

# Storm Water Management Plan

Lago de San Marcos  
City of San Marcos

TM # 5388

December 12, 2006

*Prepared for:*

Western Pacific Housing, Inc.  
5790 Fleet Street, Suite 210  
Carlsbad, CA 92008

*Prepared by:*

 **Lundstrom**  
**+associates**  
1764 San Diego Avenue, Suite 200  
San Diego, California 92110  
Tel: 619.641.5900 Fax: 619.641.5910  
| PLANNING | CIVIL ENGINEERING | LAND SURVEYING |

*Contact Person:*

William Lundstrom

JN 146-33

O:\146-33\Water Resources\SWMP

## Executive Summary

### Project Location

Longitude 117°12'46"W

Latitude 33°7'33"N

### Type of Project

- Single-Family Residential       Multi-Family Residential  
 Commercial       Industrial  
 Other: \_\_\_\_\_

### Receiving Water Summary

<b>Receiving Water</b>	<u>San Marcos Creek</u>	<b>303(d) Impairments</b>	<u>NONE</u>
<b>Hydrologic Unit</b>	<u>Carlsbad (904.00)</u>		<u>NONE</u>
<b>Hydrologic Area</b>	<u>San Marcos Creek (904.51)</u>		<u>Bacteria Indicators</u>
<b>Hydrologic Sub-Area</b>	<u>Richland (904.52)</u>		<u>NONE</u>

### Anticipated Pollutants (Based on Land Use)

- Sediment       Nutrients       Heavy Metals  
 Organics       Trash/Debris       BOD  
 Bacteria       Oils/Grease       Pesticides

### Best Management Practice Summary

- Site Design       Source Control       Treatment Control  
Landscape Design      Curb Inlet Signage      Vegetated swale  
\_\_\_\_\_      Efficient Irrigation Practices      Vortechnics Unit  
\_\_\_\_\_      Homeowner Outreach      \_\_\_\_\_

### Construction Site Priority

- Low       Medium       High

### Report Requirements

- SWMP       WPCP       SWPPP  
WDID No. TBD

**Operation and Maintenance Summary**

*BMP Maintenance Agreement:*

Yes       No       N/A

*Agreement Type:*

- Recorded Maintenance Agreement       Covenants, Conditions, and Restrictions (CC&Rs)  
 Maintenance District  
 Other: \_\_\_\_\_

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## **Introduction**

Storm water discharges from land and impervious areas such as paved streets, parking lots, and building rooftops generated during rainfall and snow events often contain pollutants in quantities that could adversely affect water quality. Most storm water discharges are considered point sources and require coverage by a National Pollution Discharge Elimination (NPDES) permit. The primary method to control storm water discharges is through the use of best management practices (BMPs).

### *Purpose and Scope*

This Storm Water Management Plan (SWMP) has been developed in order to characterize receiving waters, identify the pollutants of concern for the site, and preliminarily identify the appropriate post-construction storm water best management practices to address these constituents. This report also identifies maintenance requirements for proposed BMP and recommends mechanisms that will ensure that the BMPs are maintained throughout the life of the project.

### *Regulatory Environment*

The Clean Water Act was amended in 1987 to provide that discharge of pollutants to waters of the United States without a National Pollution Discharge Elimination System (NPDES) permit is unlawful. In 1990, the EPA published final regulations (commonly referred to as the Phase II rule) mandating that discharges of storm water to waters of the U.S. from construction projects without an NPDES permit be prohibited.

The Phase II rule describes six minimum control measures that most NPDES General Permittees will need to implement. These minimum control measures will typically be implemented by applying BMPs that are appropriate to the project source, location, and climate. These six minimum control measures are:

- ❖ Public education and outreach on storm water impacts;
- ❖ Public involvement/participation;
- ❖ Illicit discharge detection and elimination;
- ❖ Construction site storm water runoff control;
- ❖ Post-construction storm water management in new development and redevelopment; and
- ❖ Pollution prevention/good housekeeping for municipal operations.

While the EPA allows for two permitting options to meet these requirements (individual permits and General Permits), the State Water Resources Control Board (SWRCB) has elected to adopt one statewide General Permit for California that applies to all construction-related storm water discharges except for those on tribal lands, in the Lake Tahoe Hydrologic Unit, and those performed by the California Department of Transportation.

Two of the Phase II minimum control measures, construction storm water runoff control and post-construction storm water management, have implications that affect the current project. Construction activities that might occur at the project site that may be subject to this General Permit include clearing, grading, stockpiling and excavation. If necessary, these construction issues will be addressed in a Storm Water Pollution Prevention Plan for Construction Activities (SWPPP) before commencement of the project. In addition, Appendix D of this SWMP summarizes construction-phase BMPs for the site. The project must also meet the site design, source-control, and post-construction treatment control storm water management requirements, which are the primary subject of this report.

Regional Water Quality Control Board (San Diego Region) Order No. 2001-01 (commonly known as the Municipal Permit) defines urban runoff as a waste, and requires that local municipalities regulate urban runoff. The Municipal Permit requires that each municipality develop a program to minimize or eliminate the negative water quality effects of urban runoff. A primary component of this program is to change the development approval processes and other ordinances to require that new development and significant redevelopment apply best management practices (BMPs) to the maximum extent practicable (MEP). The Municipal Permit also defines specific numeric sizing criteria for the design of these BMPs.

The County of San Diego Watershed Protection Ordinance (WPO) (San Diego County, 2002b) and Stormwater Standards Manual (San Diego County, 2002a) respond to the Municipal Permit requirements. The WPO requires that all applicants for discretionary permits or approvals demonstrate how their projects achieve compliance with stormwater regulations. Specifically, land development and redevelopment projects are required to provide a Stormwater Management Plan (SWMP) (this document) and Stormwater Maintenance Plans (SMP). These documents must demonstrate the implementation of post-construction BMPs to the MEP, and have provisions for maintenance of the BMPs in perpetuity. Post-construction BMP requirements of the WPO do not apply to those physical aspects of the project that have been completed or substantially completed at the time of application for a subsequent permit or approval is submitted.

**Storm Water Management Plan  
For Priority Projects  
(Major SWMP)**

Project Name:	Lago de San Marcos
Permit Number (Land Development Projects):	
Work Authorization Number (CIP):	
Applicant:	Western Pacific Housing, Inc.
Applicant's Address:	5790 Fleet Street, Suite 210 San Diego, CA 92008
Plan Prepared By ( <i>Leave blank if same as applicant</i> ):	Lundstrom & Associates
Date:	January 19, 2006
Revision Date (If applicable):	December 12, 2006

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 67.804.f). 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	
Building Permits		<b>X</b>	
Tentative Map	<b>X</b>		

Instructions for a Major SWMP can be downloaded at <http://www.co.sandiego.ca.us/dpw/stormwater/susmp.html>.

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

## Section 1. Project Information

### 1.1. Project Description

The 1.97 acre project is located south of SR-78 at the southern corner of Lake San Marcos Drive and Rancho Santa Fe Road (reference Thomas Bros. 1128-C2). **Attachment A** provides a location map for the site.

### 1.2. PRIORITY PROJECT DETERMINATION

Please check the box that best describes the project. Does the project meet one of the following criteria?

**Table 1-1** Priority Project Determination

<b>PRIORITY PROJECT</b>	<b>YES</b>	<b>NO</b>
Redevelopment within the County Urban Area that creates or adds at least 5,000 net square feet of additional impervious surface area	<b>X</b>	
Residential development of more than 10 units	<b>X</b>	
Commercial developments with a land area for development of greater than 100,000 square feet		<b>X</b>
Automotive repair shops		<b>X</b>
Restaurants, where the land area for development is greater than 5,000 square feet		<b>X</b>
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		<b>X</b>
Environmentally Sensitive Areas: All development and redevelopment located within or directly adjacent to or discharging directly to an environmentally sensitive area (where discharges from the development or redevelopment will enter receiving waters within the environmentally sensitive area), 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.		<b>X</b>
Parking Lots 5,000 square feet or more or with 15 parking spaces or more and potentially exposed to urban runoff		<b>X</b>
Streets, roads, highways, and freeways which would create a new paved surface that is 5,000 square feet or greater	<b>X</b>	

**Limited Exclusion:** Trenching and resurfacing work associated with utility projects are not considered priority projects. Parking lots, buildings and other structures associated with utility projects are subject to SUSMP requirements if one or more of the criteria above are met.

If you answered **NO** to all the questions, then **STOP**. Please complete a Minor SWMP for your project. If you answered **YES** to any of the questions, please continue.

The following questions provide a guide to collecting information relevant to project stormwater quality issues. Please provide a description of the findings in text box below.

**Table 1-2** Information relevant to project stormwater quality issues.

	QUESTIONS	COMPLETED	NA
1.	Describe the topography of the project area.	X	
2.	Describe the local land use within the project area and adjacent areas.	X	
3.	Evaluate the presence of dry weather flow.		X
4.	Determine the receiving waters that may be affected by the project throughout the project life cycle (i.e., construction, maintenance and operation).	X	
5.	For the project limits, list the 303(d) impaired receiving water bodies and their constituents of concern.	X	
6.	Determine if there are any High Risk Areas (municipal or domestic water supply reservoirs or groundwater percolation facilities) within the project limits.		X
7.	Determine the Regional Board special requirements, including TMDLs, effluent limits, etc.	X	
8.	Determine the general climate of the project area. Identify annual rainfall and rainfall intensity curves.	X	
9.	If considering Treatment BMPs, determine the soil classification, permeability, erodibility, and depth to groundwater.	X	
10.	Determine contaminated or hazardous soils within the project area.		X

Please provide a description of the findings in the following box. *For example:*  
*The project is located in the San Diego Hydrologic unit. The area is characterized by rolling grassy hills and shrubs. Within the project limit there are no 303(d) impaired receiving water and no Regional Board special requirements.*

*The project is located in the Carlsbad Hydrologic unit. The area is characterized by an existing professional office. Runoff from the project runs along Lake San Marcos Drive and eventually discharges into Lake San Marcos and ultimately into the Pacific Ocean via San Marcos Creek. Within the project limit there are no 303(d) impaired receiving water and no Regional Board special requirements.*

## Section 2. Characterization of Receiving Waters

The project site is located on the 12,665-acre (19.8-square mile) Richland Hydrologic Sub-Area (HSA 904.52), which is part of the San Marcos Hydrologic Area (HA 904.50) and Carlsbad Hydrologic Unit (HU 904.00). **Table 2-1** compares the project site to the local watershed area.

**Table 2-1** Comparison of Watershed Areas.

	Area (acres)	12,665	2	1
Richland HSA (904.52)	12,665	100%	-	-
Property	2	.015%	100%	-
Impervious Area (Estimate)	1	.008%	50%	100%

Complete the checklist below to determine if Treatment Best Management Practices (BMPs) are required for the project.

**Table 2-2** Treatment BMPs requirement

No.	CRITERIA	YES	NO	INFORMATION
1.	Is this an emergency project		<b>X</b>	If YES, go to 6. If NO, continue to 2
2.	Have TMDLs been established for surface waters within the project limit?		<b>X</b>	If YES, go to 5. If NO, continue to 3
3.	Will the project directly discharge to a 303(d) impaired receiving water body?		<b>X</b>	If YES, go to 5. If NO, continue to 4.
4.	Is this project within the urban and environmentally sensitive areas as defined on the maps in Appendix B of the County of San Diego Standard Urban Storm Water Mitigation Plan for Land Development and Public Improvement Projects?		<b>X</b>	If YES, continue to 5. If NO, go to 6.
5.	Consider approved Treatment BMPs for the project.	<b>X</b>		If YES, go to 7
6.	Project is not required to consider Treatment BMPs			Document for Project Files by referencing this checklist.
7.	End	<b>X</b>		

Now that the need for a treatment BMPs has been determined, other information is needed to complete the SWMP.

2.1. *WATERSHED*

Please check the watershed(s) for the project.

**Table 2-3** Project Watershed

<input type="checkbox"/> San Juan	<input type="checkbox"/> Santa Margarita	<input type="checkbox"/> San Luis Rey	<input checked="" type="checkbox"/> Carlsbad
<input type="checkbox"/> San Dieguito	<input type="checkbox"/> Penasquitos	<input type="checkbox"/> San Diego	<input type="checkbox"/> Pueblo San Diego
<input type="checkbox"/> Sweetwater	<input type="checkbox"/> Otay	<input type="checkbox"/> Tijuana	<input type="checkbox"/>

Please provide the hydrologic sub-area and number(s)

**Table 2-4** Hydrologic Sub-Area(s) and Number(s)

Number	Name
HSA 904.52	Richland Hydrologic Sub-Area

Please provide the beneficial uses for Inland Surface Waters and Ground Waters. Beneficial Uses can be obtained from the Water Quality Control Plan For The San Diego Basin, which is available at the Regional Board office or at <http://www.swrcb.ca.gov/rwqcb9/programs/basinplan.html>.

**Table 2-5** Beneficial Uses of Downstream Inland Surface Waters (RWQCB, 1998).

Receiving Water (Hydrologic Unit Code)	Beneficial Use														
	Municipal/Domestic Supply	Agricultural Supply	Industrial Service Supply	Industrial Process Supply	Groundwater Recharge	Freshwater Replenishment	Hydropower Generation	Contact Water Recreation	Non-Contact Water Recreation	Significant Biological Habitats	Warm Freshwater Habitat	Cold Freshwater Habitat	Wildlife Habitat	Rare Species	Fish Spawning and Development
San Marcos Creek (HSA 904.52)	+	●						●	●		●		●		

**Table 2-6** Beneficial Use of Downstream  
Groundwater Resources (RWQCB, 1998).

● Existing Beneficial Use ☼ Potential Beneficial Use	<b>Beneficial Use</b>					
	Municipal/Domestic Supply	Agricultural Supply	Industrial Process Supply	Industrial Service Supply	Groundwater Recharge	Freshwater Replenishment
<b>Receiving Water (Hydrologic Unit Code)</b>						
Batiqitos (HSA 904.51)	●	●	●			

**2.2. POLLUTANTS OF CONCERN**

Using Table 1, 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 2-7** Anticipated and potential pollutants by project type (San Diego County, 2002a).

✓ Anticipated Pollutants P Potential Pollutants	General Pollutant Categories								
	Sediments	Nutrients	Heavy Metals	Organic Substances	Trash and Debris	Oxygen-Demanding Substances	Oils and Grease	Bacteria and Viruses	Pesticides
Detached Residential	✓	✓			✓	✓	✓	✓	✓
Attached Residential	✓	✓			✓	P <sup>(1)</sup>	P <sup>(2)</sup>	P	✓
Commercial (>100,000 sf)	P <sup>(1)</sup>	P <sup>(1)</sup>		P <sup>(2)</sup>	✓	P <sup>(5)</sup>	✓	P <sup>(3)</sup>	P <sup>(5)</sup>
Auto Repair Shops			✓	✓	✓		✓		
Restaurants					✓	✓	✓	✓	
Hillside Development (>5,000 sf)	✓				✓	✓	✓		✓
Parking Lots	P <sup>(1)</sup>	P <sup>(1)</sup>	✓		✓	P <sup>(1)</sup>	✓		P <sup>(1)</sup>
Streets, Highways, and Freeways	✓	P <sup>(1)</sup>	✓	P <sup>(4)</sup>	✓	P <sup>(5)</sup>	✓		
Retail Gasoline Outlets			✓	P <sup>(4)</sup>	✓		✓		

(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 involved food or animal waste products; (4) Including petroleum hydrocarbons; (5) Including solvents.

Note: If other monitoring data that is relevant to the project is available. Please include as Attachment C.

## Section 3. Storm Water Best Management Practice Plan

### 3.1. 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.

**Table 3-1** Construction Phase BMP alternatives

<input checked="" type="checkbox"/>	Silt Fence	<input type="checkbox"/>	Desilting Basin
<input checked="" type="checkbox"/>	Fiber Rolls	<input type="checkbox"/>	Gravel Bag Berm
<input checked="" type="checkbox"/>	Street Sweeping and Vacuuming	<input type="checkbox"/>	Sandbag Barrier
<input checked="" type="checkbox"/>	Storm Drain Inlet Protection	<input checked="" type="checkbox"/>	Material Delivery and Storage
<input checked="" type="checkbox"/>	Stockpile Management	<input checked="" type="checkbox"/>	Spill Prevention and Control
<input checked="" type="checkbox"/>	Solid Waste Management	<input checked="" type="checkbox"/>	Concrete Waste Management
<input checked="" type="checkbox"/>	Stabilized Construction Entrance/Exit	<input checked="" type="checkbox"/>	Water Conservation Practices
<input type="checkbox"/>	Dewatering Operations	<input type="checkbox"/>	Paving and Grinding Operations
<input type="checkbox"/>	Vehicle and Equipment Maintenance		
<input checked="" type="checkbox"/>	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.		

### 3.2. SITE DESIGN

To minimize stormwater impacts, site design measures must be addressed. The following checklist provides options for avoiding or reducing potential impacts during project planning. If YES is checked, it is assumed that the measure was used for this project. If NO is checked, please provide a brief explanation why the option was not selected in the text box below.

**Table 3-2** Site Design BMP alternatives

OPTIONS	YES	NO	N/A
1. Can the project be relocated or realigned to avoid/reduce impacts to receiving waters or to increase the preservation of critical (or problematic) areas such as floodplains, steep slopes, wetlands, and areas with erosive or unstable soil conditions?		X	
2. Can the project be designed to minimize impervious footprint?		X	
3. Conserve natural areas where feasible?			X
4. Where landscape is proposed, can rooftops, impervious sidewalks, walkways, trails and patios be drained into adjacent landscaping?	X		
5. For roadway projects, can structures and bridges be designed or located to reduce work in live streams and minimize construction impacts?		X	
6. Can any of the following methods be utilized to minimize erosion from slopes:			
6.a. Disturbing existing slopes only when necessary?	X		
6.b. Minimize cut and fill areas to reduce slope lengths?	X		
6.c. Incorporating retaining walls to reduce steepness of slopes or to shorten	X		

- |      |   |  |  |   |
|------|---|--|--|---|
|      | slopes?   |  |  |   |
| 6.d. | Providing benches or terraces on high cut and fill slopes to reduce concentration of flows? |  |  | X |
| 6.e. | Rounding and shaping slopes to reduce concentrated flow?                                    |  |  | X |
| 6.f. | Collecting concentrated flows in stabilized drains and channels?                            |  |  | X |

Please provide a brief explanation for each option that was checked N/A or NO in the following box.

The proposed project is currently developed therefore requiring minimal grading that is expected to minimally impact naturally vegetated areas.

If the project includes work in channels, then complete the following checklist. Information shall be obtained from the project drainage report.

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

### 3.3. SOURCE CONTROL

Please complete the following checklist for Source Control BMPs. If the BMP is not applicable for this project, then check N/A only at the main category.

**Table 3-3** Source Control BMP alternatives

<b>BMP</b>		<b>YES</b>	<b>NO</b>	<b>N/A</b>
<b>1.</b>	<b>Provide Storm Drain System Stenciling and Signage.</b>			
1.a.	All storm drain inlets and catch basins within the project area shall have a stencil or tile placed with prohibitive language (such as: “NO DUMPING – DRAINS TO _____”) and/or graphical icons to discourage illegal dumping.	<b>X</b>		
1.b.	Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the project area.			<b>X</b>
<b>2.</b>	<b>Design Outdoors Material Storage Areas to Reduce Pollution Introduction</b>			
2.a.	This is a detached single-family residential project. Therefore, personal storage areas are exempt from this requirement.			<b>X</b>
2.b.	Hazardous materials with the potential to contaminate urban runoff shall either be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the storm water conveyance system; or (2) protected by secondary containment structures such as berms, dikes, or curbs.	<b>X</b>		
2.c.	The storage area shall be paved and sufficiently impervious to contain leaks and spills.	<b>X</b>		
2.d.	The storage area shall have a roof or awning to minimize direct precipitation within the secondary containment area.	<b>X</b>		
<b>3.</b>	<b>Design Trash Storage Areas to Reduce Pollution Introduction</b>			
3.a.	Paved with an impervious surface, designed not to allow run-on from adjoining areas, screened or walled to prevent off-site transport of trash; or,	<b>X</b>		
3.b.	Provide attached lids on all trash containers that exclude rain, or roof or awning to minimize direct precipitation.	<b>X</b>		
<b>4.</b>	<b>Use Efficient Irrigation Systems &amp; Landscape Design</b>			
	The following methods to reduce excessive irrigation runoff shall be considered, and incorporated and implemented where determined applicable and feasible.			
4.a.	Employing rain shutoff devices to prevent irrigation after precipitation.	<b>X</b>		
4.b.	Designing irrigation systems to each landscape area’s specific water requirements.	<b>X</b>		
4.c.	Using flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.	<b>X</b>		
4.d.	Employing other comparable, equally effective, methods to reduce irrigation water runoff.	<b>X</b>		
<b>5.</b>	<b>Private Roads</b>			
	The design of private roadway drainage shall use at least one of the following:			
5.a.	Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings.	<b>X</b>		
5.b.	Urban curb/swale system: street slopes to curb, periodic swale inlets drain to vegetated swale/biofilter.		<b>X</b>	
5.c.	Dual drainage system: First flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to storm water conveyance system.		<b>X</b>	
5.d.	Other methods that are comparable and equally effective within the project.		<b>X</b>	
<b>6.</b>	<b>Residential Driveways &amp; Guest Parking</b>			
	The design of driveways and private residential parking areas shall use one at least of the following features.			

	6.a.	Design driveways with shared access, flared (single lane at street) or wheelstrips (paving only under tires); or, drain into landscaping prior to discharging to the storm water conveyance system.		X
	6.b.	Uncovered temporary or guest parking on private residential lots may be: paved with a permeable surface; or, designed to drain into landscaping prior to discharging to the storm water conveyance system.		X
	6.c.	Other features which are comparable and equally effective.		X
<b>7.</b>	<b>Dock Areas</b> Loading/unloading dock areas shall include the following.			X
	7.a.	Cover loading dock areas, or design drainage to preclude urban run-on and runoff.		X
	7.b.	Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.		X
	7.c.	Other features which are comparable and equally effective.		X
<b>8.</b>	<b>Maintenance Bays</b> Maintenance bays shall include the following.			X
	8.a.	Repair/maintenance bays shall be indoors; or, designed to preclude urban run-on and runoff.		X
	8.b.	Design a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.		X
	8.c.	Other features which are comparable and equally effective.		X
<b>9.</b>	<b>Vehicle Wash Areas</b> Priority projects that include areas for washing/steam cleaning of vehicles shall use the following.			X
	9.a.	Self-contained; or covered with a roof or overhang.		X
	9.b.	Equipped with a clarifier or other pretreatment facility.		X
	9.c.	Properly connected to a sanitary sewer		X
	9.d.	Other features which are comparable and equally effective.		X
<b>10.</b>	<b>Outdoor Processing Areas</b> Outdoor process equipment operations, such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, waste piles, and wastewater and solid waste treatment and disposal, and other operations determined to be a potential threat to water quality by the County shall adhere to the following requirements.			X
	10.a.	Cover or enclose areas that would be the most significant source of pollutants; or, slope the area toward a dead-end sump; or, discharge to the sanitary sewer system following appropriate treatment in accordance with conditions established by the applicable sewer agency.		X
	10.b.	Grade or berm area to prevent run-on from surrounding areas.		X
	10.c.	Installation of storm drains in areas of equipment repair is prohibited.		X
	10.d.	Other features which are comparable or equally effective.		X
<b>11.</b>	<b>Equipment Wash Areas</b> Outdoor equipment/accessory washing and steam cleaning activities shall be.			X
	11.a.	Be self-contained; or covered with a roof or overhang.		X
	11.b.	Be equipped with a clarifier, grease trap or other pretreatment facility, as appropriate		X
	11.c.	Be properly connected to a sanitary sewer.		X
	11.d.	Other features which are comparable or equally effective.		X
<b>12.</b>	<b>Parking Areas</b> The following design concepts shall be considered, and incorporated and			X

	implemented where determined applicable and feasible by the County.			
12.a.	Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design.			<b>X</b>
12.b.	Overflow parking (parking stalls provided in excess of the County's minimum parking requirements) may be constructed with permeable paving.			<b>X</b>
12.c.	Other design concepts that are comparable and equally effective.			<b>X</b>
<b>13.</b>	<b>Fueling Area</b> Non-retail fuel dispensing areas shall contain the following.			<b>X</b>
13.a.	Overhanging roof structure or canopy. The cover's minimum dimensions must be equal to or greater than the area within the grade break. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area. The fueling area shall drain to the project's treatment control BMP(s) prior to discharging to the storm water conveyance system.			<b>X</b>
13.b.	Paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete shall be prohibited.			<b>X</b>
13.c.	Have an appropriate slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of urban runoff.			<b>X</b>
13.d.	At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.			<b>X</b>

Please list other project specific Source Control BMPs in the following box. Write N/A if there are none and briefly explain.

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### 3.4. TREATMENT CONTROL

To select a structural treatment BMP using Treatment Control BMP Selection Matrix (Table 2), each priority project shall compare the list of pollutants for which the downstream receiving waters are impaired (if any), with the pollutants anticipated to be generated by the project (as identified in Table 1). Any pollutants identified by Table 1, which are also causing a Clean Water Act section 303(d) impairment of the receiving waters of the project, shall be considered primary pollutants of concern. Priority projects that are anticipated to generate a primary pollutant of concern shall select a single or combination of stormwater BMPs from Table 2, which **maximizes pollutant removal** for the particular primary pollutant(s) of concern.

Priority projects that are not anticipated to generate a pollutant for which the receiving water is Clean Water Act Section 303(d) impaired shall select a single or combination of stormwater BMPs from Table 2, which are effective for pollutant removal of the identified secondary pollutants of concern, consistent with the "maximum extent practicable" standard.

**Table 3-4** Treatment Control BMP Selection Matrix (San Diego County, 2002a).

<ul style="list-style-type: none"> <li> High Removal Efficiency</li> <li> Medium Removal Efficiency</li> <li> Low Removal Efficiency</li> <li> Unknown Removal Efficiency</li> </ul>	Treatment Control BMP Categories						
	Pollutant of Concern	Biofilters	Detention Basins	Infiltration Basins <sup>(1)</sup>	Wet Ponds or Wetlands	Drainage Inserts	Pervious pavement with sand filtration
Sediment							
Nutrients							
Heavy Metals							
Organic Compounds	?	?	?	?			
Trash & Debris			?	?			
Oxygen Demanding Substances							
Bacteria	?	?		?			
Oils and Grease			?	?			
Pesticides	?	?	?	?		?	

(1) Including trenches and porous pavement.(2) Also known as hydrodynamic devices and baffle boxes. **Original Sources:** Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (1993), National Stormwater Best Management Practices Database (2001), and Guide for BMP Selection in Urban Developed Areas (2001).

A Treatment BMP must address runoff from developed areas. Please provide the post-construction water quality values for the project. Label outfalls on the BMP map.  $Q_{WQ}$  is dependent on the type of treatment BMP selected for the project.

**Lago de San Marcos Hydrology Summary**

Outfall	Tributary Area (acres)	$Q_{100}$ (cfs)	$Q_{WQ}$ (cfs)
100	1.97	10.49	0.41

Please check the box(s) that best describes the Treatment BMP(s) selected for this project.

Biofilters

- Grass swale
- Grass strip
- Wetland vegetation swale
- Bioretention

Detention Basins

- Extended/dry detention basin with grass lining
- Extended/dry detention basin with impervious lining

Infiltration Basins

- Infiltration basin
- Infiltration trench
- Porous asphalt
- Porous concrete
- Porous modular concrete block

Wet Ponds or Wetlands

- Wet pond/basin (permanent pool)
- Constructed wetland

Drainage Inserts (See note below)

- Oil/Water separator
- Catch basin insert
- Storm drain inserts
- Catch basin screens

Filtration

- Media filtration
- Sand filtration

Hydrodynamic Separator Systems

- Swirl Concentrator
- Cyclone Separator
- Baffle Separator
- Gross Solids Removal Device
- Linear Radial Device

Note: Catch basin inserts and storm drain inserts are excluded from use on County maintained right-of-way and easements.

Include Treatment Datasheet as Attachment E. The datasheet should include the following:	<b>COMPLETED</b>	<b>NO</b>
1. Description of how treatment BMP was designed. Provide a description for each type of treatment BMP	✓	
2. Engineering calculations for the BMP(s)	✓	

Please describe why the selected treatment BMP(s) was selected for this project. For projects utilizing a low performing BMP, please provide a detailed explanation and justification.

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A vortech unit will be used at the southeast end of the project where the water will accumulate.

---

A vegetated swale is proposed on the northwestern side of the project to secondarily treat excess runoff and reduce flow velocities before releasing storm water on to Lake San Marcos Drive.

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## Section 4. Storm Water Maintenance Plan

### 4.1. MAINTENANCE

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

CATEGORY	SELECTED	
	YES	NO
<b>First</b>		<b>X</b>
<b>Second</b>	<b>X</b>	
<b>Third</b>		<b>X</b>
<b>Fourth</b>		<b>X</b>

Please briefly describe the long-term fiscal resources for the selected maintenance mechanism(s).

- 
1. Yearly training for all landscape contractor employees utilized on the site.
  2. Street sweeping once a month.
  3. Inspections of the and the vegetated swale once a year. Inspections quarterly for the vortech unit for the first year then as deemed necessary there after. Any necessary maintenance will be done in accordance with local, state, and federal regulations.
-

## Section 5. ATTACHMENTS

Please include the following attachments.

ATTACHMENT		COMPLETED	N/A
A	Project Location Map	X	
B	Site Map	X	
C	Relevant Monitoring Data		X
D	Treatment BMP Location Map	X	
E	Treatment BMP Datasheets		X
F	Operation and Maintenance Program for Treatment BMPs	X	
G	Engineer's Certification Sheet	X	

Note: Attachments A and B may be combined.

# ATTACHMENT A LOCATION MAP

# ATTACHMENT B PROJECT SITE MAP

# ATTACHMENT C RELEVANT MONITORING DATA

*(NOTE: PROVIDE RELEVANT WATER QUALITY MONITORING DATA IF AVAILABLE.)*

# ATTACHMENT D TREATMENT BMP LOCATION MAP

# ATTACHMENT E

## TREATMENT BMP DATASHEET

(NOTE: POSSIBLE SOURCE FOR DATASHEETS CAN BE FOUND AT [WWW.CABMPHANDBOOKS.COM](http://WWW.CABMPHANDBOOKS.COM). INCLUDE ENGINEERING CALCULATIONS FOR SIZING THE TREATMENT BMP.)

### BMP Selection

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A vegetated swale is proposed on the northwestern side of the project to secondarily treat excess runoff and reduce flow velocities before releasing storm water on to Lake San Marcos Drive.

---

A vortech unit is proposed for the southeast end of the project.

---

### Treatment Control BMP Calculations

First flush volume = 0.071 acre\*ft

Water Quality flow: Q = 0.3 cfs

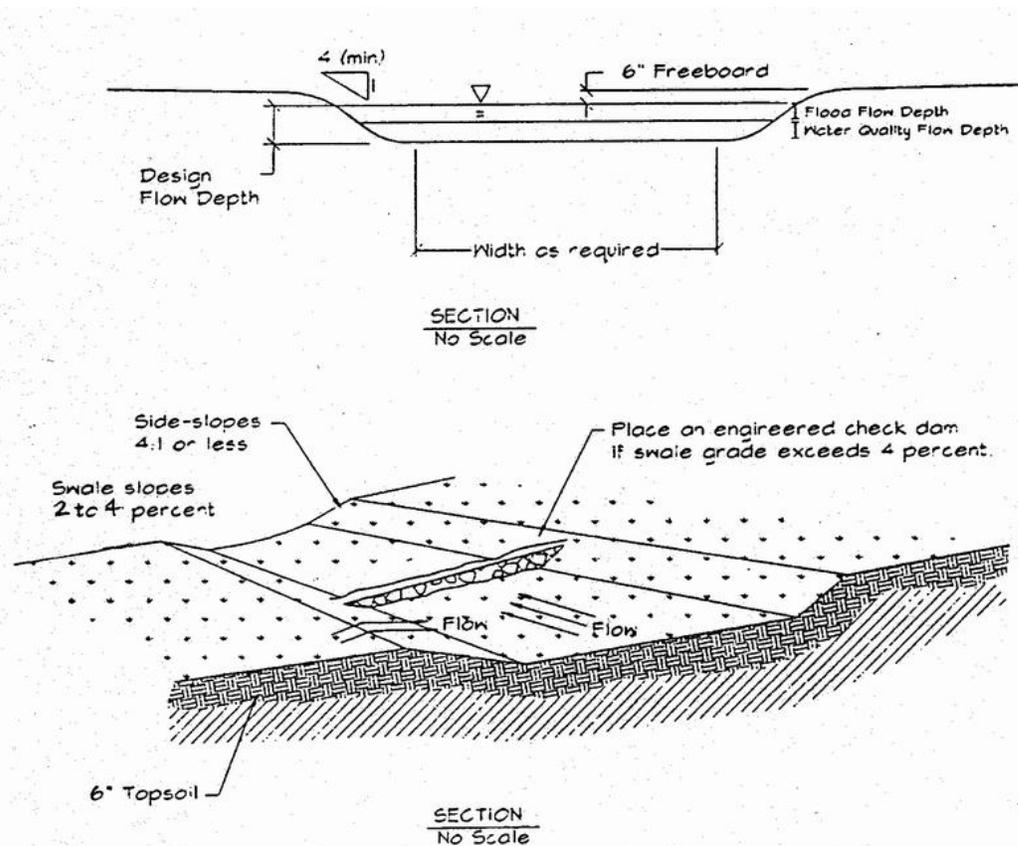
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Remaining first flush runoff will be directed to vegetated swale with rip rap and check dams.

### Treatment Control Descriptions

#### Vegetated Swales

Vegetated (grassed) swales are open-channel management practices designed to treat storm water runoff for a specified water quality volume. Storm water runoff is treated via filtration as it flows through vegetation and the subsoil matrix, as well as by infiltration into the underlying soils. The vegetated swale is an improvement on the traditional drainage ditch, incorporating modified geometry and other features that allow for use of the swale as both a treatment and conveyance practice. The following figure illustrates a typical vegetated swale design.



Typical vegetated swale design (Portland, 1995).

### *Project Location*

A vegetated swale is proposed on the northwestern side of the project to secondarily treat excess runoff and reduce flow velocities before releasing storm water on to Lake San Marcos Drive Siting and Design Considerations

### *Sizing of Swale*

Vegetated swales should generally be used to treat drainage areas of less than 5 acres. However, larger areas can be treated if the following rule of thumb is applied: 500 square feet of swale must be provided for every acre of site to be treated by the swale. Typical designs allow the runoff from the 2-year storm (i.e., the storm that occurs, on average, once every two years) to flow through the swale without causing erosion; however, swales should also have the capacity to pass larger storms (such as the 10-year storm) safely. The swales for the project site have been sized to convey a 10-year storm with 6 inches of freeboard.

## Slope, Soils, and Topography

Ideally, vegetated swales should be used on sites with slopes of less than 4 percent; runoff velocities within the channel can become too high on steeper slopes, causing erosion and inhibiting infiltration and filtering in the swale. Swales can be used in areas with slopes greater than 4 percent, provided that check dams are incorporated every 50 feet. Vegetated swales can be used on most soils, with some restrictions on the most impermeable soils.

## Design Considerations

Swales should generally have a trapezoidal or parabolic cross section with side slopes flatter than 3H:1V. Increasing the wetted perimeter (the length along the edge of the swale cross section where runoff flowing through the swale is in contact with the vegetated sides and bottom of the swale) slows runoff velocities and provides more contact with vegetation, promoting both filtration and infiltration. Flat side slopes also allow runoff entering the vegetated swale from the sides to receive some pretreatment along the side slope. The bottom should be 2–8 ft wide. The minimum width ensures a minimum filtering surface for water quality treatment, and the maximum width prevents braiding (i.e., the formation of small channels within the swale bottom).

Vegetated swales also need a relatively flat longitudinal slope and a dense vegetative cover in the channel, both of which help reduce velocities and protect the channel from erosion.

## *Maintenance Requirements*

Maintenance of vegetated swales primarily involves maintenance of the grass or wetland plant cover. Slopes should be inspected for erosion of rills or gullies on an annual basis (semi-annual the first year). Erosion problems should be corrected as necessary by re-planting native plant species. The maintenance program can be part of the regular landscape maintenance of the site, administered by the homeowners themselves, a homeowner's association, or similar mechanism responsible for maintenance.

## *Pollutant Removal*

Structural storm water management practices can be used to achieve broad resource protection goals, including flood control, channel protection and pollutant removal. Of these, vegetated swales can be used to meet pollutant removal goals.

Few studies are available regarding the effectiveness of vegetated channels; however, what data are available suggest relatively high removal rates for common pollutants. The table below summarizes the results of a study by Schueler (1997), who estimated the removal rates for vegetated channels.

Estimated pollutant removal rates for vegetated channels (Schueler, 1997).

Constituent	Removal Rate
Total Suspended Solids	81%
Total Phosphorous	29%
Nitrate N	38%
Metals	14% - 55%
Hydrocarbons	62%

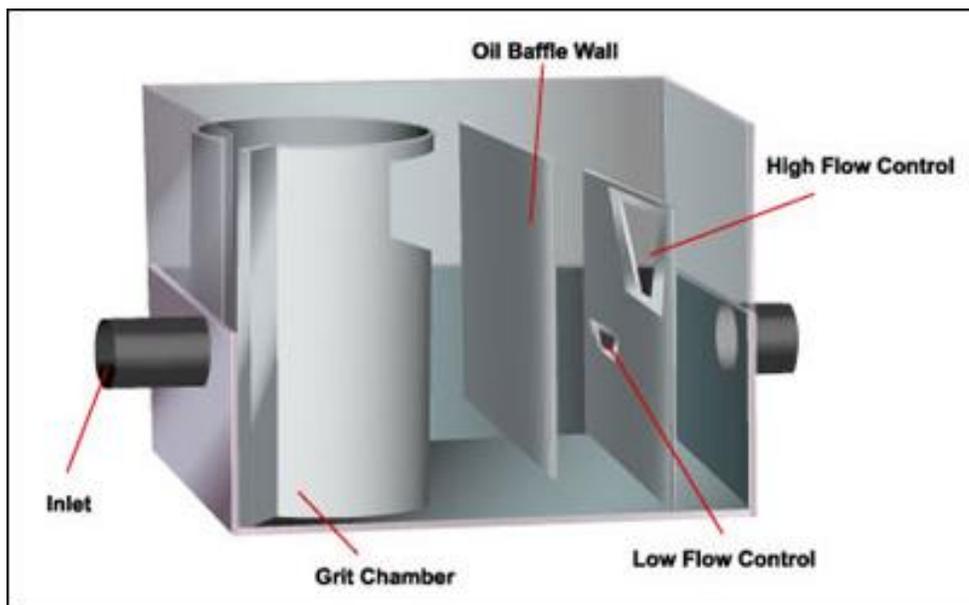
### *Cost Considerations*

A realistic estimate for the construction cost of vegetated swales (excluding design cost and contingencies) would be approximately \$0.50 per square foot, which compares favorably with other storm water management practices.

### **Hydrodynamic Stormwater Separators**

Hydrodynamic separators are flow-through structures with a settling or separation unit to remove sediments and other pollutants that are widely used in storm water treatment. No outside power source is required, because the energy of the flowing water allows the sediments to efficiently separate. Depending on the type of unit, this separation may be by means of swirl action or indirect filtration. The following figure illustrates a typical Vortechnic hydrodynamic separator unit.

Typical Vortechnic hydrodynamic separator unit



### *Project Location*

The vortech unit is proposed at the southeast end of the project.

### *Siting and Design Considerations*

#### Design Considerations

During the Vortechs System design process consideration is given to both the physical constraints of the site and the site-specific flow. Each system is designed differently based on these characteristics, and the internal flow controls are specifically designed to accommodate the expected flows.

#### Sizing the System

Each system is custom designed based on the design conditions provided. The weir, orifice, sump depth, and height of tank will vary depending on the site conditions and performance requirements. The rim and invert elevations will impact the overall height of the unit, the sump depth, and the placement of the weir and orifice. Also affecting the placement of the weir and orifice is the pipe size, the orientation of the internal walls, and the potential for tailwater. The flow rates determine the size of the weir, orifice, and the baffle opening.

#### *Maintenance Requirements*

The Vortechs System requires minimal routine maintenance. However, it is important that the system be inspected at regular intervals and cleaned when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit.

Inspection is the key to effective maintenance and it is easily performed. Vortechics recommends ongoing quarterly inspections of the accumulated sediment. The Vortechs System only needs to be cleaned when inspection reveals that it is nearly full; specifically, when sediment depth has accumulated to within six inches of the dry-weather water level.

Cleanout of the Vortechs System with a vacuum truck is generally the most effective and convenient method. Cleanout should not occur within 6 hours of a rain event to allow the entire collection system to drain down. Properly maintained Vortechs Systems will only require evacuation of the grit chamber portion of the system, in which case only the manhole cover nearest the system inlet need be opened to remove water and contaminants.

*Cost Considerations*

The capital costs for hydrodynamic separators depend on site-specific conditions. These costs are based on several factors including the amount of runoff required to be treated, the amount of land available, and any other treatment technologies that are presently being used. Capital costs can range from \$2,300 to \$40,000 per pre-cast unit. Units which are site-specifically designed typically cost more and the price is based on the individual site.

Operation and maintenance costs vary based on the company contracted to clean out the unit, and may depend on travel distances and cleaning frequency. These costs generally are low (maximum of \$1,000 a year) and vary from year to year.

Maintenance Program for Vortechnic Unit..

<b>Inspection Frequency/Indications:</b>	<u>First Year</u> <input type="checkbox"/> Before wet season begins (October); <input type="checkbox"/> After rainfall events greater than 0.5 inches; <input type="checkbox"/> After wet season (May). <input type="checkbox"/> Quarterly inspections <u>Subsequent Years</u> <input type="checkbox"/> Before wet season begins (October) <input type="checkbox"/> Quarterly inspections
<b>Maintenance Indications</b>	<b>Maintenance Activities</b>
<input type="checkbox"/> Sediment accumulation within 6-inches of the dry-weather water level	<input type="checkbox"/> Remove sediment accumulation
<input type="checkbox"/> Trash and litter present in unit	<input type="checkbox"/> Remove trash and debris

# ATTACHMENT F OPERATION AND MAINTENANCE PROGRAM FOR TREATMENT BMP

*(NOTE: INFORMATION REGARDING OPERATION AND MAINTENANCE CAN BE  
OBTAINED FROM THE FOLLOWING WEB SITE:*

*HTTP://WWW.SDCOUNTY.CA.GOV/DPW/WATERSHEDS/LAND\_DEV/SUSMP.HTML.)*

# ATTACHMENT G

## CERTIFICATION SHEET

This Storm Water Management Plan (SWMP) has been prepared under the direction of the following Registered Civil Engineer. The Registered Civil Engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based. The plans and specifications in this SWMP are not for construction purposes; the contractor shall refer to final approved construction documents for plans and specifications.

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William Lundstrom  
Registered Civil Engineer 061630  
Exp. Date 06/30/09

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Date

