical is hazardous, flammable, etc. and how to handle spills.
- Choose best management practices appropriate to your business by searching this database.
- Explain the purpose of best management practices and give employees a brief explanation of the consequences of pollution in our waterways. People are more likely to comply with directions if they understand why they are important and how they can personally benefit from keeping our creeks, rivers, and ocean clean.
- Post important safety information where BMPs should be used. Keep spills clean up information with clean up materials near storage areas, for example.
- Make compliance with BMPs convenient. Provide appropriate disposal containers, sufficient working equipment and time at the end of the shift for clean-up, etc.
- Ensure that there are open lines of communication for employees to ask questions. Before training, find out what issues employees wish would be covered.
- Consider what incentives you might give employees for BMP compliance.
- If problems are observed, address corrections and review it with employees. Document the corrections in your stormwater training records.
- Empower employees to suggest ideas for implementing effective best management practices and practical solutions.
- Consider sending employees to seminars to supplement their in-house training. Courses are offered through community workshops and business assistance centers for stormwater issues. www.rebrac.org

DON'T:

- Do not pull staff out of training to deal with business. Make sure time is set aside for training only.
- Do not assume that employees will remember everything from their training. Signs and other quick reminders will help with the orientation process of new employees.

Limitations

Staff time and budget for training materials may be limited. Consider adding BMP training to other standard training to minimize costs.

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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.

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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.

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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.

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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.

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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.

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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.

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Street and Parking Lot Sweeping

Business parks, retail centers, and multi-residential properties generally have parking lots and internal streets associated with the properties. Pollutants build-up on the street surface and can be washed or blown into the storm drain system. Once in the storm drain system, the pollutants travel to the creeks, lagoons and the ocean. Sweeping of the streets and parking lots will eliminate these pollutants from the surface, not allowing them to enter the storm drain system.

BMP Objective

The purpose of this best management practice is to sweep up materials from streets and parking lots so they do not enter the storm drain system when it rains or when the wind blows.

Implementation

Both hand sweeping and mechanical sweeping are options for cleaning parking lots and internal streets. Selection of the type of sweeping depends on the size of the parking lot and internal streets. Specialized sweeping or other cleaning, for example, power washing, may be required based on the types of pollutants that are found on the surfaces.

Hand sweeping should be limited to very small parking lot areas, where it may be cost effective. Sweeping should include the use of a broom and pan to collect the wastes. The wastes should then be disposed of properly in a waste receptacle.

Larger surfaces should employ the use of a mechanical street sweeper. There are many vendors (see [San Diego street sweep](#)) who perform sweeping services locally. It is important to request information about the types of street sweepers used and their effectiveness at cleaning the types of pollutants observed in your individual properties. Oil and grease is much different than trash and landscaping debris and may need alternative sweeping methods employed to be effective.

Limitations

It is important to recognize that although street sweeping is effective at cleaning most solids from surfaces, oil and grease as well as other liquid and solid wastes may not be picked up by the sweepers. Other surface cleaning methods, including power washing, may be required to effectively clean the surfaces of pollutants.

CLEAN WATER TOOLBOX - a resource for the San Diego region

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.

CLEAN WATER TOOLBOX - a resource for the San Diego region

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.

CLEAN WATER TOOLBOX - a resource for the San Diego region

Properly Collect and Dispose of Water - Fire Sprinkler Testing

Water is discharged from sprinkler systems during testing and maintenance. 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 fire sprinkler discharge water (or any non-rainwater) from leaving a property and entering the street and/or storm drain system.

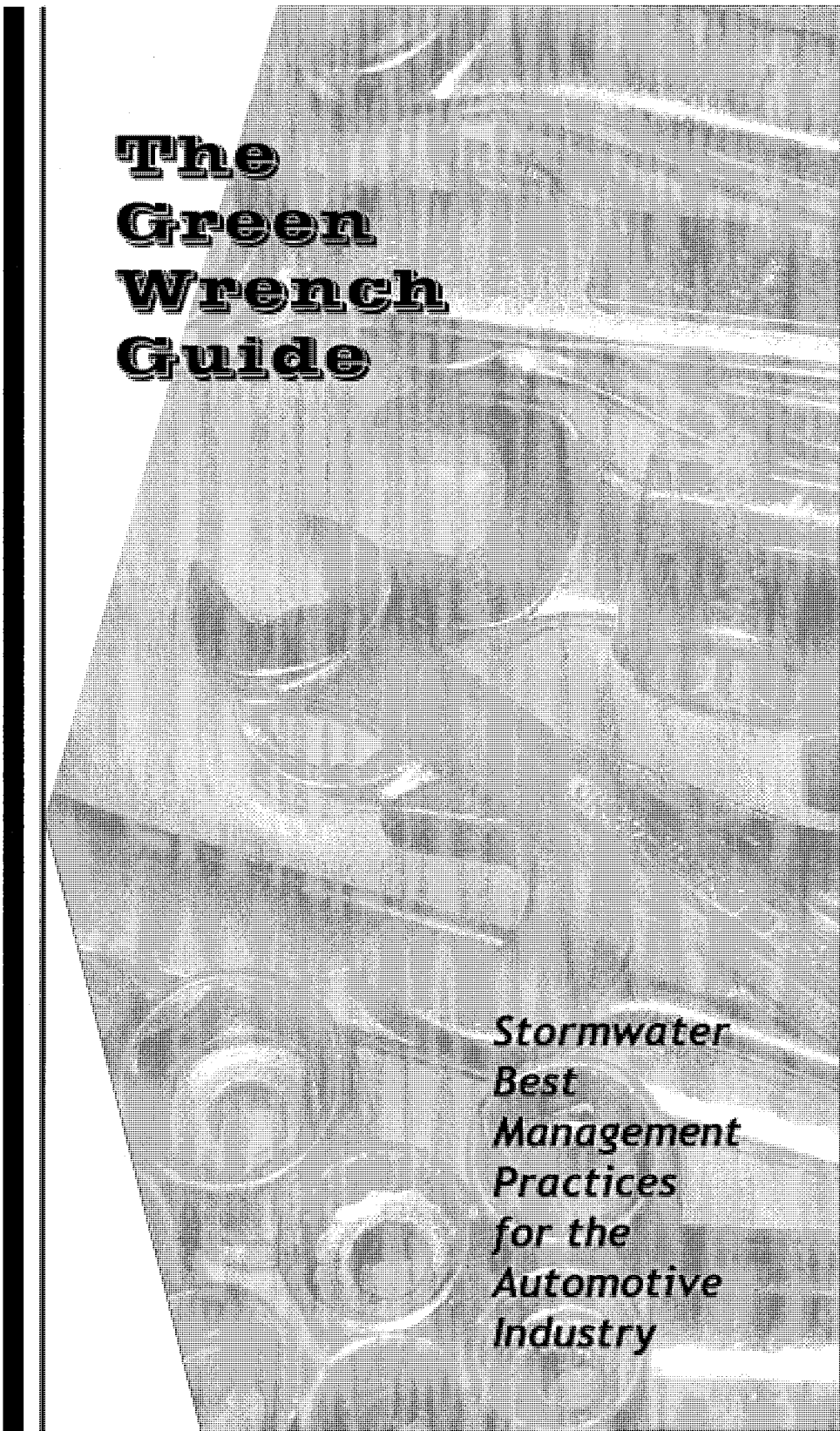
Implementation

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.

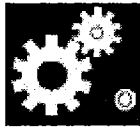
DON'Ts

- 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.



The Green Wrench Guide

**Stormwater
Best
Management
Practices
for the
Automotive
Industry**



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):**

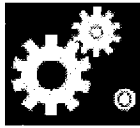
Any public or private drainage system (non-sewage) including streets, curbs, gutters, inlets, ditches, pipes, channels, culverts, streams, etc.

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Thank you to The City of San Francisco for the original Green Wrench Guide concept.



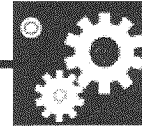
Background

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.

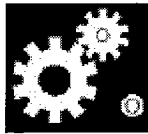


Your Responsibilities

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

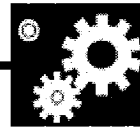
Best Management Practices (BMPs)

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.



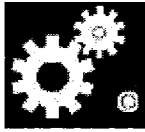
BMPs and Your Business

This guide is designed to help you think about ways to manage potential stormwater pollutants associated with your business activities. It provides information on minimum requirements, and includes suggested pollution prevention tips for the automotive industry. It is organized according to the following activity types:

- ◆ **Facility Audits**
- ◆ **Employee Training**
- ◆ **Spill Management and Reporting**
- ◆ **Vehicles and Equipment**
- ◆ **Good Housekeeping**
- ◆ **Hazardous Waste Recycling and Treatment**

This guide is not intended to address all regulatory requirements pertaining to your business. Local jurisdictions may have additional, more specific stormwater BMP requirements. Pages 17 and 18 of this guide list additional contact information where you can obtain more information on stormwater and other regulatory requirements.

Thank you for helping to keep the San Diego region a great place for people to live and visit!

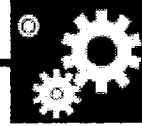


Facility Audits

Conducting your own facility audit is the best way to make sure that you stay in compliance with stormwater requirements. This can also save you money by identifying process and procedural improvements (waste prevention, etc.) to make your business activities more efficient. Be sure to address the following key areas during your audits:

- ◆ **Illegal Connections** - Inspect your business for connections that may convey pollutants to the storm drain system or receiving waters. An illegal connection is an unauthorized pipe, facility, or other device connected to the storm drain system, and may be illegal even if it was permitted at the time of installation.
- ◆ **Inlet and Discharge Points** - Identify the location of storm drain inlets on or down-gradient of your business or property. Mark these locations on a facility map and keep it posted in a common work area. Ensure that employees are shown these areas during training sessions.
- ◆ **Review of Activities** - Identify and use specific BMPs for activities with the potential to cause spills or releases of pollutants (oil, grease, fuel, etc.). Use the BMPs presented here as a guide for compliance, but don't stop there. Continue to seek out other sources of BMP information through the internet, professional associations, industry publications, etc. – you can never know too much.
- ◆ **Documentation** - Document any corrective action taken after your audit. Documentation is your key to demonstrating compliance. Be sure to include revised business practices and procedures in your employee training.

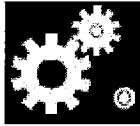
Employee Training



An effective stormwater management training program promotes employee ownership of problems and solutions. Employees are more likely to respond to training when they understand the impact of their daily activities on water quality. By involving your employees, their feedback will help implement needed actions to reduce stormwater pollution.

- ◆ Train all employees on stormwater BMPs and pollution prevention. Maintain training records on site; record the date of each training session and include a sign-in list of those who attended. Perform refresher trainings on a regular basis.
- ◆ Post signs around your shop reminding employees of BMPs and pollution prevention tips. This will also help to create awareness for your customers.
- ◆ Train employees about the proper use, handling, and disposal of all hazardous materials. Make sure all employees have current licensing and certification for their specific job duties.
- ◆ Teach employees how to control, contain, and clean up spills. Demonstrate how to properly use spill response kits.

You can stay informed about current regulations by joining trade associations and subscribing to trade journals and magazines. At trade association meetings and workshops, you will have the opportunity to learn about new pollution control practices and to network with others in your industry. Being involved will help you share ideas with others and will keep your training program up to date.



Spill Management and Reporting

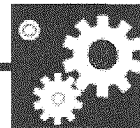
It is always best to prevent spills, but be ready when they occur. Keep spill kits readily available, preferably near work areas where spills are most likely to occur. Make sure all employees know where these materials are kept and how to properly use them to contain and immediately clean up spills. Whenever possible, use dry methods such as sweeping, vacuuming, mopping or absorbents (if absorbents are used, they may have to be disposed of as a hazardous waste). Spilled hazardous materials (antifreeze, gasoline, solvents, etc.) need to be managed as hazardous wastes. Make sure your employees are aware of any special requirements that apply to hazardous material disposal.

Use the following guidelines within 24 hours of occurrence for reporting spills:

- ◆ Report any spill or discharge that cannot be completely contained or cleaned up prior to entering the storm drain system. To report spills and discharges, call the Regional Stormwater Hotline at **(888) 846-0800**.
- ◆ If the spill involves hazardous substances, call the Department of Environmental Health (DEH), Hazardous Materials Division at **(619) 338-2284**.

Always call **911** if the spill presents an immediate threat to public health or the environment.

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.





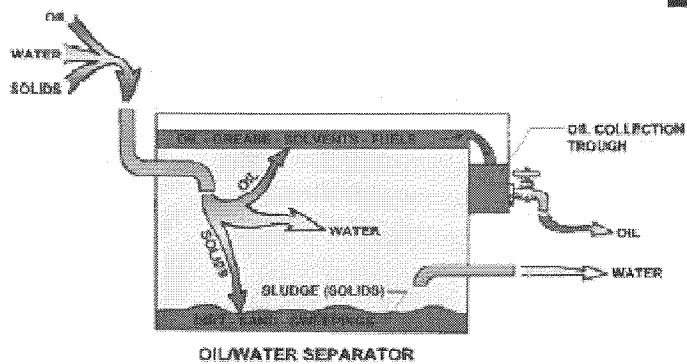
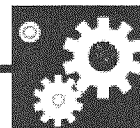
Vehicles and Equipment

- ◆ 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.

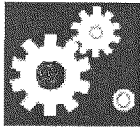
Vehicles and Equipment



An oil / water separator is designed specifically to remove petroleum products, and can also remove solids. As the mixture enters the separator, the vehicle fluids float to a collection trough and the water flows into the sewer system. Solids settle to the bottom of the separator. Bottom sludges are often contaminated with heavy metals and other pollutants and must be managed as a hazardous waste.

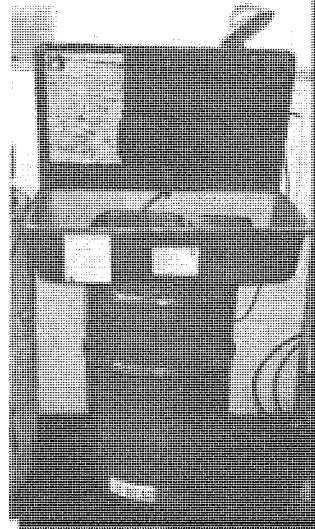
Engine and Parts Cleaning

- ◆ Designate specific areas in your service bays for parts cleaning. Do not wash or rinse parts outdoors.
- ◆ Use aqueous cleaning solutions instead of solvents whenever possible. Recycle used solutions through a licensed hazardous waste hauler.
- ◆ Avoid using hose-off degreasers; never allow runoff to enter the storm drain system. Instead, brush off loose debris and use damp rags to wipe down parts. Manage used rags through a rag service or as hazardous waste.
- ◆ Clean parts in self-contained sinks or drum units when working with solvents. Inspect part washing units daily for leaks and make repairs immediately.



Vehicles and Equipment

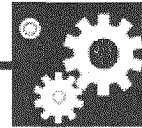
- ◆ Allow parts to drain over the solvent sink or drum, rather than allowing the solvents to drip or spill onto the floor. Never discharge the rinse solution into the sewer system.
- ◆ Recycle wastewater from steam cleaning or pressure washing activities. Discharges of wash water into the storm drain system are prohibited.



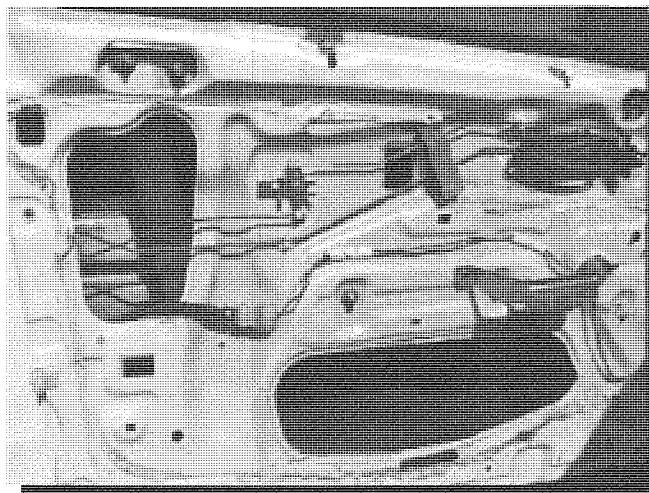
Body Repair and Painting

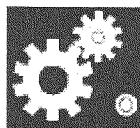
- ◆ Conduct work indoors or under cover when possible. If this cannot be done, take other precautions to prevent discharges from work areas.
- ◆ Inspect damaged vehicles for fluid leaks and use drip pans where necessary.
- ◆ Regularly clean work areas using dry methods. Use a shop vacuum or sweep up dust and debris. Do not vacuum flammable liquids.
- ◆ Allow wet sanding debris to dry overnight on the shop floor and sweep or vacuum it the next day. Liquid must not be discharged to the storm drain system. Consider investing in sanders with an attached vacuum system to capture dust at the source.

Vehicles and Equipment



- ◆ Conduct painting only in approved, enclosed areas equipped with vacuum hoods and filters.
- ◆ Minimize paint and thinner waste by carefully calculating paint needs based on surface area and by using the proper sprayer cup size.
- ◆ Collect water used to control over-spray or dust in the paint booth and recycle or dispose of it properly. Clean spray guns in a self-contained unit and recycle or properly dispose of the cleaning solution.
- ◆ Check with your local fire agency and the Air Pollution Control District for additional information and permit requirements for spray booths, coatings, and emissions.





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.



Good Housekeeping



- ◆ 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.

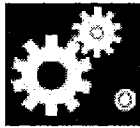
Recycling



- ◆ 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**



Training Log

Have your employees sign and date this training log so that you will have a record of their training activities.

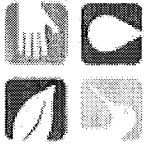
Employee Name	Date

Training Log

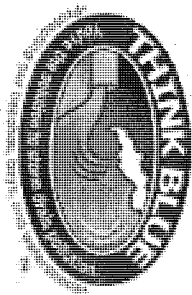
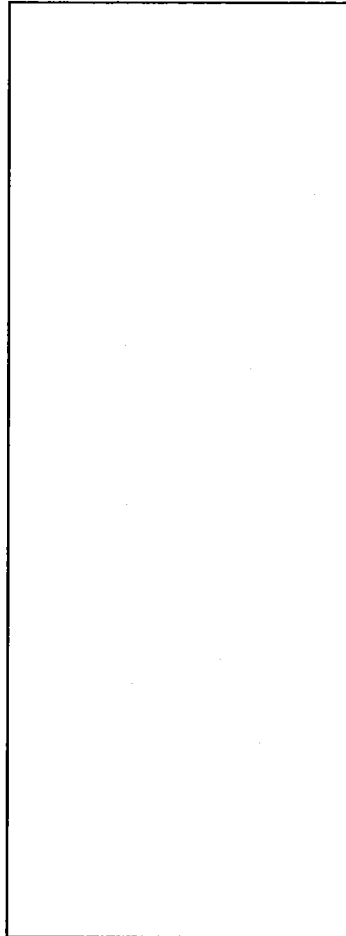


Employee Name

Date



project clean water



What's Cookin'?

*Eating and
Drinking
Establishments:
Stormwater
Best Management
Practices*





Dear Business Owner:

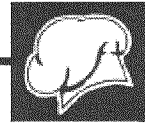
This training guide is being provided as a tool to assist eating and drinking establishments by outlining stormwater best management practices (BMPs) for owners, managers, and employees. BMPs are actions you can take to prevent or reduce pollutants from leaving your business. By using this training guide, you can proactively help to protect our waterways.

Clean eating and drinking establishments are important to everyone. However, when not properly handled and managed, routine activities that keep businesses clean, or that assist in food production, can contribute to the pollution of our watersheds. Pollution can harm aquatic habitats, human health, and ultimately can result in waterway closures. Being a successful business and an environmentally responsible eating and drinking establishment go hand-in-hand. The Food and Beverage Association, along with the County of San Diego, local city government agencies, and the Port District have developed minimum BMPs for eating and drinking establishments.

Please note that this training guide is not intended to provide requirements for all regulations that pertain to your business. The goal of this guide is to educate businesses on stormwater BMPs.

The Food and Beverage Association of San Diego County and the County of San Diego encourage you to share this information with all of your employees. To help ensure compliance, train all employees on a quarterly basis, review stormwater BMPs, and practice pollution prevention.

Thank you for being environmentally responsible and for keeping the San Diego region a desirable place for people to live and visit! Should you have any questions, please contact your local jurisdiction (see page 13 and 14 of this guide).



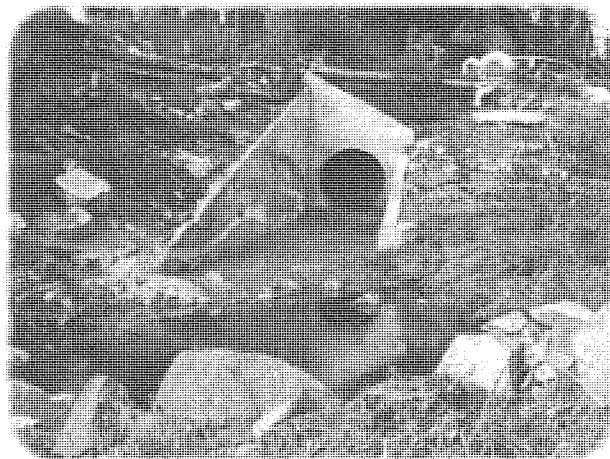
Do you know where water in the street goes?

In Southern California, water running off our streets flows into storm drains. Some people think that this water goes to our local wastewater treatment plant.

They are mistaken!

Anything entering the storm drain flows untreated into our creeks, streams, and rivers and ends up in our lakes and the ocean. Polluted water harms plants and animals and makes us sick. It causes beach closures and makes our fish and shellfish unsafe to eat.

Our ocean and lakes are being polluted!



A storm drain outlet that empties directly into a local stream.



What is causing stormwater pollution?

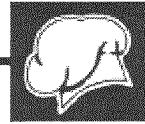
The sanitary sewer system and the storm drain system are different systems. Storm drain openings are located outside in gutters, alleys, and streets. Materials that are spilled, dumped, or poured onto these surfaces can enter the storm drain system and eventually travel to our creeks, lakes, and the ocean without being treated.

Waste water from sinks and floor drains travel through the sewer system to a waste water plant where it is treated before it flows to the ocean.

To keep our water clean, it is very important that all water used in business activities be directed only to drains that lead to the sanitary sewer.



Waste water from toilets, kitchen sinks, mop sinks, dishwashers, kitchen floor sinks and drains goes to a treatment plant.

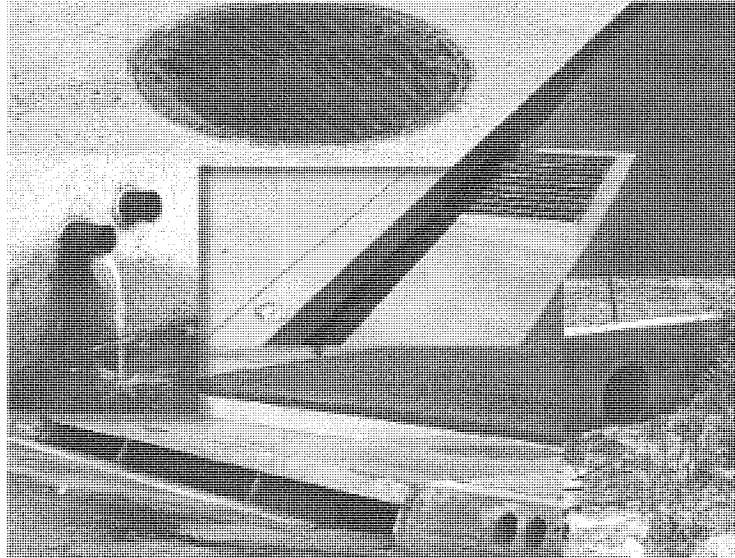


What can your business do to keep our water clean?

The County of San Diego, Unified Port District, and each of the 18 cities in the county adopted local stormwater ordinances to protect our water resources. These ordinances require your eating and drinking establishments to:

- 1. Prohibit pollutants from entering the storm drain system**
- 2. Use Best Management Practices (BMPs)**

As a business owner or operator, you are legally responsible to comply with these stormwater ordinances. Failure to comply with these ordinances could result in citations and fines.



The storm drain system includes parking lots, sidewalks, streets, gutters, and drainage channels.



Best Management Practices and Your Business

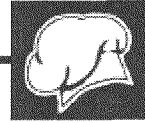
Best Management Practices, commonly called BMPs, are actions you can take to prevent or reduce pollutants from leaving your eating and drinking establishment.

A key type of BMP is "pollution prevention". Pollution prevention methods help to limit the amount of pollutants that are produced, thus eliminating the need to manage or remove them. Pollution prevention BMPs can help your business run more efficiently and can save you money.

Inspect Your Business

This is a good way to make sure that your eating and drinking establishment complies with stormwater requirements.

- ✓ Inspect inside and outside areas of your business.
- ✓ Make sure that all pipes inside your business are connected to the sewer system.
- ✓ Locate and mark storm drain openings on a map and post it in a common work area. Show your employees where the openings are located.
- ✓ Review your current practices and look for areas where you can improve.
- ✓ Inspect grease traps or interceptors regularly.
- ✓ Record any changes that you make to help prevent stormwater pollution.
- ✓ Good record keeping is your key to compliance.



Inform Your Employees

Employees are more likely to respond to training when they understand the impact of their daily activities on water quality.

- ✓ Hold staff meetings to discuss the importance of keeping our water clean.
- ✓ Train all employees on stormwater BMPs and pollution prevention.
- ✓ Have your employees read and review this guide and sign and date the training log included on pages 17 and 18.
- ✓ Record other training sessions and include date, instructor, and attendees.
- ✓ Keep training records on site.
- ✓ Provide regular refresher trainings.
- ✓ Post BMPs and pollution prevention tips around your business.
- ✓ Teach employees on the proper use of spill clean-up materials.

*Keep good training records
and self-inspection checklists
(see pages 15 and 16).*





Cleaning and Disposal

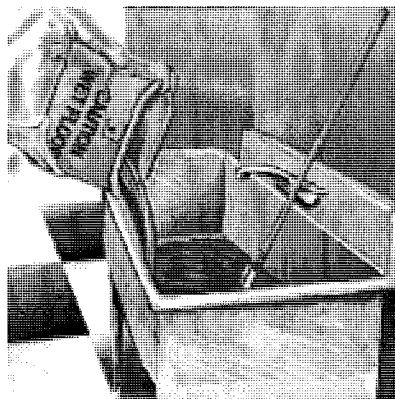
Cleaning products and food waste can pollute our waterways if they are not handled and disposed of properly.

Spill Prevention and Clean Up

It is always best to prevent spills, but be prepared when they occur.

- ✓ Routinely maintain all equipment and fix all leaks.
 - ✓ Keep spill clean-up materials handy such as near dumpsters, grease bins, and unloading areas.
 - ✓ Use dry methods for spill clean up such as rags, absorbents, brooms, and vacuums.
 - ✓ If a final rinse is needed, collect the rinse water using a mop or a wet vacuum. Pour the rinse water into a mop sink or a floor drain connected to the sewer.
 - ✓ Clean up the used absorbent and place in the trash.
 - ✓ Report any spill that cannot be cleaned up or contained before entering the storm drain.
- To report spills and discharges, call the Regional Stormwater Hotline at **(888) 846-0800**.

Pour all wash water to the sewer and not to the storm drain system.





Inside Areas

- ✓ Sweep and mop floors daily.
- ✓ Wash floor mats, kitchen mats, filters, and garbage cans in a mop sink, janitors sink, or near the kitchen floor drain.
- ✓ Never clean equipment outside where water may flow to an unprotected storm drain.
- ✓ If floor mats are too big to clean indoors, contract with a mat-cleaning service or clean them in an area that drains to the sewer.
- ✓ Pour rinse water containing soap, bleach, and disinfectants to a mop sink or sewer.

Outside Eating Areas

- ✓ Sweep or vacuum litter and food waste daily.
- ✓ Cover storm drain openings before wet cleaning, such as pressure washing.
- ✓ Contain and collect all wash water and dispose of it properly. Contact your local sewer agency for discharge requirements.



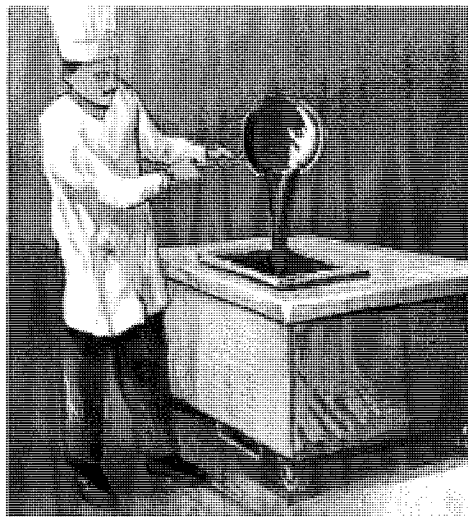
Wash floor mats in an area that drains to a sewer and not to the storm drain system.



Grease Management

Grease can collect in the sewer lines and create sewer blockages that cause sewage spills into the storm drain system.

- ✓ Install a grease trap or interceptor whenever possible or as required by a municipal sewer agency.
- ✓ Regularly clean grease traps and interceptors.
- ✓ Contract with a grease hauler to regularly service and empty your grease waste.
- ✓ Grease storage area should be regularly cleaned and inspected.
- ✓ Make sure grease bins are always tightly closed.
- ✓ Store grease bins on level ground and secure to prevent bins from tipping over.



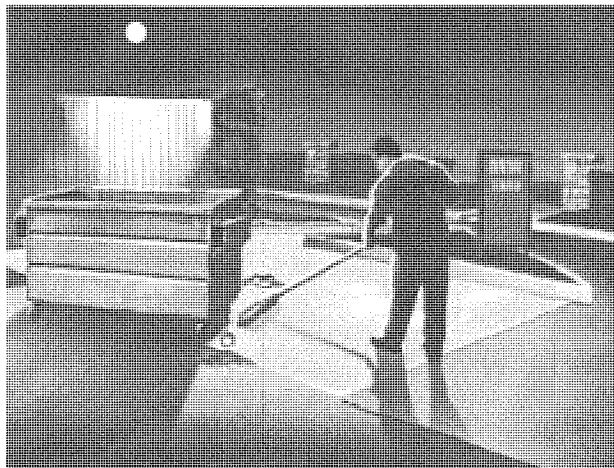
Collect bulk grease in containers and contract with a firm for recycling.



Dumpster and Unloading Areas

Liquid and solid waste from leaking trash containers and unloading areas can flow into storm drains.

- ✓ Sweep up food particles, cigarette butts, and litter around dumpsters and unloading areas regularly.
- ✓ Put trash and debris in tied plastic bags before placing into the dumpsters.
- ✓ Dispose of liquid waste into the sanitary sewer.
- ✓ Keep dumpster lids closed and locked to prevent illegal dumping.
- ✓ Do not hose out dumpsters.
- ✓ Call your solid waste hauler when dumpsters are leaking, need cleaning, or repair.



Use dry methods for cleaning up spills and leaks such as rags, absorbents, brooms, and vacuums.



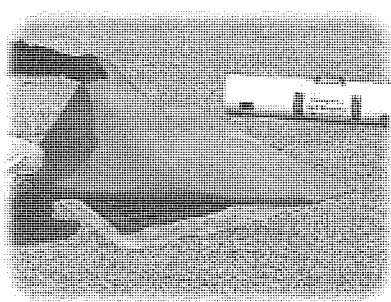
Grounds

Customers are more likely to use a trash can if your property is kept neat and clean.

- ✓ Routinely sweep and clean parking lots and paved areas around your eating and drinking establishment.
- ✓ Provide trash cans with lids in your parking lot to discourage littering.
- ✓ Post "No Dumping or Littering" signs around your property.
- ✓ Sweep up dirt, leaves, and clippings on walkways, street, and gutters.
- ✓ Apply pesticides and fertilizers according to label instructions and do not apply before a rain event. Try using less toxic alternatives.
- ✓ Adjust sprinkler heads properly to avoid over-watering and runoff.
- ✓ Clean the rooftops of your buildings at least once before the rainy season.
- ✓ Cover any materials stored outside and on the roof.



Prevent waste water from entering storm drains by using plastic sheeting or other storm drain type covers.





Recycling and Pollution Prevention

Conserve water. Eating and drinking establishments in San Diego County use millions of gallons of water each day for daily activities.

- ✓ Use proper storage and "first-in, first-out" for food materials.
- ✓ Post water conservation signs around faucets.
- ✓ Purchase recycled products or products with a high-recycled material content.
- ✓ Contact your local solid waste hauler for recycling options and bins.
- ✓ Start a recycling program and make sure recycling bins are easily accessible to employees.



Paper, cardboard, glass, aluminum, tin, and #1 and #2 plastics can easily be recycled.



How to Reach Us

County of San Diego,
Department of Environmental Health,
Food and Housing Division:



For any questions regarding eating and drinking
establishments call **(619) 338-2379** or **(800) 253-9933**

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.org



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) 839-4668
Imperial Beach	(619) 628-1369
La Mesa	(619) 667-1134
Lemon Grove	(619) 825-3810
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



<i>Self-inspection Checklist</i>	Done	Date
Employees have reviewed this guide and have been trained on stormwater BMPs.		
Employees have been shown how to properly use spill clean-up materials.		
Spill clean-up materials are readily available around your business in case of a spill.		
Storm drain openings have been located and marked.		
"No littering" signs and pollution prevention tips have been posted.		
Brooms, vacuums, and rags are available and are used instead of wet cleaning methods.		
Storm drain openings are protected and wash water is collected if water is used outside.		
Wash water from filters, garbage cans, kitchen and floor mats drain only to the sewer.		
All wash water and rinse water are drained to the sewer.		
All indoor drains, sinks, dishwashers, and food equipment drain to the sewer.		



<i>Self-inspection Checklist</i>	Done	Date
Grease traps / interceptors are installed as required by sewer agency and serviced regularly.		
Grease bins are kept tightly closed and regularly serviced by a licensed grease hauler.		
Dumpsters and grease bins do not leak and are in good shape.		
Dumpster and other waste containers are kept closed when not in use.		
Dumpster and grease bin areas, parking lots, and drives are cleaned regularly using dry methods.		
Recycling program has been established and recycling bins are accessible.		
Material stockpiled outside and on the roof are properly covered.		
Hired landscapers and contractors are familiar with stormwater regulations.		
Irrigation system is properly adjusted to prevent over-watering and runoff.		
Storm drains are kept free of trash, leaves, and dirt.		



Training Log

Have your employees **sign** and **date** this training log.

Employee Name

Date

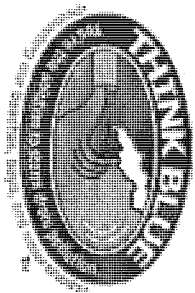


Training Log

Employee Name	Date



project clean water



ATTACHMENT E

Geotechnical Certification Sheet

The design of stormwater treatment and other control measures proposed in this plan requiring specific soil infiltration characteristics and/or geological conditions has been reviewed and approved by a registered Civil Engineer, Geotechnical Engineer, or Geologist in the State of California.

Name and registration #

Date

(NOTE: Will be provided during final engineering.)

ATTACHMENT F

Maintenance Plan

(Use Chapter 5 of the SUSMP as guidance in developing your Maintenance Plan)

(NOTE: Will be completed during final engineering.)

Operational & Maintenance Guidelines for an EDB (Extended Detention Basin)

The operational and maintenance needs of an EDB are:

- Dispersion of alluvial sediment deposition at inlet structures thus limiting the extended localized ponding of water
- Periodic sediment removal in accordance with the 18" depth threshold or 10% of the storage volume (whichever is less).
- Monitoring of the basin to ensure it is completely and properly drained.
- Outlet riser cleaning. Vegetation management to prevent marsh vegetation from taking hold, and to limit habitat for disease-carrying fauna.
- Removal of graffiti, grass trimmings, weeds, tree pruning, leaves, litter, and debris.
- Vegetative stabilization of eroding banks and basal areas.

Inspection Frequency

The facility will be inspected and inspection visits will be completely documented:

- Once a month at a minimum.
- After every large storm (after every storm monitored or those storms with more than 0.50 inch of precipitation).
- On a weekly basis during extended periods of wet weather.

Aesthetic and Functional Maintenance

Aesthetic maintenance is important for public acceptance of stormwater facilities. Functional maintenance is important for performance and safety reasons. Both forms of maintenance will be combined into an overall Stormwater Management System Maintenance.

Aesthetic Maintenance

The following activities will be included in the aesthetic maintenance program:

- Graffiti Removal. Graffiti will be removed in a timely manner to improve the appearance of an EDB, and to discourage additional graffiti or other acts of vandalism.
- Grass Trimming. Trimming of grass will be done around fences, the basin, outlet structures, and sampling structures.

- Weed Control. Weeds will be removed through mechanical means.

Functional Maintenance

The functional maintenance program includes two components: preventive maintenance and corrective maintenance.

Preventive Maintenance

Preventive maintenance will be done on a regular basis. Preventive maintenance activities to be instituted at an EDB are:

- Mowing. Vegetation in the EDB will be kept at the average maximum height of 18 inches to prevent the establishment of marsh vegetation, the stagnation of water, and the development of faunal habitats.
- Trash and Debris. During each inspection and maintenance visit to the site, debris and trash removal will be conducted to reduce the potential for inlet and outlet structures and other components from becoming clogged and inoperable during storm events.
- Sediment Management. Alluvial deposits at the inlet structures may create zones of ponded water. Upon these occurrences these deposits will be graded within the EDB in an effort to maintain the functionality of the BMP. Sediment grading will be accomplished by manually raking the deposits.
- Sediment Removal. Surface sediments will be removed when sediment accumulation is greater than 18-inches or 10 percent of the basin volume, whichever is less. Vegetation removed with any surface sediment excavation activities will be replaced through reseeding. Disposal of sediments will comply with applicable local, county, state, or federal requirements.
- Mechanical Components. Regularly scheduled maintenance will be performed on valves, fence gates, locks, and access hatches in accordance with the manufacturers' recommendations. Mechanical components will be operated during each maintenance inspection to assure continued performance.
- Elimination of Mosquito Breeding Habitats. The most effective mosquito control program is one that eliminates potential breeding habitats.

Corrective Maintenance

Corrective maintenance is required on an emergency or non-routine basis to correct problems and to restore the intended operation and safe function of an EDB. Corrective maintenance activities include:

- Removal of Debris and Sediment. Sediment, debris, and trash, which threaten the ability of an EDB to store or convey water, will be removed immediately and properly disposed of.

- **Structural Repairs.** Repairs to any structural component of an EDB will be made promptly (e.g., within 10 working days). Designers and contractors will conduct repairs where structural damage has occurred.
- **Embankment and Slope Repairs.** Damage to the embankments and slopes will be repaired quickly (e.g., within 10 working days).
- **Erosion Repair.** Where a reseeding program has been ineffective, or where other factors have created erosive conditions (i.e., pedestrian traffic, concentrated flow, etc.), corrective steps will be taken to prevent loss of soil and any subsequent danger to the performance of an EDB. There are a number of corrective actions that can be taken. These include erosion control blankets, riprap, sodding, or reduced flow through the area. Design engineers will be consulted to address erosion problems if the solution is not evident.
- **Fence Repair.** Timely repair of fences (e.g., within 10 working days) will be done to maintain the security of the site.
- **Elimination of Trees and Woody Vegetation.** Woody vegetation will be removed from embankments.
- **Elimination of Animal Burrows.** Animal burrows will be filled and steps taken to remove the animals if burrowing problems continue to occur (filling and compacting). If the problem persists, vector control specialists will be consulted regarding removal steps. This consulting is necessary as the threat of rabies in some areas may necessitate the animals being destroyed rather than relocated.
- **General Facility Maintenance.** In addition to the above elements of corrective maintenance, general corrective maintenance will address the overall facility and its associated components. If corrective maintenance is being done to one component, other components will be inspected to see if maintenance is needed.

Debris and Sediment Disposal

Since the Campus Park West Home Owners' Association (HOA) and Business Owners' Association (BOA) are responsible for maintenance of each EDB, they are also responsible for any hazardous waste generated at an EDB. Disposal of sediment, debris, and trash will be contracted out in accordance with local, county, state, and federal waste control programs.

Hazardous Wastes

Suspected hazardous wastes will be analyzed to determine disposal options. Hazardous materials generated on site will be handled and disposed of according to local, state, and federal regulations. A solid or liquid waste is considered a hazardous waste if it exceeds the criteria listed in the California Code of Federal Regulations, Title 22, Article 11 (State of California, 1985).

ATTACHMENT G

Treatment Control BMP Certification for DPW Permitted Land Development Projects

ATTACHMENT H

HMP Exemption Documentation
(If Applicable)

(NOTE: See hydromodification report.)



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