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April 29, 2008

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VIA E-MAIL AND HAND DELIVERY

Mr. Michael Monasmith
Siting Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

**Re: Carlsbad Energy Center Project (07-AFC-6)
Site Preparation and Construction Stormwater Management and Pollution
Prevention Plan**

Dear Mr. Monasmith:

On behalf of Carlsbad Energy Center LLC, please find enclosed herewith fourteen (14) paper copies and one (1) electronic copy of the *Site Preparation and Construction Stormwater Management and Pollution Prevention Plan* prepared for the Carlsbad Energy Center Project. Please note that due to the file size of the related figures only the text of the main document will be electronically served to all parties. We will serve the interested agencies and intervenors with paper copies of the document in its entirety. Should you require additional copies of this document in either format, please do not hesitate to contact Kimberly Hellwig at (916) 319-4742.

Respectfully submitted,

Stoel Rives LLP

Melissa A. Foster

MAF:kjh
Enclosures

cc: See Proof of Service List [Rev. 03/19/2008]

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE
STATE OF CALIFORNIA

Application for Certification for the
CARLSBAD ENERGY CENTER PROJECT

Docket No. 07-AFC-6
PROOF OF SERVICE
(As of 03/19/2008)

DECLARATION OF SERVICE

I, Elizabeth Hecox, declare that on April 29, 2008, I deposited in the United States mail at Sacramento, California with first-class postage thereon fully paid and addressed to those identified below **OR** transmitted via electronic mail consistent with the requirements of the California Code of Regulations, Title 20, sections 1209, 1209.5, and 1210 the following documents:

**CARLSBAD ENERGY CENTER PROJECT (07-AFC-6) SITE PREPARATION AND
CONSTRUCTION STORMWATER MANAGEMENT AND POLLUTION PREVENTION
PLAN**

CALIFORNIA ENERGY COMMISSION

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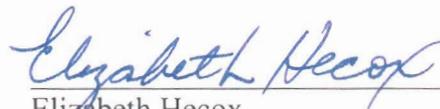
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I declare under penalty of perjury that the foregoing is true and correct.


Elizabeth Hecox

**Carlsbad Energy Center Project
 Site Preparation and Construction
 Stormwater Management and
 Pollution Prevention Plan
 Draft**

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The section includes the following certifications and approval for this Stormwater Pollution Prevention Plan (SWPPP).

- **Compliance Certification** – This certification is to be signed by the project owner or their designated representative (i.e., Project Manager or Project Proponent).
- **SWPPP Preparation Certification** – This certification is to be signed by the individual(s) that prepared the SWPPP.
- **SWPPP Compliance Certification** – This certification is to be signed by the prime contractor(s) and all subcontractors conducting work at the project site.

100.1 SWPPP PREPARATION CERTIFICATION

This Stormwater Pollution Prevention Plan (SWPPP) was developed for Carlsbad Energy Center LLC for the construction of the Carlsbad Energy Center Project (CECP) power station.

Name:	_____
Title:	_____
Company:	_____
Signature:	_____
Date:	_____

Name:	_____
Title:	_____
Company:	_____
Signature:	_____
Date:	_____

100.2 COMPLIANCE CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to require qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine or imprisonment for knowing violations."

Name: _____

Signature: _____

Title: _____ **Date:** _____

Name: _____

Signature: _____

Title: _____ **Date:** _____

Name: _____

Signature: _____

Title: _____ **Date:** _____

100.3 SWPPP COMPLIANCE CERTIFICATION

The project owner shall identify and designate a qualified person or persons to be responsible for ensuring the project's compliance with this SWPPP, the Construction General Permit and the City of Carlsbad's SUSMP requirements for the duration of the project. The responsible party shall be a representative of the project owner that will be on site and can effectively be responsible for the implementation and management of this SWPPP. **Part 1** of this form is to be signed by the individual that is assuming the responsibilities for SWPPP compliance. **Part 2** of this form is to be signed by each subcontractor on the project site

Part 1: SWPPP Certification

"I certify under penalty of law that I am familiar with this document and all attachments. As much as my work requires pollution prevention as described in the General Permit and this document, my company will perform all necessary duties to ensure the Owner/Developer is in compliance with the applicable federal, state, and local stormwater regulations. I understand my roles and responsibilities pertaining to stormwater management and wind-induced erosion. I am aware that there are significant penalties for failure of keeping the Project Site in regulatory compliance until the Notice of Termination is awarded, including the possibility of fine or imprisonment for knowing violations."

On this date the undersigned assumed responsibility for the SWPPP implementation and compliance:

Name	Title	Date
------	-------	------

Signature

On this date the undersigned assumed responsibility for the SWPPP implementation and compliance:

Name	Title	Date
------	-------	------

Signature

On this date the undersigned assumed responsibility for the SWPPP implementation and compliance:

Name	Title	Date
------	-------	------

Signature

Part 2: SWPPP Certification

Each Contractor and subcontractor shall review this SWPPP and complete the following Certification:

“I certify under penalty of law that I am familiar with this document and all attachments. As much as my work requires pollution prevention as described in the General Permit and this document, my company will perform all necessary duties to ensure the Owner/Developer is in compliance with the applicable federal, state, and local stormwater regulations. I understand my roles and responsibilities pertaining to stormwater management and wind-induced erosion. I am aware that there are significant penalties for failure of keeping the Project Site in regulatory compliance until the Notice of Termination is awarded, including the possibility of fine or imprisonment for knowing violations.”

General Contractor		Title
Name	Signature	Date
Subcontractor(s) Name/Signature	Company	Date
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

100.3 ANNUAL COMPLIANCE CERTIFICATION

By July 1 of each year, the Environmental Compliance Manager shall certify that the project's construction activities are in compliance with the requirements of this General Permit and the SWPPP. The Annual Compliance Certification shall be based upon the results and findings of inspection and monitoring requirements described herein. Annual Compliance Certification Notices shall be maintained in Appendix 11 of this SWPPP.

The Construction Manager will amend this SWPPP under the following conditions:

- When an additional BMP is proposed,
- When an alternative BMP or specification is implemented in place of a referenced BMP or specification, and/or
- When a referenced BMP or specification has been modified.

All SWPPP revisions will be documented using the SWPPP Amendment Report (refer to Appendix 2: SWPPP Amendment Report).

This Stormwater Pollution and Prevention Plan (SWPPP) has been developed on behalf of Carlsbad Energy Center LLC for the construction of the Carlsbad Energy Center Project, a proposed net 540.4 megawatt Siemens rapid response combined cycle power plant. The CECF is planned adjacent to the Encina Power Station, located at 4600 Carlsbad Boulevard, within the tank farm east of the railroad tracks. The Encina Power Station, located at 4600 Carlsbad Boulevard in Carlsbad, California, is an active power plant capable of generating approximately 960 megawatts from five units located west of the railroad tracks along Carlsbad Boulevard. The Encina Power Station is owned and operated by Cabrillo Power I LLC, a wholly owned subsidiary of NRG Energy Inc (NRG). Carlsbad Energy Center LLC is likewise a wholly owned subsidiary of NRG.

This SWPPP is designed to meet the intent and conditions of the General Permit for Stormwater Discharge Associated with Construction Activity (General Permit) in accordance with the State Water Resources Control Board (SWRCB), Water Quality Order 99-08-DWQ, National Pollutant Discharge Elimination System (NPDES)¹. This SWPPP has been prepared in accordance with the construction specifications issued for the project.

This SWPPP's major objective is to describe the BMPs for all project activities to reduce or eliminate sediment, and other construction-related pollutants, in stormwater as well as non-stormwater discharges. This SWPPP is specifically designed to:

- Address the construction activities that will be conducted during the project;
- Establish the roles and responsibilities of site personnel for management of this SWPPP;
- Describe the BMP identification and selection process;
- Describe where and when the BMPs will be installed; and
- Describe the inspection and monitoring of the BMPs to determine their effectiveness.

300.1 REGULATORY BACKGROUND

300.1.1 State of California's General Permit for Stormwater Discharge Associated with Construction Activities (General Permit)

In 1972, the Federal Water Pollution Control Act (also referred to as the Clean Water Act [CWA]) was amended to provide that the discharge of pollutants to waters of the United States from any point source is unlawful unless the discharge is in compliance with a NPDES permit. The 1987 amendments to the CWA added Section 402(p) established a framework for regulating municipal and industrial stormwater discharges under the NPDES program. On November 16, 1990, the U.S. Environmental Protection Agency (USEPA) published final regulations that establish stormwater permit application requirements for specified categories

¹ Amended and reissued 2002

of industries. The regulations provide that discharges of stormwater to water of the United States from construction projects that encompass one (1) or more acres of soil disturbance are effectively prohibited unless the discharge is in compliance with an NPDES permit.

The SWRCB has elected to adopt only one statewide General Permit that will apply to all stormwater discharges associated with construction activity except from those on Tribal Lands, in the Lake Tahoe Hydrologic Unit, and those performed by the California Department of Transportation (Caltrans). The General Permit requires all dischargers to do the following where construction activity disturbed 1 acre or more:

- Develop and implement a SWPPP which specifies BMPs that will prevent or reduce construction-related pollutants from coming in contact with stormwater (rainfall and surface drainage) and with the intent of keeping products of erosion from moving off-site into the receiving water; and
- Eliminate non-stormwater discharges to storm sewer systems and other waters of the nations; and
- Perform inspections of all BMPs to assess performance effectiveness

300.1.2 City of Carlsbad SUSMP Requirements

On February 21, 2001 the San Diego Regional Water Quality Control Board (Regional Board) issued the Municipal Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Municipal Permit to the City and County of San Diego, the Port of San Diego, and 17 other cities in the region, including the City of Carlsbad. The Municipal Permit was revised and reissued effective January 24, 2007.

The Municipal Permit requires the development and implementation of stormwater regulations addressing stormwater pollution issues in development planning and construction associated with private and public development projects. Specifically, private and public development projects are required to include stormwater best management practices (BMPs) both during construction and in the project's permanent design to reduce pollutants discharged from the project site, to the Maximum Extent Practicable. The primary objectives of the Stormwater Standards are to (1) effectively prohibit non-stormwater discharges; and (2) reduce the discharge of pollutants from stormwater conveyance systems to the Maximum Extent Practicable both during construction and throughout the use of a developed site.

To address pollutants that may be generated from new development once the site is in use, the Municipal Permit further requires that the City implement a series of permanent BMPs described in a document called the Model Standard Urban Stormwater Mitigation Plan, or SUSMP, which was approved by the Regional Board on June 12, 2002. The City of Carlsbad, revised and reissued the municipality's SUSMP requirements effective March 24, 2008 in accordance with the 2007 Municipal Permit. The City's SUSMP requirements apply to all projects requiring any permit approvals on or after December 2, 2002.

The City of Carlsbad requires that development and significant redevelopment projects that fall under the category of "priority projects" include BMPs to ensure that those projects reduce potential urban pollutant runoff. Redevelopment is described as land-disturbing activities that result in the creation, addition, or replacement of 5,000 square feet or more of impervious

surface area on an already developed site. Redevelopment includes, but is not limited to the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of a routine maintenance activity; and land disturbing activities related to structural or impervious surfaces.

Actions that require a discretionary action by the City of Carlsbad (i.e., planned industrial permits, redevelopment permits, coastal development permits) should complete the Construction Activity Standards Questionnaire (Questionnaire). The Questionnaire determines if the project is subject to the Priority Project Permanent Stormwater BMP Requirements and/or the Standard Permanent Stormwater BMP Requirements conditions of concern. Table 1 details Carlsbad's permanent stormwater BMP requirements (Note- References made in the Table refer to the City of Carlsbad's Stormwater Standards Manual, refer to Appendix 12).

Projects are encouraged to address the City of Carlsbad's permanent BMP requirements through the creation of a hydrologically functional project design that attempts to mimic the natural hydrologic regime by:

- To ensure that the owners/contractors take full responsibility for managing stormwater pollution caused by their activities;
- To ensure that stormwater BMPs are properly documented and implemented and are functioning effectively;
- To identify maintenance (e.g., sediment removal) and repair needs; and
- To ensure that the project proponents implement their stormwater management plans.

Self-inspections performed by a qualified contact person should adhere to the following schedule:

- Perform daily weather forecasting at all times;
- Inspect at 24-hour intervals during extended rainfall events;
- Perform daily evaluations as earth moving/grading is being conducted during the wet season;
- Perform weekly (every 7 days) in the dry season as earth moving/grading is progressing; and
- Submit self-inspection checklists to the City's project inspector on a weekly basis during the rainy season.

**Table 1
City of Carlsbad SUSMP Requirements
Permanent Stormwater BMP Requirements**

	Site Design BMPs ⁽¹⁾	Source Control BMPs ⁽²⁾	BMPs Applicable to Individual Priority Project Categories ⁽³⁾										Treatment Control BMPs ⁽⁴⁾	
			a. Private Roads	b. Residential Driveways & Guest Parking	c. Dock Areas	d. Maintenance Bays	e. Vehicle Wash Areas	f. Equipment Wash Areas	g. Outdoor Processing Areas	h. Surface Parking Areas	i. Fueling Areas	j. Hillside Landscaping		
Standard Projects	R	R	R	R	R	R	R	R	R	R	R	R	R	O
Priority Projects:														
Detached Residential Development	R	R	R	R									R	S
Attached Residential Development	R	R	R											S
Commercial Development greater than 100,000 ft ²	R	R			R	R	R		R					S
Heavy industry /industrial	R	R	R		R	R		R	R	R				S
Automotive Repair Shop	R	R			R	R	R	R				R		S
Restaurants	R	R			R			R						S
Steep Hillside Development greater than 5,000 ft ²	R	R	R										R	S
Parking Lots	R	R									R ⁽⁵⁾			S
Retail Gasoline Outlets	R	R				R	R	R		R	R			S
Streets, Highways & Freeways	R	R												S
<p>R = Required; select one or more applicable and appropriate BMPs from the applicable steps in Section III.2.A-D, or equivalent as identified in Appendix B.</p> <p>O = Optional/ or may be required by City staff. As appropriate, applicants are encouraged to incorporate treatment control BMPs and BMPs applicable to individual priority project categories into the project design. City staff may require one or more of these BMPs, where appropriate.</p> <p>S = Select one or more applicable and appropriate treatment control BMPs from Appendix B.</p> <p>(1) Refer to Section 2.3.3.1</p> <p>(2) Refer to Section 2.3.3.2.</p> <p>(3) Priority project categories must apply specific storm water BMP requirements, where applicable. Priority projects are subject to the requirements of all priority project categories that apply. Refer to Section 2.3.3.3</p> <p>(4) Refer to Section 2.3.3.4</p> <p>(5) Applies if the paved area totals >5,000 square feet or with >15 parking spaces and is potentially exposed to urban runoff.</p>														

300.1.3 City of Carlsbad Construction SWPPP Standards and Requirements

Section 3 of the City of Carlsbad's 2008 Stormwater Standards Manual establishes standards and requirements for development of Construction Stormwater Pollution Prevention Plans to ensure compliance with the City's Municipal Permit and Stormwater Ordinance. The Construction SWPPP Standards Manual establishes a tiered-system for classification of construction projects, based on the project's perceived threat to water quality; establishes minimum SWPPP requirements for each tier; establishes minimum BMPs for each tier; establishes minimum BMPs for projects that discharge to a 303 (d) listed receiving water, including mandating the use of Active Treatment Systems under specific conditions; and requires the project proponent to certify compliance to the applicable Construction SWPPP tier level.

Every construction activity within the City that has the potential to negatively affect water quality should prepare a construction storm water pollution prevention plan (Construction SWPPP) whether or not the City issues a construction permit for the activity. To ensure compliance with all the various State and Regional permitting regulations, the City established a three-tiered system for the preparation of Construction SWPPPs. The tiers range from Tier 3 representing the highest threat to water quality to Tier 1 representing the lowest threat to water quality. The threshold triggers for each of the three tier levels are generally described below together with a reference to the applicable Construction SWPPP standards.

Tier 3 - Construction activities that impact one or more acres (individually or cumulatively through phased construction) or that pose a significant potential for storm water quality impairment should prepare a Tier 3 Construction SWPPP in conformance with the standards and requirements of the Construction General Permit and City Standards.

Tier 2 – Construction activities that impact less than one acre and that pose a moderate threat to storm water quality should prepare a Tier 2 Construction SWPPP in conformance with City Standards. In the case of small linear underground/overhead utility projects, the project should also demonstrate compliance with the General Linear Utility Permit.

Tier 1 – Construction activities that impact less than one acre and pose a low threat to storm water quality should prepare a Tier 1 Construction SWPPP in conformance with City Standards. In the case of small linear underground/overhead utility projects, the project should also demonstrate compliance with the General Linear Utility Permit.

The CECP construction project is considered a Tier 3 project.

Advanced Treatment is defined in the Municipal Permit as the use “of mechanical or chemical means to flocculate and remove suspended sediment from runoff from construction sites prior to discharge.” If a project meets all of the following criteria, advanced treatment will be required:

- a. All or part of the site is within 200 feet of waters named on the CWA Section 303(d) list of Water Quality Limited Segments as impaired for sedimentation and/or turbidity;

- b. The disturbance area is greater than five acres, including all phases of the development;
- c. The disturbed slopes are steeper than 4:1 with at least 10 feet of relief, and drain toward a Section 303(d) listed receiving water for sedimentation or turbidity;
- d. The site contains a predominance of soils with USDA-NRCS Erosion factors kf greater than or equal to 0.4.

300.2 NOTICE OF INTENT & WASTE DISCHARGE IDENTIFICATION (WDID) NUMBER

The Waste Discharge Identification (WDID) Number for the CECF Construction Project is _____ . A copy of the Notice of Intent (NOI) and the WDID Confirmation Notice are included in Appendix 1.

300.3 ROLES AND RESPONSIBILITIES

Establishing and maintaining a SWPPP that minimizes water pollution, both as a written document and as implemented in the field, involves several entities. The Project Manager, Construction Superintendent, Environmental Compliance Manager and SWPPP Inspector are on the same team with regard to keeping the site and construction practices in compliance with the stormwater pollution prevention BMPs described in Section 500 of this document. Below are the SWPPP's key roles and the highlights of each person's responsibilities:

300.3.1 Construction Project Manager

As a representative of the Carlsbad Energy Center LLC, the Construction Project Manager is responsible for overall project compliance and inspection. The Construction Manager is also responsible for overseeing the general and significant project activities and verifying that the contractor and subcontractors are fulfilling their contractual responsibilities to keep the site in compliance. The Construction Manager, as a representative of the project owner, is ultimately responsible for compliance of the project with the General Construction Permit and is responsible for verifying the contractor is implementing the SWPPP.

300.3.2 Construction Supervisor/Superintendent

As a representative of the prime contractor, the Construction Supervisor is responsible for the day-to-day construction-related activities and is responsible for completion of the contracted work. In addition, the Construction Supervisor is responsible for the following as it relates to the SWPPP.

- a. Implementing and monitoring the SWPPP program to verify and certify compliance;
- b. Verifying that the wet weather monitoring is conducted and the results documented as described in Section 6 of this document; and

- c. Verifying that all appropriate site personnel have been trained in accordance with Section 8 of this document:
- d. Conduct BMP Inspections at least once a week and document the inspection results as described in Section 6 of this document.
- e. Based on the BMP inspection findings, maintain, service, repair and/or replace damaged and/or ineffective BMPs to ensure that construction related stormwater pollutants do not discharge offsite;
- f. Prepare and maintain the Daily Construction Activity Logs. The purpose of the Daily Construction Activity Log is to track ongoing construction activities and to ensure that all appropriate BMPs are in place, properly installed and maintained prior to commencement of any construction activity;
- g. Verify that that areas inactive for more than seven² (7) days are stabilized in accordance with Section 5: *BMP Implementation and Inspection Schedule*; and
- h. Verify that the BMPs are in place and operational at the end of a storm event and to immediately recommend corrective actions if any BMP has been breached and/or is demonstrated to be ineffective in controlling discharge of site-specific stormwater pollutants.

300.3.3 Environmental Compliance Manager

The CECP Environmental Compliance Manager will be responsible for verifying and documenting that the project is meeting the conditions of project's permit requirements, mitigation monitoring requirements and the bid specifications. In this role the Environmental Compliance Manager will manage an oversight and inspection program and work closely with the project management team throughout construction to identify any potential problems as they relate to project compliance

300.3.4 SWPPP Inspector

On behalf of the Construction Project Manager and/ or prime contractor the SWPPP Inspector will provide oversight management of the SWPPP document and conduct inspections to evaluate project compliance with this document and the Construction General Permit. The SWPPP Inspector will be trained and certified in stormwater quality management, erosion and sediment control practices and/or in Stormwater BMP inspection and assessment. The SWPPP inspector will work closely with project's Environmental Compliance Manager to address any issues identified by the Environmental Compliance Manager.

300.4 CONTACT INFORMATION

² In accordance with the City of Carlsbad's SUSMP Requirements

TABLE 2 Project Contact Information				
Name	Firm	Role	Telephone(s)	e-mail
		Construction Project Manager		
		Construction Supervisor		
Sheila Henika	Cabrillo I LLC	Environmental Compliance Manager	760-268-4018	
		SWPPP Inspector		

300.5 STORMWATER POLLUTION PREVENTION PLAN CHECKLIST

A summary checklist of the information contained in this SWPPP and reference to where the information is located is provided in Table 3 below.

TABLE 3 Stormwater Pollution Prevention Plan Checklist		
Project Information	Permit Section	Section in SWPPP
GENERAL CONSTRUCTION PERMIT REQUIREMENTS		
Vicinity Map (graphic)		
Major roadways, geographic features or landmarks	A.5.a.1	Figures 1,2
Site perimeter	A.5.a.1	Figures 1,2
Geographic features	A.5.a.1	Figures 1,2
General topography	A.5.a.1	Figures 1,2
Site Map (graphic)		
Site perimeter	A.5.a.2	Figures 1,2
Existing and proposed buildings, lots, and roadways	A.5.a.2	Figures 1,2
Storm water collection and discharge points	A.5.a.2	Figures 3A,3B, 7B, 7D
General topography before and after construction	A.5.a.2	Figures 1,2
Anticipated discharge location(s)	A.5.a.2	Figures 3A,3B, 7B, 7D
Drainage patterns	A.5.a.2	Figures 3A,3B, 7B, 7D
Relevant drainage areas	A.5.a.2	Figures 3A,3B, 7B, 7D
Temporary on-site drainage	A.5.a.2	Figures 3A,3B, 7B, 7D
Drainage (graphic)		
Drainage patterns	A.5.b.1	Figures 3A,3B, 7B, 7D
Slopes after major grading	A.5.b.1	Figures 2, 7D
Calculations for storm water run-on	A.5.b.1	Appendix 7
BMPs that divert off-site drainage from going through site	A.5.b.1	Figures 7A-7D
Storm Water Inlets (graphic)		
Drainage patterns to storm water inlets or receiving water	A.5.b.2	Figures 3A,3B, 7B, 7D

TABLE 3 Stormwater Pollution Prevention Plan Checklist		
Project Information	Permit Section	Section in SWPPP
BMPs that protect storm water inlets or receiving water	A.5.b.2	Figures 7A-7D
Site History/Past Site Usage		
Description of toxic materials treated, stored, or spilled on site	A.5.b.3	Section 500.1
BMPs that minimize contact of contaminants with storm water	A.5.b.3	Section 500.2-500.4
Location of Areas Designated for: (graphic)		
Soil or waste storage	A.5.b.4	Figures 7A-7D
Vehicle storage & service	A.5.b.4	Figures 7A-7D
Construction material loading, unloading, and access	A.5.b.4	Figures 7A-7D
Equipment storage, cleaning, maintenance	A.5.b.4	Figures 7A-7D
BMP Descriptions for: (graphic or narrative)		
Waste handling and disposal areas	A.5.b.5	Section 500.2-500.5
On-site storage and disposal of construction materials and waste	A.5.b.5	Section 500.2-500.5
BMPs to minimize exposure of storm water to construction materials, equipment, vehicles, waste	A.5.b.5	Section 500.2-500.5
Post Construction BMPs	A.5.b.6, A. 10	Section 800
Additional Information		
Description of other pollutant sources and BMPs that cannot be shown graphically	A.5.c.1	Section 500.1
Pre-construction control practices	A.5.c.1	Section 300.6
Inventory of materials and activities that may pollute storm water	A.5.c.2	Section 500.1, Tables 4,5
BMPs to reduce/eliminate potential pollutants listed in the inventory	A.5.c.2	Section 500.2-500.4
Runoff coefficient (before & after)	A.5.c.3	Appendix 7
Percent impervious (before & after)	A.5.c.3	Section 300.10.6
Copy of the NOI and WDID #	A.5.c.4	Appendix 1
Construction activity schedule	A.5.c.5	Sections 300.7-300.9, Appendix 10
Contact information	A.5.c.6	Section 300.4, Table 2
EROSION CONTROL		
The SWPPP shall include: (graphic)		
Areas of vegetation on site	A.6.a.1	Figures 2, 3B, 6, 7B, 7D
Areas of soil disturbance that will be stabilized during rainy season	A.6.a.2	Figures 2, 3B, 6, 7B, 7D
Areas of soil disturbance which will be exposed during any part of the rainy season	A.6.a.3	Figures 2, 3B, 6, 7B, 7D
Construction phase / BMP sequencing schedule including supplemental pre-rain action plan for erosion control measures	A.6.a.4	Sections 300.7-300.9, Appendix 10, Tables 6,7
BMPs for erosion control	A.6.b	Figures 2, 7A-7D, Tables 6,7
BMPs to control wind erosion	A.6.c	Figures 2, 7A-7D, Tables 6,7
SEDIMENT CONTROL		
Description/Illustration of BMPs to prevent increase of sediment load in discharge	A.8	Section 500.2-500.6, Tables 6, 7

TABLE 3 Stormwater Pollution Prevention Plan Checklist		
Project Information	Permit Section	Section in SWPPP
Construction phase / BMP sequencing schedule including supplemental pre-rain action plan for sediment control measures	A.8	Sections 300.7-300.9, Appendix 10, Tables 6,7
NON-STORM WATER		
Description of non-storm water discharges to receiving waters	A.9	Sections 300.10, 500.4, Tables 6,7
Locations of discharges	A.9	Figures 3A, 3B
Description of BMPs	A.9	Sections 300.10, 500.4, Tables 6,7
Name and phone number of qualified person responsible for non-storm water management	A.9	Section 300.4, Table 2
POST-CONSTRUCTION		
Description and location of BMPs	A.10	Sections 800, 300.6.7
Operation/Maintenance of BMPs after project completion (including funding)	A.10	Section 800
MAINTENANCE, INSPECTIONS, AND REPAIR		
Name and phone number of qualified person responsible for inspections	A.11	Section 300.4, Table 2
Inspection checklist: date, weather, inadequate BMPs, visual observations of BMPs, corrective action, inspector's name, title, signature	A.11.a-f	Section 600, Appendix 3
OTHER REQUIREMENTS		
Documentation of all training	A.12	Section 500.6, Appendix 4
List of Contractors/Subcontractors	A.13	Table 2
Description of site inspection plans	B.3	Section 500.6, Appendix 4
Compliance certification (annually 7/1) if project is under active construction	B.4	Section 100.3, Appendix 11
Noncompliance reporting	B.5	Section 600.4
Records of all inspections; compliance certifications; noncompliance reports, etc. should be kept for at least three years	B.6	Section 600
Monitoring program for sediment contribution from direct discharges to impaired water bodies	B.7	Sections 600, 700
Monitoring program for pollutants not visually detectable in storm water (non-visible pollutants)	B.8	Sections 600, 700
Signed Certification for SWPPP, reports, amendments, etc. Who is authorized to sign and by what authority has the duly authorized representative been assigned?	C.9,10	Sections 300.3, 500.3
Location of General Permit and SWPPP on site during construction activities	C. 17	Sections 100, 600, Appendix 8
CARLSBAD MS4 PERMIT REQUIREMENTS		
General Site Management	MP D.2.c CSWSM 3.3	Sections 500.2-500.6
Pollution Prevention		Sections 500.2-500.6
Stormwater Management Plan		Section 800
Erosion and Sediment Control		Sections 500.2-500.6
Advanced Treatment Control		Sections 500.2-500.6

**TABLE 3
Stormwater Pollution Prevention Plan Checklist**

Project Information	Permit Section	Section in SWPPP
303 (d) Listed Waters		Sections 500.2-500.6
Inspection of Construction Site	MP D.2.d CSWSM 3.4	Section 600
Standard Stormwater Pollution Prevention Notes	CSWSM 3.3.10	Appendix 7

300.6 PROJECT DESCRIPTION

300.6.1 Carlsbad Energy Center Project (CECP)

The construction project is located in San Diego County within the City of Carlsbad, California (Figure 1: Site Vicinity Map). The site is located in an industrial area in the City of Carlsbad, in San Diego County adjacent to the Encina Power Station. The CECP will consist of the following components:

- 540.4-megawatts (MW) net (at 73.6 degrees Fahrenheit (°F) with steam power augmentation and evaporative cooling), 558 MW gross combined-cycle generating facility configured using two trains with one natural-gas-fired combustion turbine generators (CTG) and one steam turbine generator (STG) per train (or unit).
- Interconnection to the existing electrical transmission system via 138-kilovolt (kV) and 230-kV lines that connect to the existing 138-kV and 230-kV SDG&E substations located on the Encina Power Station.
- Natural gas will be delivered to the site via 18-inch-diameter pipeline. The natural gas will flow through a flow metering station, gas scrubber/filtering equipment, a gas pressure control station, and electric-driven booster compressors prior to entering the combustion turbines
- The CECP proposes to discharge sanitary wastewater to the City of Carlsbad's Encina Wastewater Authority (EWA) sanitary sewer system. A new line connection will be added to connect to the Authority's system. A new 12-inch sanitary sewer line would exit the plant site from the west side of the site and connect with the EWA's existing wastewater pipe which runs immediately adjacent to the plant site on the west side, parallel to the existing rail line. The total distance of the new line would be approximately 1,100 feet.
- CECP proposes to use California Code of Regulation (CCR) Title 22 reclaimed water that would be supplied by City of Carlsbad and delivered to the CECP via a new 12-inch pipeline from the interconnection point at Cannon Road and Avenida Encinas (approximately 3,700 feet long).
- CECP will use City of Carlsbad potable water (as needed) by connecting to an existing water main located approximately 1,100 feet from the project site.

Figure 2: CECP Plot Plan shows the location of the CECP generating facility, electric transmission lines, natural gas pipeline, reclaimed water supply pipeline, and potable water supply line.

In preparation of construction of the CECP power plant, tanks 5, 6 & 7 of the East Tank Farm will be demolished; the contaminated soil will be remediated; the lateral berms removed; the CECP power plant's new berms constructed; the new access roads into the CECP site constructed; and disturbed soil subsequently stabilized under CEC approval.

The project will be constructed in six (6) phases:

1. Site Preparation: Tank Demolition and Soil Remediation;
2. Installation of Pipelines (Linear Construction);
3. Lateral Berm and Pavement Removal;
4. CECP Berm and Access Road Construction;
5. CECP Power Plant Construction (Vertical Construction)
6. Post-Construction Permanent Stormwater BMP Installation & Site Stabilization

300.6.2 Site Preparation

The East Tank Farm demolition phase consists of the demolition and removal of three fuel storage tanks (tanks 5, 6, and 7) and associated piping, pumps and other processing equipment, and remediation of contaminated soils identified beneath the tanks and associated equipment and piping. Fuel oil Tank 4 will be left in place and will continue to provide backup fuel oil to the Encina Power Station for use in the event of an emergency loss of natural gas, as required by the California Independent System Operator to maintain electrical system reliability.

The East Tank Farm, consisting of Tanks 5, 6, and 7, occupy approximately 11 acres in the northeast section of the existing Encina power station site. The tanks are located within impoundment basins and separated by concrete-coated earthen berms. The top of the two lateral berms between tanks 5 and 6 and tanks 6 and 7 are at an elevation of 54 feet above mean sea level (msl). The berms are constructed at a 1.5 to 1 slope and are approximately 20 to 25 feet high from the bottom of the Tank Farm impoundment.

At the bottom of the each tank basin, the footprint of each tank is surrounded by a six-inch layer of gravel. Dike drain sump structures, inlets, and 18-inch diameter corrugated metal drainage pipes line the perimeter of each basin. A drain rock layer, 4-inches thick, overlays the bottom 15 feet of the slopes of the earthen berms. The slopes of the earthen berms and drain rock layer are covered with a two-inch thick layer of gunite, reinforced with 6 x 6 – 10/10 welded wire fabric. The dike drains are connected to sump pumps which are controlled by manually actuated valves that pump the contained surface drainage offsite discharge to the Lagoon. Refer to Figures 3A: *Stormwater Drainage Outfall Locations* and 3B: *Drainage Sheds and Discharge Locations* for additional drainage details.

Tanks 5, 6 and 7 formally contained No. 6 fuel oil. Tank 5 was constructed with a pontoon floating roof and holds a nominal net capacity of 250,000 barrels (bbl) or 10,500,000 gallons. The tank has a 240-foot diameter and a 32-foot height, with a minimum roof height of 4.6 feet. Tank 6 was constructed with a double deck floating roof and holds a nominal net capacity of 445,000 bbl or 18,690,000 gallons. The tank has a 315-foot diameter and a 32-foot height, with a minimum roof height of 5.5 feet. Tank 7 was constructed with a double deck floating roof and holds a nominal net capacity of 450,000 bbl or 18,900,000 gallons. The tank has a 318-foot diameter and a 32-foot height, with a minimum roof height of 6 feet.

The three tanks and associated appurtenances will be dismantled within the recessed tank farm impoundment, and the respective waste materials generated will be transported off-site for disposal or recycling. Removal of fuel and cleaning of the tanks will be performed prior to the tank demolition and soil remediation project as part of plant maintenance in accordance with the

Encina Power Station's current Industrial Stormwater Pollution Prevention Plan. Additionally asbestos and lead-based paint abatement associated with the tank structures will be completed as part of planned maintenance activities and pursuant to permit requirements of San Diego Air Pollution Control District prior to the tank removal and soil remediation project.

Tank Removal activities include demolition and removal of the following equipment:

- Tanks 5, 6, and 7, including all tank roofs, tank floors, and tank walls;
- All associated above and below ground piping and structures;
- Associated catwalks, walkways and floors;
- Concrete and concrete masonry unit walls and slabs;
- Electrical conduit, lighting and ballasts, and motor control centers; and
- Mechanical equipment, valves, and all appurtenances and other related material.

Tank Disassembly and Disposal

During demolition the tank components and equipment will be cut apart using heavy equipment, torches, and/or pneumatic cutting tools. An excavator with a grapple attachment and laborers in man-lifts will remove the corrugated exterior siding and insulation on the tanks. An excavator with a shear attachment will cut the tank roofs. Laborers in man-lifts will cut steel from tank walls which will be dropped to the tank floor towards the tank interior. Once on the tank floor or ground, the large metal pieces will be cut, using hydraulic shears or cutting torches, into smaller pieces for easy transport and disposal. The tank floor will be cut last using either heavy equipment, torches or pneumatic cutting tools.

All scrap steel will be appropriately sized and then transported to offsite to a scrap metal recycling facility. Excavators and loaders will load demolition debris directly from the Tank Farm impoundment area into dump trucks for off-site transportation and disposal to a local permitted landfill in accordance with California regulations. The steel from all metal tanks will be transported to a scrap yard for recycling in accordance with California regulations. Steel scrap yards will sell the steel to mills to melt in furnaces for future use.

Conveyance piping to the tanks is primarily aboveground, but is directed through the berms. The conveyance piping systems and other appurtenances include the following:

- No. 6 fuel oil fill line system;
- No. 6 fuel oil supply system to Boilers 4 and 5 and associated piping;
- Saturated steam system;
- Electrical systems including instrumentation and controls;
- South control house equipment;
- North control house equipment;
- Service/control air systems;
- City water system;
- Fire protection (foam) system; and
- Secondary containment sump pump systems

Conveyance piping scheduled for removal will be tagged prior to dismantling. Pipes will be tagged from the tanks and traced back to the source as far as practical. Prior to dismantling, the pipes will be checked for liquid contents that may be present from prior decontamination efforts. Holes may be drilled along the pipes to check for fluids.

To the greatest extent practicable, pipes will be dismantled only after all contents have been drained and managed using appropriate protocols. Portable containment units (i.e., plastic sheeting equipped with impervious berms) will be placed on the ground surface prior to draining or cleaning any pipes. All residues and contaminants will be handled and managed appropriately prior to disposal offsite.

Pipes containing hardened No. 6 fuel oil may have to be cleaned after removal. Pipes containing hardened No. 6 fuel oil will be sheared and sized and placed in roll-off containers for off-site transportation to a disposal facility for cleaning. Once pipe segments have been cleaned at the disposal facility, they will be recycled as scrap. If the pipes containing hardened No. 6 fuel oil cannot be cleaned for scrap, the receiving facility will be responsible for proper disposal of the contaminated pipe segments. It is anticipated that all conveyance piping can be recycled at an appropriate facility.

Remediation Activities

Soil and/or groundwater remediation may be required for potential contamination underneath, and/or adjacent to, the demolished fuel oil storage tanks conveyance piping and other appurtenances. It is reported that No. 2 oil was placed underneath the storage tanks during the original construction as a corrosion prevention technique. Soil characterization and removal of reported No. 2 oil impregnated sand cushion from the footprint locations of former Tanks 5, 6, and 7 will occur when tank demolition is complete, and necessary remediation will be performed pursuant to the requirements of the San Diego County Department of Environmental Health (DEH) Site Assessment and Mitigation (SAM) Program.

Potentially impacted soils will be characterized, excavated, properly manifested, and transported off-site for disposal and/or recycling. The results of the sampling and analysis will be used to establish cleanup levels. Based on those levels, a Soil Remediation Plan will be developed based on requirements of the responsible agencies.

The Soils Remediation Plan will include identification of appropriate and effective stormwater pollution prevention BMPs designed to prevent or reduce stormwater and surface drainage exposure to potential contaminated soils. The Soils Remediation Plan is incorporated into this SWPPP by reference (refer to Appendix 9). The BMPs stipulated in the Soil Remediation Plan are required in addition to the BMPs mandated in this SWPPP and will be implemented, inspected and maintained in accordance to all applicable provisions of this SWPPP. Soil disturbing activities associated with this phase of the construction will be limited to sampling and excavation of contaminated soils located within the former tanks' footprint. Contaminated soils will be transported offsite to an approved waste recycling and disposal facility.

Generated construction wastes (waste asphalt/concrete debris) will be staged within the basin until shipped offsite for recycling and/or disposal at a facility authorized to receive construction-related wastes. As part of the project initial mobilization, disturbed soil areas shall be stabilized in accordance with Section 500 of this SWPPP.

300.6.3 Linear Construction

Construction of the CECP power plant will include:

- Installation of 1,100 foot-long 18-inch diameter nature gas pipeline: This 1,100-foot-long pipeline will extend from the existing So Cal Gas transmission pipeline (Line TL

2009, “Rainbow line”) that runs immediately adjacent to the plant site, on the west side parallel to the existing rail line;

- Installation of the 12-inch diameter 1,100-foot long sanitary sewer line. If approved, the new 12-inch sanitary sewer line would exit the plant from the west side of the site and connect with the Encina Water Authority’s existing wastewater pipe which runs immediately adjacent to the plant site on the west side, parallel to the existing rail line;
- Installation of the 12-inch diameter 3,700-foot long Title 22 reclaimed water pipeline. If approved, the Title 22 reclaimed water will be delivered to the CECP via the new 12-inch pipeline from the interconnection point at Cannon Road and Avenida Encinas; and
- Installation of the 1,100-foot long potable water pipeline. CECP will use City of Carlsbad potable water by connecting to an existing water main located approximately 1,100 feet from the project site.

Installation of the pipelines will consist of trenching to construct the pipeline corridors; temporary stockpiling of excavated soils along pipeline corridors; installation of pipeline runs; testing of pipeline functionality; backfilling trenches; and stabilization of disturbed soil areas.

300.6.4 Lateral Berm and Pavement Removal

Site preparation for the CECP includes removal of the existing lateral berms and access ramps between former Tanks 5, 6, and 7. Removal of the two intermediate berms and associated access ramps will provide an open, generally flat, site area for the CECP. The extent of intermediate berm removal needed to prepare the CECP site is depicted in Figure 4: Berm Removal Locations.

Prior to initiation of the vertical construction phase the paved areas of the basin’s invert will be demolished and the area scraped to bare soils. Generated construction wastes (waste asphalt and concrete debris) will be staged within the basin until shipped offsite for recycling and/or disposal at a facility authorized to receive construction-related wastes. Disturbed soil areas shall be stabilized in accordance with Section 500 of this SWPPP.

300.6.5 CECP Berm and Access Road Construction

The total volume of soils excavated as part of berm removal is approximately 46,700 cubic yards. This material will be used as fill material to reconstruct CECP power blocks’ berm (Refer to Figure 5: CECP Berm Construction); construction of a new boundary berm along the west side of the CECP site (refer to Figure 2: CECP Plot Plan); and grade and construct new access roads into the CECP power plant. The west side berm will be approximately 11 feet high, with crest level at approximately 66 feet above mean sea level. The total length of the west side berm sections will be about 850 feet.

300.6.6 CECP Facility Construction

The project includes construction of two trains of Siemens rapid response combined cycle (“R2C2”) generating units. The two new units (designated Units 6 and 7) will be on the northeast

area of the existing site, between the existing rail line and Interstate 5 highway, occupying approximately 23 acres. Construction of the CECP power plant will include:

- Construction of the 540.4MW combined-cycle generating facility; and
- Interconnection to the existing electrical transmission system;

During construction, approximately 3 to 4 acres of the existing Encina Power Station west of the railroad tracks will be used for construction worker parking. This area is currently used as asphalt parking overflow for employees.

Approximately 7 to 9 acres on the Encina Power Station will be used for onsite construction equipment/material laydown. No offsite construction worker parking or construction equipment/material laydown are anticipated to be required for the construction of the CECP (see Figure 6: Project Boundaries and Figures 7A-7D: WPCDs). These areas are currently vacant areas and/or developed with asphalt surfaces.

Materials and equipment will be delivered by truck and rail. Construction truck deliveries access will be from Avenida Encinas and Carlsbad Boulevard, as shown on Figure 6: Project Boundaries and Figures 7A-7D: WPCDs. An existing railroad spur off of the regional rail line paralleling the site is located adjacent to the west side of the project site and will be available for delivery of large or heavy equipment.

300.6.7 Post-Construction Permanent Stormwater BMP Installation

The City of Carlsbad requires that development and significant redevelopment projects that fall under the category of “priority projects” include BMPs to ensure that those projects reduce potential urban pollutant runoff. The CECP post-construction BMPs will include:

- Installation of in-ground pretreatment system (i.e., oil/water separation and sand media filtration);
- Installation of a bio-infiltration basin designed to retain onsite the 2 year-24 hour storm event; and
- Permanent stabilization of areas of disturbed soils

Refer to Section 9 of this SWPPP for additional detail and discussion of the CECP site’s permanent stormwater BMP commitments.

300.7 PROJECT SCHEDULE

Construction of the generating facility, from tank demolition to commercial operation, is expected to begin in the second quarter of 2009 and will take approximately 28 months, in accordance with the following schedule:

Phase	Construction Activity	Period
1	Site Preparation	2 nd Quarter 2009: 2-3 Months
2	Linear Construction	2 nd Quarter 2009: 1-2 Months
3	Berm and Pavement Removal	2 nd Quarter 2009: 1-2 Months

Phase	Construction Activity	Period
4	Berm and Access Road Construction	3 rd Quarter 2009: 1-2 Months
5	CECP Facility Construction	3 rd Quarter 2009: 21 Months
6	Post-Construction Stormwater BMP	1 st Quarter 2011: 2-3 Months

Refer to Appendix 10 for the detailed and current Construction Activity Schedule.

300.8 CONSTRUCTION BMP IMPLEMENTATION SCHEDULE

Table 7 provides the BMP implementation schedule for each phase of construction. Appendix 10: *Construction Schedule* provides the project's detailed construction schedule. The Construction Project Manager is responsible for ensuring that the BMPs are implemented in accordance with these schedules.

300.9 CONSTRUCTION BMP INSPECTION AND MAINTENANCE SCHEDULE

Table 8 provides the BMP inspection and monitoring schedule for this project. The BMPs shall be inspected and maintained in accordance with the inspection and maintenance recommendations called out in the BMP specification sheets (see Appendix 6). The Construction Project Manager is responsible for ensuring that each BMP is inspected to the BMP-specific specification standard in accordance with the schedule detailed in Table 8.

Equipment and vehicle inspection and maintenance is required to verify that all equipment, tools and vehicles are in good condition, in proper operating order and are free of any fluid leakage prior to bringing the equipment, tools or vehicles onto the project site. Each subcontractor is required to provide a copy of the subcontractor's written equipment and vehicle maintenance program to the Project Manager upon request.

300.10 SITE DESCRIPTION

300.10.1 Vicinity and Location of Site

The 23-acre CECP project site is located in the northeast portion of the existing Encina Power Station. Encina Power Station is located in the central portion of the City of Carlsbad, adjacent to the Pacific Ocean, immediately west of I-5 and north of the intersection of Carlsbad Blvd and Cannon Road (see Figures 1 & 2). The 95-acre Encina Power Station is located in Township 12 South, Range 4 West, Section 7, in San Diego County. The Power Station is comprised of Assessor Parcel Numbers (APNs): 210-01-41 and 210-01-43. The site address is at 4600 Carlsbad Blvd, Carlsbad, California 92008.

The Encina Power Station is divided by the Atchison, Topeka, and Santa Fe (AT&SF) railway which transect the power plant from the north and south. Both the CECP site and the Power Station are bordered on the north by the Agua Hedionda Lagoon, an important component of the local watershed that provides a drainage pathway to the Pacific Ocean.

300.10.2 Topography

The CECP site is located in an area that is characterized by coastal terraces. The elevation of the Subject Property varies from sea level to approximately 60 feet above mean seal level (msl) (Haley & Aldrich, 2004b). The general topographic gradient of the project site is west/northwest (refer to Figure 3B).

300.10.3 Surface Water Bodies

The CECP site is located within the Carlsbad Hydrologic Unit (CHU). The CHU is comprised of six watersheds (Loma Alta, Buena Vista, Agua Hedionda, Encinas, San Marcos, and Escondido) and four coastal lagoons (Buena Vista, Agua Hedionda, Batiquitos, and San Elijo) (RBF Consulting, 2006). The Agua Hedionda Lagoon is located immediately north of the East Tank Farm, and the Pacific Ocean is located west of the Encina Power Station, west of Carlsbad Blvd. The tank farm is located within the 500-year flood zone (FEMA, 1997).

The Agua Hedionda Lagoon has a total watershed drainage area of approximately 29 square miles in the cities of Carlsbad, Vista, and Oceanside, and in unincorporated San Diego County (RBF Consulting, 2006). Agua Hedionda Creek is the primary stream into the watershed, which begins on the southwestern slopes of the San Marcos Mountains in north San Diego County, and flows generally southwestward to the Agua Hedionda Lagoon and the Pacific Ocean.

The beneficial uses of Agua Hedionda Creek include municipal and domestic supply, agriculture, industrial services, contact and non-contact water recreation, and wildlife and warm freshwater habitat.

300.10.4 Geology

The CECP site is located in the Pacific Coastal Plain of the Peninsular Range Geologic Province of California, which is characterized by bedrock consisting of Cretaceous age granitic rocks of the Peninsular Ranges Batholith, older metamorphic rocks associated with the intrusion of the Batholith, and sedimentary materials. The sedimentary rocks that comprise the coastal region range from terrestrial conglomerates to marine sand and bay mud. The terrace deposits encountered at the site have been characterized as yellowish to reddish brown to light gray and olive, weakly to moderately cemented, silty to poorly graded medium to fine sands (Haley & Aldrich, 2004b). The Santiago Formation encountered at the site has been characterized as predominately light gray and light brown with shades of yellow and olive, interbedded, weakly to moderately cemented sandstone and siltstone. The soil mapping unit descriptions and characteristics are as follows:

1. Map Unit Description: MIC Marina loamy coarse sand, 2 to 9 percent slopes. This soil unit covers the entire property;
2. Formation: Eolian sand derived from mixed sources
3. Typical profile: Loamy coarse sand and loamy sand throughout
4. Shrink-swell capacity: Not given; expected as none due to dominance of sands
5. Depth and drainage: Very deep (> 60 inches deep) and somewhat excessively drained
6. Permeability^b: Moderate to rapid

7. Runoff^b: Slow to medium
8. Erosion hazard: Slight to moderate
9. Capability class: IIIs-4

Notes:

- a. Soil characteristics listed above are based on soil mapping descriptions provided in the published soil survey (NRCS, 1973) and the online soil survey (soildatamart.nrcs.usda.gov).
- b. Information for MIC map unit not available; information for the Marina series used instead.

300.10.5 Hydrogeology

The groundwater beneath the CECP site is located with the CHU. The groundwater beneath the Encina Power Station has been designated as having non-beneficial groundwater use; however, the Agua Hedionda Lagoon has been designated as having beneficial uses (Haley & Aldrich, 2004b).

Groundwater levels fluctuate with seasonal and tidal influences. Historical groundwater levels in monitoring wells at the power plant have ranged from 14 feet below to 10 feet above msl (FDGTI, 1998a). The groundwater beneath the Encina Power Station is generally brackish and flows northwest toward the Agua Hedionda Lagoon and the Pacific Ocean.

300.10.6 Drainage

The 23-acre CECP site, including the adjacent access roads, is less than 50% impervious (i.e., paved). The CECP facility will be located within an impoundment basin. The top of the berm is at an elevation of 54 feet above mean sea level (msl). The berm is constructed at a 1.5 to 1 slope and is approximately 20 to 25 feet high from the bottom of the impoundment. The slopes of the earthen berms and drain rock layer are covered with a two-inch thick layer of gunite, reinforced with 6 x 6 – 10/10 welded wire fabric.

Within the former tank farm (Tanks 5, 6, and 7), interior drainage (drainage within each of the tank's containment berms) is contained and collected in toe ditches (at the base of the interior slopes). Dike drain sump structures, inlets, and 18-inch diameter corrugated metal drainage pipes line the perimeter of each basin. Within each of the three basins, drainage enters a toe drain and is pumped via a sump into a 6-inch line located along the east end of the basin at the top of the containment berm. The 6-inch line collects drainage from each of the three basins and routes the drainage to the northwest side of Tank 7 where the 6-inch pipe discharges into the 18-inch corrugated metal pipe (CMP) pipe (main drain). The 18-inch CMP pipe daylights at the top of the north slope to the Agua Hedionda Lagoon (Refer to Figure 3A). A sparsely vegetated 12 acre-parcel located immediately north of the tank farm basin also drains to the 18-inch CMP discharge pipe via a drain inlet located at the southern toe of the north slope.

Minor modification of existing drainage system that currently services the former East Tank Farm will be necessary as a result of berm removal and reconstruction. Minor grading may be necessary to direct drainage within the CECP site impoundment to the drain inlets that will need to be relocated and reinstalled as part of the CECP site's berm reconstruction phase.

Drainage from within the CECP site impoundment will continue to be collected within the drainage channel located at the toe of the berm and will be pumped to above-ground mobile oil/water separator and sand media filter for pretreatment. Discharge from the treatment units

will be to an infiltration trench for onsite retention and infiltration for low-volume storm events, and/or for additional volume reduction/filtration prior to offsite discharge (refer to Figure 7B).

Surface areas that are currently not fully stabilized, but proposed for use as laydown for construction and/or where the areas' drainage comingles with the construction site's stormwater prior to offsite discharge will be stabilized prior to start-up of construction.

As a result of this project, the amount of overall impervious surfaces will decrease, resulting in a reduction in the project's post-construction runoff coefficient, and consequently a reduction in the volume of stormwater ultimately discharged offsite. The overall reduction in impervious surfaces is a result of reducing the overall basin floor to be repaved by at least one acre. This unpaved area, pervious area will be stabilized and used for employee parking during operation of the CECP power plant. Refer to Appendix 7 for a summary description of the project's pre- and post construction site surface conditions and drainage calculations.

300.10.7 Water Quality

The primary water bodies within the project area are Agua Hedionda Lagoon and the Pacific Ocean. These water bodies are located within the San Diego Basin Plan. Basin Plans are adopted and amended by Regional Water Boards under a structured process involving full public participation and state environmental review. Basin Plans complement water quality control plans adopted by the State Water Board.

As part of the Basin Plan, the State has established water quality objectives for waters within the basin plan. The water quality objectives are either narrative or numeric and are often different for different water bodies. The Porter-Cologne Water Quality Control Act defines water quality objectives as "...the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area" [Water Code Section 13050(h)]. It also requires the Regional Water Board to establish water quality objectives, while acknowledging that it is possible for water quality to be changed to some degree without unreasonably affecting beneficial uses.

The San Diego Basin Plan has established numeric effluent limits (NELs) for discharges, including stormwater discharges, into Agua Hedionda Lagoon:

Constituent	Maximum Allowed Concentration (mg/l or as noted)	Constituent	Maximum Allowed Concentration (mg/l or as noted)
Total Dissolved Solid (TDS)	500	Methyl Blue Active Substance (MBAS)	0.5
Chloride (Cl)	250	Boron (B)	0.75
Sulfate (SO ₄)	250	Odor	none
Percent Sodium (% Na)	60	Turbidity (NTU)	20
Iron (Fe)	0.3	Color (Units)	20
Manganese (Mn)	.05	Fluoride (F)	1

The Federal Clean Water Act (CWA) requires States to identify and make a list of surface water bodies that are polluted. These water bodies, referred to as "water quality limited segments," by definition do not meet water quality standards even after discharges of wastes from point sources have been treated by the minimum required levels of pollution control technology. States are required to compile these water bodies into a list, referred to as the "Clean Water Act Section 303(d) List of Water Quality Limited Segments" (List).

The Federal Clean Water Act as well as the State's Porter-Cologne Act prohibit discharges into Waters of the US and/or Waters of the State that can cause or contribute to an exceedance of a receiving water's water quality objectives. The discharge into a receiving water of a pollutant, in any quantity or concentration, for which the receiving water is designed as being impaired for is prohibited.

The "Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List" is the policy for the State and Regional Water Boards to follow when developing updates to the List. This policy describes the process by which the State and Regional Water Boards comply with the requirements of the Clean Water Act in developing the List.

On June 28, 2007 the U.S. Environmental Protection Agency gave final approval to California's 2006 Section 303(d) List of Water Quality Limited Segments. The Agua Hedionda Lagoon is listed as impaired for indicator bacteria and sedimentation/siltation. The Pacific Ocean at Carlsbad Beach is listed as impaired for indicator bacteria.

The following list of documents were used in preparation of this SWPPP, and herein incorporated by reference. The documents are as follows:

- National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity, 2002
- San Diego Regional Water Quality Control Board's Water Quality Control Plan (Basin Plan)
- State of California 2007 Clean Water Act's Section 303(d) List of Impaired Water Bodies
- City of Carlsbad, Public Works Department, Standard Urban Storm Water Mitigation Plan (SUSMP), Storm Water Standards; March 2008
- Application for Certification (AFC) for the Carlsbad Energy Center Project, September 2007
- Caltrans Stormwater Quality Handbook: Construction Site BMPs Manual, March 2003.
- CASQA California Stormwater BMP Handbooks, January 2003
- Phase II Environmental Soil and Groundwater Assessment Report, Encina Seawater Desalination Project, Carlsbad, California, Geomatrix, May, 2006

500.1 POLLUTANT SOURCE ASSESSMENT

This section provides an assessment of the types of potential stormwater pollutants anticipated during the Encina Power Station's CECP project. Potential sources of stormwater pollutants considered are those pollutants that are known, or should be known, to exist at the site as a consequence of:

- Current land use practices;
- Past land use practices; and
- Construction related activities.

500.1.1 Past Land Uses

The Encina Power Station has been in operation as a power generation station since 1954 with no material change in the land use of the site since origination. The original three approximate 100-MW Encina units (Units 1-3) went on line in 1954, 1956 and 1958. Units 4 and 5 were commissioned in 1972 and 1978 respectively (FDGTI, 1998b). These generating units are rated at 300 and 330 MW, respectively.

Initially, the power plant used three above-ground storage tanks (ASTs) in the West Tank Farm for fuel oil storage (for Units 1-3). Four additional ASTs were constructed between 1971 and 1977 in the area currently known as the East Tank Farm (FDGTI, 1998b) for Units 4 and 5. Natural gas has been the primary fuel used at the Subject property since 1984.

A considerable amount of disturbance has occurred over the entire existing Encina Power Station. Extensive excavation, grading, and deposition of fill occurred during the Station's initial construction in the 1950's and proceeded during various stages of upgrades and expansions up to the present. Historic photographs reveal that prior to construction, the entire property was graded, leveled, fill brought in, a stream channelized, portions of the lagoon were dredged, and an underground water intake was built to bring water into the plant from the ocean (Jeff Bisson, 2007, pers. comm.; Smallwood, 2005).

East Tank Farm are has been excavated to bedrock during construction of the tank farm. Geotechnical evaluations within the plant confirm the presence of fill to a depth of at least 10 feet. Prior to construction of the tank farm, this portion of the current power plant was used for agricultural activities

In 1999, Cabrillo Power I LLC acquired the power plant from San Diego Gas and Electric (SDG&E) and now owns the power plant and related facilities, fuel oil storage tanks, and lagoon areas of Encina Power Station

500.1.2 Current Land Uses

The Encina Power Station currently operates as a natural gas-fired power generating facility with back-up fuel necessary in only two of the seven fuel oil tanks (i.e., in tanks 2 and 4). Consequently the need to store large volumes of fuel oil is obsolete. Tanks 5, 6 and 7 are currently being prepared for decommissioning, which will entails lead and asbestos abatement from the tanks and the associated piping and pumping equipment; removal for offsite recycling or disposal of current fuel oil inventories remaining in the tanks; and cleanout of the tanks and piping to remove residual fuel oil.

The land in the vicinity of Encina Power Station is characterized as urban, and primarily comprised of other developed land including commercial, agricultural, and residential. The area adjacent to the Encina Power Station includes the Pacific Ocean to the west; Interstate 5 and agricultural land to the east; SDG&E operation and maintenance facility, Cannon Road and residential areas to the south; and other residential areas to the north.

500.1.3 Construction Related Activities

Hazardous materials to be used during construction of the CECP and its associated linear facilities will include gasoline, diesel fuel, motor oil, hydraulic fluid, solvents, cleaners, sealants, welding flux, various lubricants, paint, and paint thinner. There are no feasible alternatives to motor fuels and oils for operating construction equipment. The types of paint required are dictated by the types of equipment and structures that are to be coated and by the manufacturers' requirements for coating.

The quantities of hazardous materials that will be handled during construction are relatively small and Best Management Practices (BMPs) will be implemented by contractor personnel. Therefore, the potential for environmental effects is expected to be small. During construction of the project and its linear facilities, regulated substances, as defined in California's Health and Safety Code, Section 25531, will not be used.

The quantities of hazardous materials that will be onsite during construction are small, relative to the quantities used during operation. Construction personnel will be trained to handle the materials properly. The most likely possible incidents will involve the potential for fuels, oil, and grease dripping from construction equipment. The small quantities of fuel, oil, and grease that might drip from construction equipment will have relatively low toxicity and will be biodegradable. Therefore, the expected environmental impact is minimal.

Small oil spills may also occur during onsite refueling. Equipment refueling will be performed away from water bodies to prevent contamination of water in the event of a fuel spill. Therefore, the potential environmental effects from fueling operations are expected to be limited to small areas of contaminated soil. If a fuel spill occurs on soil, the contaminated soil will be placed into barrels or trucks for offsite disposal as a hazardous waste. The worst-case scenario for a chemical release from fueling operations would be a vehicle accident involving a service or refueling truck.

During construction of CECP, the primary waste generated will be solid nonhazardous waste. However, some nonhazardous liquid waste and hazardous waste (solid and liquid) will also be generated. Most of the hazardous wastes will be generated at the CECP site, but a small quantity of hazardous waste will be generated during construction of the electric transmission

line, natural gas supply line, potable water line, reclaimed water line, and the sewer line. The types of waste and their estimated quantities are described below.

Nonhazardous Solid Waste

Listed below are nonhazardous waste streams that could potentially be generated from construction of the generating facility, the electric transmission line, and other supply/disposal lines.

Paper, Wood, Glass, and Plastics

Paper, wood, glass, and plastics will be generated from packing materials, waste lumber, insulation, and empty nonhazardous chemical containers. Approximately 80 tons of these wastes will be generated during construction. These wastes will be recycled where practical. Waste that cannot be recycled will be disposed of weekly in a Class III landfill. Onsite, the waste will be placed in dumpsters.

Metal

Metal will include steel from welding/cutting operations, packing materials, and empty nonhazardous chemical containers. Aluminum waste will be generated from packing materials and electrical wiring. Approximately 10 tons of waste metal will be generated during construction. Waste will be recycled where practical and non-recyclable waste will be deposited in a Class III landfill.

Concrete

Approximately 60 tons of excess concrete will be generated during construction. Waste concrete will be recycled and/or disposed of at a state approved construction and debris (C&D) landfill and in accordance with Section 500 of this SWPPP and the project's Approved Waste Management Plan.

Nonhazardous Wastewater

Nonhazardous wastewater will be generated, including sanitary wastewater, equipment washwater, storm water runoff, and wastewater from pressure testing the gas supply line. Nonhazardous wastewater shall be managed in accordance with Section 500 of this SWPPP and the project's Waste Management Plan. Sanitary waste will be collected in portable, self-contained toilets. Equipment washwater will be contained at specifically designated wash areas and disposed of offsite. Stormwater runoff will be pretreated and retained onsite for low-volume storm events and/or pretreated and filtered prior to offsite discharge. The gas supply pipeline hydrostatic test water will be filtered to collect any sediment and welding fragments and managed in accordance with the project's Dewatering Permit

Hazardous Waste

Most of the hazardous waste generated during construction will consist of liquid waste, such as flushing and cleaning fluids, passivating fluid (to prepare pipes for use), and solvents. Some hazardous solid waste, such as welding materials and dried paint, may also be generated. All hazardous waste will be managed in accordance with the project's approved Waste Management Plan and this SWPPP.

Flushing and cleaning waste liquid will be generated when pipes and boilers are cleaned and flushed. Passivating fluid waste is generated when high temperature pipes are treated with either a phosphate or nitrate solution. The volume of flushing and cleaning and passivating liquid waste generated is estimated to be one to two times the internal volume of the pipes cleaned. The quantity of welding, solvent, and paint waste is expected to be minimal.

The construction contractor, will be responsible for proper handling of hazardous waste in compliance with all applicable federal, state, and local laws and regulations, including licensing, personnel training, accumulation limits and times, and reporting and recordkeeping. The hazardous waste will be collected in satellite accumulation containers near the points of generation. It will be moved daily to the facility's 90-day hazardous waste storage area, located at one of the site's construction laydown areas. The waste will be removed from the site by a certified hazardous waste collection company and delivered to an authorized hazardous waste management facility, prior to expiration of the 90-day storage limit.

Table 4 CECP Estimated Construction Waste Generation					
Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Scrap wood, glass, plastic, paper, calcium silicate insulation, and mineral wool insulation	Construction	Normal refuse	8,000 lbs/mo (dumpster)	Regulated Nonhazardous	Recycle and/or dispose of in a Class II or III landfill
Scrap Metals	Construction	Parts, containers	1,000 lbs/mo	Regulated Nonhazardous	Recycle and/or dispose of in a Class II landfill
Concrete	Construction	Concrete	60 tons during construction	Regulated Nonhazardous	Recycle and/or dispose of in a Class II landfill
Empty liquid material containers	Construction	Drums, containers, totes	100 containers	Regulated Nonhazardous	Containers <5 gallons will be disposed as normal refuse. Containers >5 gallons will be returned to vendors for recycling or reconditioning.
Spent welding materials, i.e. welding rods	Construction	Solid	100 lbs/mo	California Regulated Hazardous	Recycle or dispose at a Class I landfill
Waste oil filters	Construction equipment and vehicles	Solids	100 lbs/mo	California Regulated Hazardous	Recycle at a permitted TSDF
Used and waste lube oil	CT and ST lube oil flushes	Hydrocarbons	200 drums (life of project construction)	California Regulated Hazardous	Recycle at a permitted TSDF
Oily rags, oil sorbent excluding lube oil flushes	Cleanup of small spills	Hydrocarbons	100 lb/mo	California Regulated Hazardous	Recycle or dispose at a permitted TSDF
Solvents, paint, adhesives	Maintenance	Varies	180 lbs/mo	Hazardous	Recycle at a permitted TSDF

Table 4 CECP Estimated Construction Waste Generation					
Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Spent lead acid batteries	Construction equipment, trucks.	Heavy metals	5 batteries per year	Hazardous	Store no more than 10 batteries (up to 1-year) recycle offsite.
Spent alkaline batteries	Equipment	Metals	10 batteries per month	Universal Waste solids	Recycle or dispose offsite at an Universal Waste Destination Facility
Steam turbine cleaning waste	Pre-boiler piping	Corrosive cleaning chemicals	200 gallons before plant startup	Regulated Hazardous	Dispose at a permitted TSDF
Waste oil	Equipment, vehicles	Hydrocarbons	20 gal/mo	Non-RCRA Hazardous Liquid	Dispose at a permitted TSDF

Table 5: Pollutant Source Summary provides a summary of the potential stormwater pollutant that is anticipated to be encountered for this project, the associated pollutant source and generating activity:

Table 5 Pollutant Source Summary			
Phase	Activity	Pollutant	Source
1	a. Mobilization	Sediments	Disturbed soils
	b. Equipment mobilization and staging	Oils, greases, fueling	Equipment, vehicles operation
	a. Piping disconnection b. Piping removal c. Tank demolition d. Metal cutting; shredding e. Trucking/transport	Oils, chemical from fire suppression foam	Emptying pipes (residual materials)
		Oils, greases, metal fines/scrap, weld flux, contaminated waste wasters	Metal shredding and cutting; water used to cool hot metal surfaces
		Sediments, concrete debris/dusts, fugitive dust	Equipment movement, trucking, demolition
	a. Soil sampling and characterization b. Excavation c. Soil transport	Sediments, fugitive dust, oils, greases, metal particulate/fines	Soil sampling and excavation
	2	a. Linear Construction	Sediments
Oils, greases, fueling			Equipment, vehicles operation

Table 5 Pollutant Source Summary			
Phase	Activity	Pollutant	Source
3	a. Berm Removal b. Pavement Demolish	Sediments	Disturbed soils; soils stockpiling; paved surface demolition; construction debris
		Oils, Greases	Equipment, vehicles operation; Asphalt paving
		Concrete wastes (pH)	Removal of paved surfaces; Concrete use; equipment washout
4	a. Berm construction b. Drainage system installation c. Access Road Construction	Sediments	Disturbed soils; soils stockpiling; paved surface demolition; construction debris
		Oils, Greases	Equipment, vehicles operation; Asphalt paving
		Concrete wastes (pH)	Removal of paved surfaces; Concrete use; equipment washout
5	a. CECF Construction	Sediments	Disturbed soils; soil stockpiling; construction debris
		Oils, Greases	Equipment, vehicles operation; Asphalt paving, painting wastes
		Concrete wastes (pH)	Concrete use; equipment washout
6	a. Post Construction	Sediments, fugitive dust	Disturbed soils, disposition of fugitive dusts from offsite sources

500.2 BEST MANAGEMENT PRACTICES

For this SWPPP to be deemed in compliance with the State of California's Construction General Permit, an "effective combination of erosion and sediment controls" will be employed at the project site during all phases of active construction. This section describes the types of stormwater Best Management Practices (BMPs) to be used at the site to reduce or eliminate sediment and other construction-related pollutants in stormwater and non-stormwater discharges during construction activities.

The BMP selection process is an iterative process, with the primary emphasis on eliminating contact with identified potential stormwater pollutant sources. Where contact cannot be eliminated, the focus is to retain the stormwater onsite and/or treat the stormwater to remove

the pollutants prior to offsite discharge. This section describes the minimum BMP requirements to be used at the CECP construction site.

Table 6 provides the Caltrans specification describing proper BMP installation and maintenance. An alternative BMP and/or specification may be used in place of the BMP or specification referenced in Table 6 if it can be demonstrated that the alternative BMP and/or specification meets the following conditions:

- The alternative BMP or specification will serve the same intent as the referenced BMP or specification; and
- The alternative BMP or specification will be as effective as the referenced BMP or specification.

The use of an alternative BMP or specification will be approved by the Project Manager prior to implementation. Reference to the BMPs throughout this section will use the common BMP name. Refer to Appendix 6 for BMP installation and maintenance specifications.

The selection and placement of structural BMPs to be employed during the CECP project are represented on the project's Water Pollution Control Drawings (WPCDs) (refer to Appendix 7). The intent of the WPCDs is to serve as guidance for the contractor for general area deployment. Exact location of BMPs will be adjusted to accommodate field conditions at the time the construction activity takes place.

500.3 GENERAL REQUIREMENTS

500.3.1 Overall Duties and Requirements

The Construction Project Manager is responsible for verifying that the identification and selection of appropriate and effective BMPs based on existing and anticipated site conditions.

The Construction Manager will amend this SWPPP under the following conditions:

- When an additional BMP is proposed,
- When an alternative BMP or specification is implemented in place of a referenced BMP or specification, and/or
- When a referenced BMP or specification has been modified.

All SWPPP revisions will be documented using the SWPPP Amendment Report (refer to Appendix 2: SWPPP Amendment Report).

The Construction Project Manager will verify that the BMPs are installed, inspected, maintained, and repaired by qualified personnel trained in accordance with Section 8, *Training*.

500.4 CONTROL BMPs

500.4.1 Non-Stormwater Discharge Control

Non-stormwater discharges are any type of runoff/surface drainage not made up solely of stormwater, including non-stormwater generated from dewatering operations, in-stream work and equipment cleaning and dust control. For this project, non-stormwater also includes any water used for cooling during metal cutting/shredding operations or pipe flushing. In the event that a non-stormwater discharge is anticipated, all non-stormwater discharges will be pre-approved by the Project Manager and will be documented in the BMP schedules prior to generation.

The Project Manager will verify that water conservation measures are implemented and maintained during the duration of this project. Water used or discharged from the site shall be free of contaminants and similar in character to potable water.

500.4.2 Construction Materials Pollution Control BMPs

1. Equipment, material storage/staging areas and work areas at the construction site will be in accordance with the BMP specifications provided in this section. At the minimum the following conditions will apply at all times:
 - Surface drainage will be diverted away/around equipment, staging and work areas;
 - Waste and scrap staging/storage areas and work (i.e., metal cutting) areas will be limited to the tank farm basin;
 - Equipment and materials staging and storage areas located outside the tank basin will be limited to the areas noted on Figures 7A and 7C;
 - Drip pans will be provided for all staged equipment and vehicles during periods of inactivity.
2. Minor emergency equipment or vehicle repair and maintenance is allowed at the construction site. All major repairs and regular scheduled maintenance shall be performed offsite. Onsite servicing of equipment and vehicles or equipment washing is prohibited;
3. Delivery and onsite storage of construction related materials will be done in accordance with the material delivery specification. Onsite construction related materials will be handled in accordance with the Material Use specification.
4. A Hazardous Material Inventory will be prepared and provided to the Project Manager, regardless of the quantity delivered, stored or used onsite. The Hazardous Material Inventories will be incorporated into the SWPPP by reference and be considered a part of this document.

5. Onsite stockpiling of construction debris and spoils material will be permitted only under the following conditions:
 - Recovered construction debris can only be stockpiled onsite for no more than 96 hours at a time; and
 - All stockpiled materials will be managed in accordance with the BMP specifications detailed in Section 500 of this document

500.4.3 Waste Management and Pollution Control BMPs

1. Solid waste generated or staged onsite will be handled in accordance with the solid waste management specification provided in the CECP Waste Management Plan. At the minimum, the following solid waste management practices will be complied with by site personnel, including subcontractors:
 - Any stockpiles generated will be covered with fiber matting or plastic sheeting and fiber rolls and/or silt fencing installed at the toe of the stockpile to provide for sediment control;
 - Covered, water tight trash containers will be provided at the staging area;
 - Stockpiles and trash containers will be located as far up gradient a drain inlet, drainage channel or an offsite discharge outfall. There shall be no stockpile or trash container located within 25 feet of the main drain inlet to the Lagoon's outfall located at the north end of the project site;
 - Surface drainage will be diverted away/around stockpiles and trash containers;
2. All trash and debris will be deposited in the trash containers at the end of each day;
3. Hazardous wastes generated at the project site will be the sole property and responsibly of the subcontractor generating the hazardous wastes. Each subcontractor is required to comply with all federal, state and local laws and regulations governing the generation, storage, shipment and disposal of any hazardous wastes generated at the construction site. Subcontractors will, at the minimum comply with the following:
 - California Code of Regulations, Title 22: Division 4.5: Environmental Health Standards for the Management of Hazardous Wastes
 - Caltrans BMP WM-6: Hazardous Waste Management

Non-hazardous wastes and/or hazardous wastes will not be disposed of onsite. Contaminated soils that are either generated as a result of construction activities or identified as part of the contaminated soil remediation will be managed in accordance with the contaminated soils management specification.

500.4.4 Spill Prevention and Control BMPs

1. A Spill Prevention and Control Program (SPCP) will be in-place in the event that hazardous materials are discovered within the project corridor and/or hazardous materials or wastes are spilled or leaked as a consequence of project-related activities. At the minimum, the SPCP shall meet the following conditions:
 - Contaminated soils management specification,
 - Provide for notification to the Construction Project Manager of any chemical spill or release, and
 - Provide for certification that the spill has been cleaned up and all wastes properly disposed of offsite.
2. At no time, or under any conditions will spills be flushed to any drainage conveyance, drain inlet or drainage channel unless:
 - The flush wastewater can be captured and contained and shipped offsite for proper disposal as a regulated waste; and
 - The drainage conveyance system unit or device can be decontaminated prior to receiving stormwater drainage

500.4.5 General Site Management Requirements

The following minimum general site management requirements shall be implemented at all times, when applicable:

- a. Emphasize pollution prevention where appropriate;
- b. Implement all the requirements of the site approved Construction SWPPP to manage storm water and non-storm water discharges from the site at all times;
- c. Minimize areas that are cleared and graded to only the portion of the site that is necessary for construction; and,
- d. Minimize exposure time of disturbed soil areas;
- e. Minimize grading during the wet season and coincide grading with seasonal dry weather periods to the extent feasible. If grading does occur during the wet season, then implement additional BMPs for any rain events that may occur;
- f. Limit the amount of exposed soil allowed at one time to the amount that which can be adequately protected by deploying standby erosion control and sediment control BMPs prior to a predicted rainstorm;
- g. Temporarily stabilize and/or re-seed disturbed soil areas as rapidly as possible;
- h. Preserve the natural hydrologic features of the site where feasible;,,
- i. Preserve riparian buffers and corridors where feasible;,,
- j. Maintain all BMPs until removed; and,
- k. Retain, reduce and properly manage all pollutant discharges on-site to the MEP standard.

500.4.6 Dry Season Site Management Requirements

The following minimum BMPs are to be in place at throughout the year during both the wet and dry seasons:

- a. Graded areas shall have erosion protection BMPs properly installed;
- b. Adequate perimeter protection BMPs shall be installed and maintained;
- c. Adequate sediment control BMPs shall be installed and maintained;
- d. Adequate BMPs to control offsite sediment tracking shall be installed and maintained;
- e. A minimum of 125% of the material needed to install standby BMPs to protect the exposed areas from erosion and prevent sediment discharges, shall be stored onsite;
- f. Develop/implement wet weather action plan and deploy standby BMPs to completely protect the exposed portions of the site within 48 hours of a predicted storm event, where a predicted storm event is defined as a forecasted, 40% chance of rain by 5-day National Weather Service;
- g. Deployment of physical or vegetation erosion control BMPs shall commence as slopes are completed;
- h. The area that can be cleared, graded, and left exposed at one time is limited to the amount of acreage that the contractor can adequately protect prior to a predicted rain event;

500.4.7 Rainy Season Site Management Requirements

In addition to the dry season requirements described above, the following additional minimum BMPs shall be in place at the CECP during the rainy season, which is defined as October 1st through April 30th:

- a. Erosion control, perimeter protection and sediment control BMPs shall be upgraded if necessary to provide sufficient protection for storms likely to occur during the rainy season;
- b. Adequate physical or vegetation erosion control BMPs shall be installed and established for all completed slopes prior to the start of the rainy season. These BMPs will be maintained throughout the rainy season. If a selected BMP fails, it shall be repaired and improved, or replaced with an acceptable alternate as soon as it is safe to do so. The failure of a BMP indicates it was not adequate for the circumstances in which it was used. Repairs or replacements will be implemented resulting in a more robust BMP in place;
- c. The amount of exposed soil allowed at one time shall not exceed that which can be adequately protected by deploying standby erosion control and sediment control BMPs prior to a predicted rain event;
- d. A disturbed area that is not completed but that is not being actively graded shall be fully protected from erosion if left for 10 or more days and the associated BMPs deployed; and
- e. Vegetation erosion control shall be established prior to the rainy season to be considered as an effective BMP.

500.4.8 Additional Controls for Construction Sites That Discharge to 303(d) Listed Waters

Since the project site will discharge stormwater to a 303(d) water body that is listed as impaired for sediment, the following BMPs shall be implemented at all times to the maximum extent possible:

- a. Maintain vegetative cover as much as possible by developing the project in a phased approach to reduce the amount of exposed soil at any one time;
- b. Limit the areas of active construction to five acres at any one time;
- c. Provide 100 percent soil cover for all areas of inactive construction throughout the entire time of construction, on a year-round basis;
- d. Provide appropriate perimeter control at all appropriate locations along the site perimeter and at all inlets to the storm drain system at all times during the rainy season;
- e. Provide vegetated buffer strips between the active construction area and any water bodies; and
- f. Provide stabilized construction entrances and limit all vehicle and foot traffic to those entrances.

500.4.9 Advanced Treatment Methods

When a project meets all of the following criteria, advanced treatment will be required:

- a. All or part of the site is within 200 feet of waters named on the CWA Section 303(d) list of Water Quality Limited Segments as impaired for sedimentation and/or turbidity;
- b. The disturbance area is greater than five acres, including all phases of the development;
- c. The disturbed slopes are steeper than 4:1 with at least 10 feet of relief, and drain toward a Section 303(d) listed receiving water for sedimentation or turbidity; and
- d. The site contains a predominance of soils with USDA-NRCS Erosion factors k_f greater than or equal to 0.4 (high erodibility potential).

The CECP construction project is not subject to the City of Carlsbad's Advanced Treatment requirements per Section 3.3.9 of the 2008 Stormwater Standards manual for the following reasons:

- a. Slopes that drain towards the Agua Hedionda Lagoon will be left undisturbed during construction; and
- b. Site soils have a low to moderate erodibility potential.

500.5 PROJECT PHASING AND BMP REQUIREMENTS

Table 6 summarizes the BMPs to be used at the project. The BMPs will be implemented through the duration of the project at an appropriate level considering the time of the year and current site conditions. It is expected that the BMPs will be implemented and maintained in a

proactive manner. Table 7 describes the BMPs to be installed and maintained during each phase of the project.

Table 6 BMP Summary				
Pollutant	BMP	BMP Performance Intent	CASQA Specification¹	CalTrans Specification¹
Erosion And Sediment	Scheduling	Reduce the amount and duration that disturbed soils are exposed to erosion by wind, rain, runoff and tracking; and work areas are exposed to stormwater	EC-1	SS-1
	Preservation of Existing Vegetation	Protection of desirable existing vegetation that provides for erosion and sediment controls	EC-2	SS-2
	Hydroseeding	Provide permanent and/or temporary protection of exposed/disturbed soils from wind and rain erosion	EC-4	SS-4
	Soil Binders	Soil binders are materials applied to the soil surface to temporarily prevent water-induced erosion of exposed soils on construction sites. Soil binders also provide temporary dust, wind, and soil stabilization (erosion control) benefits.	EC-5	SS-5
	Straw Mulch	Temporary soil stabilization alternative that provides for a uniform layer of straw cover over distributed soil areas	EC-6	SS-6
	Fiber Mats	Temporary soil stabilization alternative where pre-manufactured erosion control mats are used to cover disturbed soil areas	EC-7	SS-7

Table 6 BMP Summary				
Pollutant	BMP	BMP Performance Intent	CASQA Specification¹	CalTrans Specification¹
	Velocity Dissipation	These devices are placed at pipe outlets to prevent scour and reduce the velocity and/or energy of storm water flows	EC-10	SS-10
	Slope Drains	A pipe used to intercept and direct surface runoff into a stabilized watercourse, trapping device or stabilized area. Slope drains are used with lined ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes.	EC-11	SS-11
	Stabilized Construction Entrance	A point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.	TR-1	TC-1
	Stabilized Construction Roadways	A temporary access road designed for the control of dust and erosion created by vehicular tracking.	TR-2	TC-2
	Infiltration Trench	A long, narrow rack-filled trench designed to infiltrate/store stormwater	TC-10 ²	
	Bio-infiltration Basin	A shallow impoundment that is designed to infiltrate stormwater	TC-11 ²	

Table 6 BMP Summary				
Pollutant	BMP	BMP Performance Intent	CASQA Specification¹	CalTrans Specification¹
	Wind Erosion Control	Applying water and/or other dust palliatives as necessary to prevent or alleviate erosion by the forces of wind.	WE-1	WE-1
	Silt Fence	Temporary linear sediment barrier of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff.	SE-1	SC-1
	Fiber Rolls	Temporary Linear barrier placed at intervals on the face of slopes to intercepts/slows flow velocity, release runoff as sheet flow and provide for some sediment filtration/removal	SE-5	SC-5
	Check Dam and/or Gravel Bag Berm/Barrier	Temporary Linear barrier placed to intercepts/slows flow velocity, release runoff as sheet flow and provide for sediment filtration/removal	SE-4	SC-4/SC-6/SC-8
	Sweeping	Remove/control tracked sediments and prevent migration to storm drainage conveyance systems and water courses	SE-7	SC-7
Non-Stormwater Discharges	Storm Drain Inlet Protection	To detain and/or to filter sediment-laden runoff to allow sediment to settle and/or to filter sediment prior to discharge into storm drainage systems or watercourses	SE-10	SC-10

Table 6 BMP Summary				
Pollutant	BMP	BMP Performance Intent	CASQA Specification¹	CalTrans Specification¹
	Water Conservation	Management of construction related activities that use water in a manner that avoids causing erosion or transport of pollutants offsite	NS-1	NS-1
	Illegal Discharge Detection and Reporting	Methods to recognize and report illegally dumped or discharged materials on a construction site	NS-6	NS-6
	Vehicle Fueling and Equipment Maintenance	Vehicle and equipment maintenance will performed within the laydown/equipment storage area	NS-9 NS-10	NS-9 NS-10
Construction Materials	Materials Delivery and Storage	Minimize/eliminate stormwater contact with, or discharge to a water course or storm drainage conveyance system, construction materials during site delivery and storage	WM-1	WM-1
	Material Use	Minimize/eliminate stormwater contact with, or discharge to a water course or storm drainage conveyance system, construction materials during use onsite	WM-2	WM-2
	Stockpile Protection	Minimize/eliminate stormwater contact with, or discharge to a water course or storm drainage conveyance system, construction materials and wastes stockpiles onsite	WM-3	WM-3

Table 6 BMP Summary				
Pollutant	BMP	BMP Performance Intent	CASQA Specification¹	CalTrans Specification¹
	Contaminated Soils Management	Minimize/eliminate stormwater contact with, or discharge to a water course or storm drainage conveyance system, of contaminated soils discovered and/or generated at the construction site (if applicable)	WM-7	WM-7
	Spill Prevention and Cleanup	Minimize/eliminate stormwater contact with, or discharge to a water course or storm drainage conveyance system, spills and discharges of chemicals and construction materials	WM-4	WM-4
Construction Related Wastes	Waste Management	Minimize/eliminate stormwater contact with, or discharge to a water course or storm drainage conveyance system, construction related wastes	WM-5	WM-5
	Hazardous Waste Management	Minimize/eliminate stormwater contact with, or discharge to a water course or storm drainage conveyance system, construction related hazardous wastes	WM-6	WM-6
	Sanitary Waste Management	The portable sanitary facility will be staged on a portable trailer and staged down gradient from the creek corridor or any other drainage way.	WM-9	WM-9

Notes: 1 - Or equivalent specification/standard
 2 - Per CASQA Development/Redevelopment & Construction BMP Handbooks

Table 7 BMP Phasing Schedule		
Phase	BMP Specification	Application¹
All phases	Scheduling/Preserve Existing Vegetation	Schedule work to prevent or minimize stormwater contact with construction activities
All phases	Straw Mulch	To temporarily stabilize disturbed areas
All phases	Fiber Mats/Plastic Sheeting	At slope from the upper pad to the lower pad; At the slope to the railroad drain inlet; At all materials stockpiles; All unpaved/soft-plated berm surfaces
All phases	Stabilized Construction Entrance	At any construction site access/regress point where surface conditions change from paved (impervious) to unpaved (pervious), including access/regress from the haul road into the tank basin; from Avenida Encinas Rd to the haul road located at the south end of the SDG&E property adjacent to the project site
All phases	Stabilized Construction Roadways	The haul road access roads and laydown areas
All phases	Silt Fence	Along the western side of new west berm; along top of slopes at north pad
Phases 1-5	Fiber Rolls	At the top and toe of any slope not permanently stabilized with either pavement or vegetation; At the top of slope to the railroad drain inlet; west side of haul road; along any pipeline corridor adjacent to the length of the corridor
Phases 1-5	Gravel Bag Berm/Barrier	To be used to direct surface drainage around equipment & material storage/staging areas; stockpiles and active work areas
All phases	Drain Inlet Protection	At the main drain inlet located at the north end of the lower pad; at each drain inlet located within the tank basin; at the railroad drain inlet
Phases 1-5	Infiltration Trench	Prior to removal of existing drainage system features as part of berm removal and prior to reconstruction of drainage system and until Phase 6 BMPs are installed and functional
6	Bio-infiltration Basin	As part of construction of permanent stormwater BMPs
All phases	Sweeping	All paved surfaces on a daily basis at the end of the work shift and prior to an anticipated storm event
All phases	Water Conservation	Prevent/minimize the generation of non-stormwater

Table 7		
BMP Phasing Schedule		
Phase	BMP Specification	Application¹
All phases	Illegal Discharge Detection and Reporting	On a daily basis
All phases	Vehicle Fueling and Equipment Maintenance	On a daily basis
All phases	Materials Delivery and Storage	On a daily basis
All phases	Material Use	On a daily basis
All phases	Stockpile Protection	On a daily basis
All phases	Contaminated Soils Management	On a daily basis
All phases	Spill Prevention and Cleanup	On a daily basis
All phases	Waste Management	On a daily basis
All phases	Hazardous Waste Management	On a daily basis
All phases	Sanitary Waste Management	On a daily basis

¹ Refer to WPCDs

500.6 OVERVIEW OF TRAINING RESPONSIBILITIES

The project owner(s), Project Manager, and each subcontractor, will be responsible for training their own site personnel in the requirements of this SWPPP as well as the implementation, inspection and maintenance of all stormwater BMPs. Individuals responsible for the SWPPP preparation, implementation, and permit compliance are required to be trained and the SWPPP shall document the training. This includes all personnel responsible for selection, inspection, maintenance, and repair of BMPs. The Project Manager will have a minimum of 24 hours of documented formal stormwater pollution prevention training (can include a combination of formal training, field training, and hands-on experience).

It is important that each subcontractor be trained to the requirements of this SWPPP to the extent that their work activities can result in potential release of pollutants to stormwater. The Project Manager need to be diligent in documenting that site personnel have been properly trained.

500.6.1 Training Elements

Training of project and site personnel will be accomplished through formal pre-mobilization briefings, informal training including tailgate site briefings, and hands-on demonstrations if so needed. The frequency of training shall be such that all site personnel performing work on the project site is familiar with the BMPs and stormwater protection requirements described in this SWPPP to include, but not limited to the following:

- Erosion control BMPs
- Sediment control BMPs
- Non-stormwater BMPs
- Waste Management and Materials Pollution Control BMPs
- Emergency procedures specific to this construction stormwater management

500.6.2 Training Documentation/Log

Documentation of training will be recorded using the Training Record/Log included in Appendix 4. Site inspections shall include a review of the log documentation to verify that all personnel performing work for the CECP have been trained and recorded on the log.

600.1 SWPPP MONITORING AND REPORTING PROGRAM

The monitoring and reporting program for this construction project is designed to satisfy the compliance requirements stipulated in the General Construction Permit; and to demonstrate and document the effectiveness of project's BMPs in preventing and/or minimizing the discharge of construction-related pollutants into stormwater. Table 8 details this SWPPP's monitoring and reporting requirements and schedule:

Table 8 SWPPP Monitoring and Reporting Schedule				
Item	Action	Frequency	Report Form	Responsibility
BMP Inspection	Inspect all site BMPs and cleanout/ repair per BMP specification	Weekly	BMP Inspection Checklist or other	Construction Project Manager, or designated representative
		Daily during grading and excavation	BMP Inspection Checklist or other	Construction Project Manager, or designated representative
Site Maintenance	Cleanup/ housekeeping activities	Daily at end of shift	Daily Log	Subcontractors/ Construction Supervisor
Waste Disposal	Pickup and Offsite disposal of wastes, including trash and septic wastes	Daily at end of shift	Daily Log	Construction Project Manager, or designated representative
Rain Forecast	Track wet weather forecast to anticipate storm activity	Daily	Wet Weather Report	Construction Project Manager, or designated representative
Wet Weather Inspection	Conduct BMP inspection verify BMPs in place, operational per specification	<ul style="list-style-type: none"> • 24 Hrs pre-storm • 24 hrs during storm • 24 Hr after storm 	<ul style="list-style-type: none"> • BMP Inspection Checklist • Wet weather Report 	Construction Project Manager, or designated representative

600.2 BMP INSPECTION REPORT

Detailed BMP inspections are required at least once a week, in accordance with the BMP Inspection Schedule described in Table 8. The inspection results will be documented using the Weekly BMP Inspection Report (see Appendix 3), or an equivalent document. As part of the weekly BMP inspection, the Construction Project Manager is required to do the following:

- Review any SWPPP amendments to assess impacts to selection, installation, maintenance and effectiveness of the project's BMPs, and
- Review the construction activity logs to verify that all corrective actions have been initiated and that the corrective action is effective in resolving the associated discrepancy.

The Project Manager, or designated representative, will ensure that prior to, during, and immediately following any storm event that appropriate BMPs are in place, operational and effective. The Project Manager, or designated representative, will also take immediate corrective action when a BMP has been breached and/or has failed. The corrective action taken will be documented and made a part of this SWPPP.

A BMP is considered "breached" or "failed" under the following conditions:

- The BMP has not been installed and/or maintained in accordance with the Specification; and/or
- The BMP has been damaged and/or altered; and/or
- Stormwater runoff and/or surface drainage that passes through the BMP is not "clean and clear" immediately down gradient of the BMP.

600.3 WET WEATHER MONITORING AND OBSERVATION REPORT

Wet weather monitoring is a critical component of this SWPPP. Wet weather monitoring will be performed on a daily basis throughout the CECF construction. Wet Weather Monitoring and Observation Report (see Appendix 3), or an equivalent document will be kept. Wet weather monitoring can be conducted via the internet by logging onto the following address for the National Weather Service: <http://www.wrh.noaa.gov/>, as follows:

- On a daily basis, track pending wet weather conditions and document the conditions on the Weekly Wet Weather Monitoring and Observation Report;
- Within 24 hours of an anticipated storm event, conduct a BMP inspection and document the results on the Weekly BMP Inspection Report and complete Part 2 (A) and Part 2(B) of the Weekly Wet Weather Monitoring and Observation Report;
- In the unlikely event there is an extended storm event, conduct a BMP inspection and document the results on the Weekly BMP Inspection Report and complete Part 2 (C) and Part 2(D) of the Weekly Wet Weather Monitoring and Observation Report.

Conduct a BMP inspection immediately following a storm event, but no later than 24 hours after the storm event concludes. Document the results on the Weekly BMP Inspection Report and complete Part 2 (E) and Part 2(D) of the Weekly Wet Weather Monitoring and Observation Report.

600.4 EMERGENCY NOTIFICATION AND NON-COMPLIANCE REPORTING

600.4.1 Emergency Notification

Outside notification is required for the project for any offsite discharge, or the potential of an offsite discharge, of non-stormwater, including, but not limited to fuels, oils, chemicals, sanitary wastes, or process and wash waters (i.e., any non-potable water not comprised solely of stormwater). The following outside notification is required:

- The San Diego Regional Water Quality Control Board (RWQCB)
- City of Carlsbad Environmental Management Department (EMD); and
- State of California Office of Emergency Services (OES).

These agencies will be notified as soon as practical, but no later than 24 hours of knowledge of the offsite discharge. The Project Manager, or designated representative, is responsible for notifying these agencies and for reporting follow-up no later than 30 days of verbal notification to the designated agencies.

600.4.2 Non-compliance Reporting

The Project Manager, or designated representative, is required to provide a written *Notice of Noncompliance* (NON) to the RWQCB within 30 days of knowledge of the following conditions:

- Failure to certify, by July 1 of each year, that the project's construction activities are in compliance with the provisions of this SWPPP and the Construction General Permit;
- Failure to implement the BMPs listed in Section 500 of this SWPPP
- Failure to conduct inspection, monitoring and/or reporting as described in Sections 6, 7 and 9 of this SWPPP; and/or
- Failure to initiate corrective actions to BMP breaches, failures and emergency situations.

The written NON shall describe, at the minimum, the following:

- Noncompliant event;
- An initial assessment of any potential impacts caused by the noncompliant event;
- Corrective actions to be taken to achieve compliance; and
- A time schedule of when compliance will be achieved.

Copies of any emergency notifications, Notices of Non-Compliance, and/or any other correspondence from the RWQCB or local water quality agency will be maintained as part of this SWPPP.

700.1 REGULATORY BACKGROUND

The General Permit was reissued by the SWRCB on August 19, 1999. The General Permit requires, in general:

- That stormwater BMPs be developed, designed, installed and maintained during construction and post construction phases. The purpose of the stormwater BMPs is to reduce or eliminate pollutants which are caused by, or are the result of, the construction activities from coming in contact with rainfall and stormwater surface drainage and/or being discharged off-site with the construction site's stormwater runoff; and specifically
- That construction sites develop, implement and maintain a combination of effective erosion control and sediment control BMPs to prevent soils, sediments, debris and suspendable solids from leaving the construction site and moving into receiving waters at levels above pre-construction levels.

The San Francisco BayKeeper, Santa Monica BayKeeper, San Diego BayKeeper, and Orange Coast Keeper filed a petition for writ of mandate challenging the General Permit in the Superior Court, County of Sacramento. On September 15, 2000, the Court issued a judgment and writ of mandate and directed the SWRCB to modify the provisions of the General Permit to require permittees to implement specific sampling and analytical procedures to determine whether Best Management Practices (BMPs) implemented on a construction site are:

- Preventing further impairment from sediments in stormwaters discharged directly into waters listed as impaired (Clean Water Act Section 303(d) List [303(d) List]) for sediment, silt, or turbidity; and
- Preventing other pollutants that are known or should be known by permittees to occur at construction sites and that cannot be visually observed or detected in stormwater discharges, from causing or contributing to exceedances of water quality objectives.

The monitoring, sampling and analysis provisions in the General Permit were modified pursuant to the court order and were issued as Resolution No. 2001- 046, adopted by the SWRCB on April 26, 2001. Effective August 01, 2001, all construction projects are required to amend the site's Stormwater Pollution Prevention and Monitoring Programs to address sampling and analysis of sediments and non-visual pollutants. The intent of this Section is to demonstrate compliance with the provisions of Resolution No.2001-046.

700.1.1 Purpose of Sampling and Analysis

The purpose of sampling is to determine whether the BMPs used on a site are effective in controlling potential construction-related pollutants from coming in contact with stormwater, and/or leaving the site, and causing and/or contributing to an exceedance of water quality objectives in the receiving waters. According to the modifications to the General Permit (refer to Resolution No. 2001-046) there are two categories of monitoring required:

- Sediment in stormwater discharged directly to water bodies listed as impaired for sediment/siltation or turbidity on the SWRCB's 303(d) list water bodies; and
- Non-visible pollutants.

700.1.2 Sedimentation Monitoring

Sampling and testing of stormwater discharges from construction sites for sedimentation is required when there is a direct discharge of stormwater from the construction site into a receiving water listed on the 303(d) List as impaired due to sedimentation or turbidity. The watercourses nearest the project site are the Agua Hedionda Lagoon and the Pacific Ocean, both of which are listed on the current Clean Water Act Section 303(d) List³ as impaired due to sedimentation/siltation and/or indicator bacteria. Consequently the CECP is obligated to sample and test for sediments and settleable solids in the stormwater discharges from the site associated with the construction activities.

700.1.3 Non-Visible Pollutant Monitoring

Non-visible pollutants are those pollutants that cannot be detected through visual observation of the pollutant source and/or stormwater discharge. Non-visible pollutants include pollutants that are known, or should be known, to occur on the construction site as a result of the construction activity and/or current or past land use practices. Non-visible pollutants that shall be considered for sampling and analysis include potential pollutants generated from the following sources:

- Materials that are being used in the construction activities;
- Materials are stored on the construction site;
- Materials that were spilled during construction operations and not cleaned up;
- Materials that were used, handled or stored in a manner that presented the potential for a release of the materials during past land use activities;
- Materials that were spilled during previous land use activities; and
- Materials that were applied to the soil as part of past land use activities.

Table 5: *Pollutant Source Summary and Identification* lists the potential stormwater pollutants, and the associated potential pollutant sources, expected to be encountered on this project, based on an evaluation of known pre-construction, current site conditions and construction activities.

700.2 STORMWATER SAMPLE PLAN

Table 9: *Stormwater Sample Plan* lists the potential pollutant source; the sample location and frequency of sampling; the indicator parameter(s) to be sampled for that pollutant source; the testing method and method detection limit; and the performance target limit for that parameter. The performance target limit is the NEL and/or narrative benchmark by which the effectiveness of the associated BMPs will be evaluated. The performance target limits are USEPA's Multi-Sector Permit Parameter Benchmark Values for Stormwater Discharges Associated with

³ As of June 2007

Industrial Activities or the San Diego Water Quality Basin Plan Water Quality Objectives. These numeric constituent concentration limits are representative of the level of pollutant loading that does not cause or contribute to an exceedance of the water quality objectives of the construction site's receiving waters.

Table 9 Stormwater Sample Plan					
Pollutant Source	Sample Locations And Frequency	Testing Parameters	Testing Method ¹	Detection Limit	Performance Target Limit
Sediments, litter, wastes, metal scrap/debris and construction debris	In-Stream ³ when there is a stormwater discharge directly into the Agua Hedionda Lagoon at the following locations: 1. 18" CMP outfall at the North Slope 2. 300 feet upstream within the lagoon of the point the 18" CMP discharges into the Lagoon 3. 300 feet downstream within the lagoon of the point the 18" CMP discharges into the Lagoon	Turbidity	LaMotte 2020e portable turbidimeter calibrated and operated per manufacturer's instructions.		≤ 20 NTUs ² at 18" CMP Outfall
					The turbidity measured at the 300 ft downstream sample location cannot exceed the turbidity measured at 300 ft upstream sample location
Oils, greases, fuels, contaminated soils	18" CMP outfall at the North Slope	Total Oil and Grease (TOG)	EPA 1664	1 mg/l	15 mg/l
Concrete wastes, cooling waters, cutting fluids		pH (STD)	EPA 9040	1-14	6-9

**Table 9
Stormwater Sample Plan**

Pollutant Source	Sample Locations And Frequency	Testing Parameters	Testing Method ¹	Detection Limit	Performance Target Limit
Sediments, litter, wastes, metal scrap/debris; fuels; construction debris; cooling waters, cutting fluids; contaminated soils		Total Dissolved Solid (TDS)	EPA 160.1	1.0 mg/l	500 mg/l
		Chloride (Cl)	EPA 300	.20 mg/l	250 mg/l
		Sulfate (SO ₄)	EPA 300	.10 mg/l	250 mg/l
		Percent Sodium (% Na)	EPA 200.7	.50 mg/l	60 mg/l
		Iron (Fe)	EPA 200.7	.010 mg/l	.3 mg/l
		Manganese (Mn)	EPA 200.7	.010 mg/l	.05 mg/l
		Methyl Blue Active Substance (MBAS)	EPA 425.1	.025 mg/l	.5 mg/l
		Boron (B)	EPA 200.7	.05 mg/l	.75 mg/l
		Odor	EPA 140.1	1TON	none
		Color (PCU)	EPA 110.2	1 PCU	20 PCU
		Fluoride (F)	EPA 300	.10 mg/l	1 mg/l

¹ Or equivalent approved testing method

² San Diego Region Basin, Plan Agua Hedionda Lagoon NELs

³ Performance Target limit to be applied to the mathematical difference between upstream and down stream

700.2.1 Sample Collection Location and Frequency

Stormwater that comes in contact with, and/or discharges from the construction project area, including the all of the following areas, shall be monitored as a representation of the construction project's stormwater quality:

- Work areas (i.e., CECF construction-related activities taking place);
- Equipment and materials staging/storage areas;
- Wastes and stockpile areas; and
- Access roadways, including the haul road

Table 9 and Figure 3A describes and identifies where stormwater samples will be visually monitored inspected and representative samples collected for analysis by a DHS certified testing laboratory.

Stormwater shall be sampled as follows for any storm event which results in a direct discharge of stormwater into the Agua Hedionda Lagoon from the construction project site:

- Stormwater shall be sampled in accordance with Table 9 within the first hour of the observed discharge from the 18" CMP outfall (refer to Figure 3A); and
- For extended storm events where construction activities are ongoing, stormwater shall be sampled for turbidity in accordance with Table 9 every 24-hours at a minimum;

700.2.2 Sample Collection and Reporting Responsibilities

The Construction Project Manager is responsible for ensuring that appropriate sample collection equipment and supplies are available onsite within 24 hours of an anticipated storm event. The Construction Project Manager or the designated representative is required to coordinate with the project's designated testing laboratory to secure within 24 hours of an anticipated storm event the following materials and supplies:

- Certified cleaned and labeled sample collection containers. Sample containers need not be preserved when sample delivery to the designated testing laboratory can be accomplished within four (4) hours of sample collection. Sample Containers shall be preserved prior to sample collection when sample delivery to the designated testing laboratory cannot be accomplished within 4 hours of sample collection. All chemical sample preservation shall be performed by laboratory personnel; and
- A Laboratory Chain of Custody (COC) form

All stormwater samples shall be collected within the first hour of the observed discharge at the 18" CMP outfall. Sample collection shall be performed when there is an offsite discharge that occurs during daylight hours⁴. The Construction Project Manager is responsible for designating trained personnel to collect samples and analyze stormwater run-off at each designated sample collection location in accordance with the these sample protocols and good laboratory practices.

⁴ Stormwater sampling must be conducted seven days a week, without regard to daily activity schedules.

The designated stormwater sampler shall be responsible for the following:

- Complete the COC form:
 - Facility information (facility name and address);
 - Sample identifier;
 - Date/time sampled;
 - Analysis required per sample, based on Table 1; and
 - Total volume and/or number of containers per sample.

- Document the sampling activity and prepare a Sample Log as follows:
 - Date and time the offsite discharge initially occurs;
 - Time sample collected
 - Sample collection location;
 - Description activities taking place at the project site within the previous week
 - Description of the condition of the sample (i.e., color, odor, etc);
 - Any other observations or conditions unique to the sampling event;
 - Name of the facility and the individual taking the sample;

- Label the sample collection containers with:
 - Date and time of sampling;
 - Sample identification;
 - Facility identification; and
 - Name of person taking the sample.

Once the samples have been collected, properly logged and labeled, the sampler will be responsible for immediately storing the collected samples at 4° C (39° F) until the collected samples are sent to the designated testing laboratory. At a minimum, the testing laboratory will receive samples within 24 hours of the sample collection. All samples released to the laboratory will be accompanied with the completed Chain of Custody form.

700.2.3 Laboratory Quality Control Requirements

The following Quality Control (QC) samples will be run with each laboratory sample set or analytical batch of stormwater samples:

- Method Blanks: 1 per batch or every 20 Samples, Whichever Is greater
- Matrix Spike Samples: 1 Control Matrix Spike and 1 Field Matrix Spike per Batch or Every 20 Samples, Which Ever Is Greater
- Matrix Duplicate: 1 per Matrix or Every 20 Samples

700.2.4 Sample Results Evaluation

The Construction Project Manager is required to designate appropriately qualified personnel to review the sample testing results and assess the effectiveness of the project's stormwater

BMPs. The site's stormwater BMPs will be considered ineffective when the construction related stormwater sample parameters exceed the performance target limits listed in Table 9.

When stormwater sample data indicates that the project's stormwater BMPs are ineffective, the Construction Project Manager will be responsible for initiating and documenting appropriate corrective action.

700.2.5 Record Keeping Requirements

The Construction Project Manager is responsible for collecting the following Laboratory Analytical Sample Results:

- Field Sample Results;
- QC Results, Including Acceptance Limits;
- Chain of Custody Documentation;
- Field Sample Log Data; and
- Any Other Pertinent Information.

The Environmental Compliance Manager is responsible for maintaining for three years all stormwater inspection and testing reports as part of the project's SWPPP documentation.

700.2.6 Water Quality Exceedance Notification

Environmental Compliance Manager and/or Construction Project Manager is responsible for providing verbal notification to the RWQCB as soon as practical, but no later than 48 hours of knowledge of an exceedance. If it is determined or suspected, through visual observation and/or stormwater sampling and analysis that a stormwater discharge has caused or contributed to an exceedance of an applicable water quality standard immediate corrective action is required.

Notification is required when the following conditions are not maintained as a result of a direct discharge of stormwater from the project site into the Agua Hedionda Lagoon:

Section A: Discharge Prohibitions: A.3: Stormwater discharges shall not cause or threaten to cause pollution, contamination, or nuisance. The terms "pollution", "contamination" and "nuisance" are defined in California's Porter-Cologne Water Quality Control Act⁵ as follows:

1. "*Contamination*" means an impairment of the quality of the waters of the state by waste to a degree which creates hazard to the public health through poisoning or through the spread of disease. "Contamination" includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected.
2. "*Pollution*" means an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects either of the following:
 - (A) The waters for beneficial uses.

⁵ Effective January 1, 2007

(B) Facilities which serve these beneficial uses.

“Pollution” may include “contamination.”

3. “Nuisance” means anything which meets all of the following requirements:
 - A. Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.
 - B. Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.
 - C. Occurs during, or as a result of, the treatment or disposal of wastes.

Section C: Special Provisions for Construction Activity: C.2: *All dischargers shall develop and implement a SWPPP in accordance with Section A: Storm Water Pollution Prevention Plan. The discharger shall implement controls to reduce pollutants in storm water discharges from their construction sites to the BAT/BCT performance standard. The BAT/BCT standard is met when it can be demonstrated that the stormwater discharge does not cause or contribute to an exceedance of an applicable water quality standing for the receiving waters;*

Section B: Receiving Water Limitations, of the State’s General Permit for Stormwater Discharges Associated with Construction Activity (General Permit) requires that Stormwater Pollution Prevention Plans (SWPPP) be designed and implemented such that storm water discharges and authorized nonstorm water discharges shall not cause or contribute to an exceedance of any applicable water quality standards contained in a Statewide Water Quality Control Plan and/or the applicable RWQCB’s Basin Plan.

Within 14 days of verbal notification to the RWQCB, the Environmental Compliance Manger or Construction Project Manager is required to provide a written report to the RWQCB and Environmental Compliance Manager that describes the following:

- Nature and cause of the water quality exceedance; and
- Initial and/or interim corrective actions to prevent continued exceedance of the water quality standard; and
- BMPs currently being implemented; and
- Additional BMPs to be implemented to prevent continued exceedance of the water quality standard; and/or
- Any maintenance or repairs of existing BMPs to prevent continued exceedance of the water quality standard; and
- Schedule of implementation of corrective actions and additional BMPs

800.1 POST-CONSTRUCTION BMPS

Post-Construction BMPs are permanent measures installed during construction that are intended to either reduce or eliminate the discharge of pollutants into stormwater following completion of the construction activities. The City of Carlsbad requires that development and significant redevelopment projects, which fall under the category of “priority projects”, include permanent stormwater BMPs to ensure that those projects reduce potential urban pollutant runoff. Such BMPs include the following (refer to Table 1 and Appendix 12: City of Carlsbad SUSMP Stormwater Standards Manual):

- a. Site Design BMPs in accordance with Section III.2.A of the City’s Stormwater Standards Manual; and
- b. Source Control BMPs in accordance with Section III.2.B of the City’s Stormwater Standards Manual; and
- c. Treatment Control BMPs in accordance with Appendix C of the City’s Stormwater Standards Manual

**800.2 PROJECT COMPLIANCE WITH CITY OF CARLSBAD SUSMP
STORMWATER STANDARDS****800.2.1 Determination of Project Category**

Actions that require a discretionary approval by the City of Carlsbad (i.e., planned industrial permits, redevelopment permits, coastal development permits) should complete the Construction Activity Standards Questionnaire (refer to Appendix 13 to determine if the project is subject to the City’s Priority Project Permanent Stormwater BMP Requirements and/or the Standard Permanent Stormwater BMP Requirements. CECP Construction is a Priority Project because it meets the following conditions:

- Discharges to an SEA- Agua Hedionda Lagoon
- Waste generation, storage
- Material loading/unloading
- Vehicle/equipment serving and maintenance areas
- Requires Industrial Stormwater Permit coverage; and
- Grading and ground disturbance

800.2.2 Pollutants of Concern

According to Table 2 of Section III of the Stormwater Standards Manual the CECP power plant is categorized as a heavy industry/ industrial development. Anticipated and/or potential stormwater pollutants associated with is type of land use category include the following:

- Sediment

- Heavy Metals
- Organic Compounds
- Trash & Debris
- Oxygen Demanding Substances; and
- Oils & Greases

The primary water bodies within the project area are Agua Hedionda Lagoon and the Pacific Ocean. These water bodies are located within the San Diego Basin Plan. Basin Plans are adopted and amended by Regional Water Boards under a structured process involving full public participation and state environmental review. Basin Plans complement water quality control plans adopted by the State Water Board.

As part of the Basin Plan, the State has established water quality objectives for waters within the basin plan. The water quality objectives are either narrative or numeric and are often different for different water bodies. The Porter-Cologne Water Quality Control Act defines water quality objectives as "...the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area" [Water Code Section 13050(h)]. It also requires the Regional Water Board to establish water quality objectives, while acknowledging that it is possible for water quality to be changed to some degree without unreasonably affecting beneficial uses.

The San Diego Basin Plan has established numeric effluent limits (NELs) for discharges, including stormwater discharges, into Agua Hedionda Lagoon:

Constituent	Maximum Allowed Concentration (mg/l or as noted)	Constituent	Maximum Allowed Concentration (mg/l or as noted)
Total Dissolved Solid (TDS)	500	Methyl Blue Active Substance (MBAS)	0.5
Chloride (Cl)	250	Boron (B)	0.75
Sulfate (SO ₄)	250	Odor	none
Percent Sodium (% Na)	60	Turbidity (NTU)	20
Iron (Fe)	0.3	Color (Units)	20
Manganese (Mn)	.05	Fluoride (F)	1

The federal Clean Water Act (CWA) requires States to identify and make a list of surface water bodies that are polluted. These water bodies, referred to as "water quality limited segments," by definition do not meet water quality standards even after discharges of wastes from point sources have been treated by the minimum required levels of pollution control technology. States are required to compile these water bodies into a list, referred to as the "Clean Water Act Section 303(d) List of Water Quality Limited Segments" (List).

The Federal Clean Water Act as well as the State's Porter-Cologne Act prohibit discharges into Waters of the US and/or Waters of the State that can cause or contribute to an exceedance of a

receiving water's water quality objectives. The discharge into a receiving water of a pollutant, in any quantity or concentration, for which the receiving water is designed as being impaired for is prohibited.

The "Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List" is the policy for the State and Regional Water Boards to follow when developing updates to the List. This policy describes the process by which the State and Regional Water Boards comply with the requirements of the Clean Water Act in developing the List.

On June 28, 2007 the U.S. Environmental Protection Agency gave final approval to California's 2006 Section 303(d) List of Water Quality Limited Segments. The Agua Hedionda Lagoon is listed as impaired for indicator bacteria and sedimentation/siltation. The Pacific Ocean at Carlsbad Beach is listed as impaired for indicator bacteria.

800.2.3 Conditions of Concern

The 23-acre CECP site, including the adjacent access roads, is less than 50% impervious (i.e., paved). The CECP facility will be located within an impoundment basin. The top of the berm is at an elevation of 54 feet above mean sea level (msl). The berm is constructed at a 1.5 to 1 slope and is approximately 20 to 25 feet high from the bottom of the impoundment. The slopes of the earthen berms and drain rock layer are covered with a two-inch thick layer of gunite, reinforced with 6 x 6 – 10/10 welded wire fabric.

Within the former tank farm (Tanks 5, 6, and 7), interior drainage (drainage within each of the tank's containment berms) is contained and collected in toe ditches (at the base of the interior slopes). Dike drain sump structures, inlets, and 18-inch diameter corrugated metal drainage pipes line the perimeter of each basin. Within each of the three basins, drainage enters a toe drain and is pumped via a sump into a 6-inch line located along the east end of the basin at the top of the containment berm. The 6-inch line collects drainage from each of the three basins and routes the drainage to the northwest side of Tank 7 where the 6-inch pipe discharges into the 18-inch corrugated metal pipe (CMP) pipe (main drain). The 18-inch CMP pipe daylights at the top of the North Slope to the Agua Hedionda Lagoon (Refer to Figure 3A). A sparsely vegetated 12 acre-parcel located immediately north of the tank farm basin also drains to the 18-inch CMP discharge pipe via a drain inlet located at the southern toe of the north slope.

Minor modification of existing drainage system that currently services the former East Tank Farm will be necessary as a result of berm removal and reconstruction. Minor grading may be necessary to direct drainage within the CECP site impoundment to the drain inlets that will need to be relocated and reinstalled as part of the CECP site's berm reconstruction phase.

Drainage from within the CECP site impoundment will continue to be collected within the drainage channel located at the toe of the berm and will be pumped to above-ground mobile oil/water separator and sand media filter for pretreatment. Discharge from the treatment units will be to an infiltration trench for onsite retention and infiltration for low-volume storm events, and/or for additional volume reduction/filtration prior to offsite discharge (refer to Figure 7B).

Surface areas that are currently not fully stabilized, but proposed for use as laydown for construction and/or where the areas' drainage comingles with the construction site's stormwater prior to offsite discharge will be stabilized prior to start-up of construction.

As a result of this project, the amount of overall impervious surfaces will decrease, resulting in a reduction in the project's post-construction runoff coefficient, and consequently a reduction in the volume of stormwater ultimately discharged offsite. The overall reduction in impervious surfaces is a result of reducing the amount of basin floor to be repaved by at least one acre. This unpaved, pervious area will be stabilized and used for employee parking during operation of the CECP power plant. Refer to Appendix 7 for a summary description of the project's pre- and post construction site surface conditions and drainage calculations.

Section 2.3.2.3 of the City of Carlsbad's 2008 Stormwater Standards Manual states that priority projects where downstream erosion is a potential, that the project's conditions of concern should be identified through preparation of a project-specific drainage study. As noted, the CECP power plant will, under post-construction conditions, will have a lower Runoff Coefficient as a result in decrease in impervious surface area. Since there will be a reduction in the volume of stormwater ultimately discharged offsite the potential for downstream erosion is reduced. In accordance with Section 2.3.2.3 of the 2008 Stormwater Standards Manual the project is not required prepare a drainage study to determine the project's conditions of concern.

800.3 PERMANENT STORMWATER BMPS

800.3.1 LID Site Design BMPS

Based on the type of pollutants associated with the CECP power plant's land use/project category and the receiving water's identified pollutants of concern and conditions of concern, and in accordance with Section 2.3 of the 2008 Stormwater Standards Manual, the following Site Design BMPS have been selected for post-construction stormwater management. Note- the BMP referenced refer to the City of Carlsbad 2008 Stormwater Standards Manual:

a. Maintain, or Reduce Pre-Development Rainfall Runoff Characteristics

BMP-1: Minimize Impervious Surfaces Under post-construction conditions the amount of impervious surface area will be reduced by at least 1 acre, at least a 5% reduction;

BMP-2: Increase Rainfall Infiltration: Under post-construction conditions, approximately 2 acre-ft (i.e., 2year/24-hour storm event) of surface drainage will be retained onsite.

BMP-2: Stabilization of Disturbed Soils Areas: As part of the construction-related soil stabilization BMPs, the CECP site's access roads and the 12 acre pad located north of the tank farm will be stabilized with drain rock and/or native vegetation. These soil stabilization BMPs will be maintained under post-construction conditions;

b. Protect Slopes and Channels:

BMP-5: Runoff from tops of slopes will be conveyed via a slop drain. Riprap installed as an energy dissipater (**BMP-8**) and will be maintained and/or reinforced during construction and under post construction conditions

BMP-6: Existing vegetation on the external north slope will be preserved during construction phases and maintained under post-construction conditions

BMP-6: The new west berm will be vegetated with native or drought tolerant vegetation where practicable consistent with the Carlsbad Landscape Manual;

800.3.2 Source Control BMPs

Based on the type of pollutants associated with the CECP power plant's land use/project category and the receiving water's identified pollutants of concern and conditions of concern, and in accordance with Section 2.3.3 of the 2008 Stormwater Standards Manual, the following Source BMPs and Project Specific BMPs have been selected for post-construction stormwater management:

a. Outdoor Material & Waste Storage Areas

BMP-10: Hazardous materials with the potential to contaminate stormwater runoff will be stored within the CECP site's designed hazardous materials storage buildings in accordance with California Code of Regulations' Title 22 hazardous Materials Storage requirements;

BMP-11: Trash storage areas will consist of walled enclosures equipped with a roof or awning. The floor of the covered enclosure will be concrete paved and designed so not to allow run-on from adjoining areas;

b. Drain Inlet Stenciling:

BMP- 17: All drain inlets will be concrete stamped with prohibitive language (e.g., "No Dumping – I Live Downstream"), satisfactory to the City of Carlsbad's Engineer;

c. Project Specific BMPs

BMP-22: Dock Areas: Loading/unloading dock areas shall be covered and/or will be designed to confine surface drainage within the loading dock area and prevent surface drainage from draining into the loading dock areas from adjacent areas. Direct connections to storm drains from loading docks are prohibited.

BMP-23: Maintenance Bays: Bays shall be covered and/or will be designed to confine surface drainage within the maintenance bay area and prevent surface drainage from draining into the maintenance bay area from adjacent areas. Direct connections to storm drains from maintenance bays are prohibited.

BMP-25: Equipment Wash Areas: Areas for washing/steam cleaning of equipment shall be self-contained to preclude run-on and runoff; covered with a roof or overhang; and equipped with a clarifier or other pretreatment facility (i.e., oil water separator); and connected to the sanitary sewer in accordance with the existing Encina Power Station's POTW Discharge Permit. and

BMP-26: Outdoor Processing Areas: Outdoor processing areas shall be sloped toward a dead-end sump and will be graded/ bermed to prevent run-on from surrounding areas.

BMP-30: Surface Parking Areas: Areas used for employee parking will be graveled not paved

800.3.3 Treatment Control BMPs

Based on the type of pollutants associated with the CECP power plant's land use/project category and the receiving water's identified pollutants of concern and conditions of concern, and in accordance with Section 2.3.3 of the 2008 Stormwater Standards Manual, the following Treatment Control BMPs have been selected for post-construction stormwater management:

- a. **Drain Insert Filtration Units:** The drain inlets located within the CECP power plant's basin will be retrofitted with drain inlet inserts designed to filter trash, debris and medium sized soil particles. Additionally, the drain inlet located at the south of the toe of the north slope will also be retrofitted with a drain inlet filtration insert;
- b. **Pretreatment:** Phase 4 of the CECP construction project obligates the facility to install an oil/water separator and sand media filtration system to pretreat the site's stormwater and surface drainage prior to discharge from the site's basin;
- c. **Stormwater Volume Reduction and Bio-infiltration:** A bio-infiltration basin shall be constructed to receive the CECP site's pretreated stormwater prior to offsite discharge. Spoils generated from the berm removal phase will be used to construct the bio-infiltration basin. The area north of the CECP site is about 3.3 acres. Fill material will be placed at varying depth from 3 feet to 9 feet to establish a grade of approximately 60 feet above mean sea level. The basin shall be sized and design to retain onsite and infiltrate the stormwater runoff generated from a 2 year/24-hour storm event. For larger storm event the basin will provide additional filtration prior to offsite discharge to the existing 18" drainage pipe (Refer to Figure 3A) that discharges to the Agua Hedionda Lagoon. Refer to Appendix 7 for basin sizing considerations and calculations.

800.3.4 Permanent BMP Maintenance Agreement

The owner/operator of the CECP power plant will negotiate an agreement with the City of Carlsbad regarding the maintenance, repair and replacement of the project's permanent stormwater BMPs, as necessary, for the life of this project. Prior to initiation of the CECP Project, the owner/operator or the designated agent will submit to the City of Carlsbad a proposed maintenance agreement for review and execution (refer to Appendix 14: Permanent Stormwater BMP Maintenance Agreement).

In accordance with 2.4 of the City of Carlsbad's 2008 Stormwater Standards Manual, project owner/operators are required to propose a maintenance agreement with the City that assures that permanent BMPs will be installed and maintained throughout the life of the project. The maintenance agreement should include the following:

- **Operation & Maintenance Plan:** The Encina Power Plant's Facility Maintenance Department will assume the responsibility of maintaining the permanent stormwater BMPs identified for this project. The maintenance tasks will be incorporated into the facility's current facility maintenance program within 30 days of installation of the BMPs. The CECP Industrial Stormwater Pollution Prevention Plan will serve as the project's Permanent Stormwater BMPs Operation & Maintenance. Refer to Appendix 15: CECP Industrial Stormwater Pollution Prevention Plan;

- **Access Easement/Agreement:** The owner/operator of the CECP power plant will assume all responsibility for the maintenance of the project's permanent stormwater BMPs. Site access by City of Carlsbad personnel will not be required.

APPENDIX 1

Notice of Intent

TO BE PROVIDED WITHIN 90 DAYS OF MOBILIZATION

APPENDIX 2

SWPPP Amendments

AMENDMENT SUMMARY REPORT

REPORT NUMBER: _____

SECTION NUMBER(S): _____

DATE OF CHANGE(S): _____

DESCRIPTION OF CHANGES:

NAME: _____

TITLE: _____

SIGNATURE: _____

DATE: _____

- Copies:
- Construction Manager
 - Project Manager
 - Construction Forman
 - Project Engineer

Other _____

APPENDIX 3

Inspection Reports

WET WEATHER MONITORING AND OBSERVATION REPORT

Reporting Period: _____

Part 1: Daily Rain Tracking Report

Date	Next Anticipated Storm Event				Weather Monitoring Source
	72 Hours	48 Hours	24 Hours	< 24 Hours	

Part 2: Wet Weather BMP Inspection

A. Date of Next Anticipated Storm Event Within the Next 72 Hours: _____

B. 24 Hr Pre-Storm Event BMP Inspection Conducted during Reporting Period?

- I. Yes _____ (Attach the completed BMP Checklist to this Report)
- II. No _____ (Explain)
- III. Are all required BMPs in place and operational: Yes _____ No _____ (Explain)
- IV. Are all active/disturbed areas stabilized per SWPPP: Yes _____ No _____ (Explain)

C. Storm Event

- I. Date of Storm Event: _____
- II. Start Time of Storm Event: _____
- III. Duration of Storm event: _____ to _____

D. 24 Hour Interval BMP Inspection Conducted during Reporting Period?

- I. Yes _____ (Attach the completed BMP Checklist to this Report)
- II. No _____ (Explain)
- III. Are all required BMPs in place and operational: Yes _____ No _____ (Explain)
- IV. Are all active/disturbed areas stabilized per SWPPP: Yes _____ No _____ (Explain)

**CONSTRUCTION SWPPP INSPECTION REPORT
SWPPP ASSESSMENT**

Construction Site/Project: _____

Date/Time: _____

Inspector(s): _____ **Title:** _____

SWPPP Element	Status	Comments
Certifications		
Training		
Amendments		
Weekly BMP Inspections		
Wet Weather Monitoring		
WPCDs/Site Mapping		
Stormwater Sample Collection		
Non-Compliance Reports		

Inspector Signature: _____ **Date:** _____

Construction Supervisor Name: _____

Construction Supervisor Signature: _____ **Date:** _____

CONSTRUCTION SWPPP INSPECTION REPORT BMP ASSESSMENT

Construction Site/Project: _____

Date/Time: _____

Inspector(s): _____ Title: _____

BMP	Location	Status	Comments
Silt Fencing			
Fiber Rolls/Mats			
Soil Stabilization			
Inlet Protection			
Entrances/Exits & Roads			
House Keeping			
Waste Management			

BMP	Location	Status	Comments
Stockpiles			
Non-Stormwater Controls			
Materials Management			
Dust Control			
Post-Construction BMPs			

Inspector Signature: _____ Date: _____

Construction Supervisor Name: _____

Construction Supervisor Signature: _____ Date: _____

**CONSTRUCTION SWPPP INSPECTION REPORT
CONTINUATION FORM**

Construction Site/Project: _____

Date/Time: _____

Inspector(s): _____ **Title:** _____

Inspector Signature: _____ **Date:** _____

Construction Supervisor Name: _____

Construction Supervisor Signature: _____ **Date:** _____

CONSTRUCTION SITE BMP INSPECTION CHECKLIST

Type of Inspection: (Check applicable section)

Weekly BMP Inspection: _____

24 Hr Pre-Storm Event BMP Inspection: _____

Post-Storm Event BMP Inspection: _____

24 Hr Interval Storm Event BMP Inspection: _____

Inspector Name: _____

Inspector Title: _____

Inspection Date: _____

Weather Condition: _____

Construction Phase	Required BMP *	BMP Location	BMP In place & Installed Per BMP Specification*	BMP maintained per BMP Specification*	Comments/Corrective Action

* Reference SWPPP Sections 4 through 6

Inspector Signature _____

BMP INSPECTION CHECKLIST

Type of Inspection: (Check applicable section)

Weekly BMP Inspection: _____

24 Hr Pre-storm Event BMP Inspection: _____

Post-storm Event BMP Inspection: _____

24 Hour Interval Storm Event BMP Inspection: _____

Inspector Name: _____

Inspector Title: _____

Inspection Date: _____

Weather Condition: _____

Construction Phase	Required BMP *	BMP Location	BMP In place & Installed Per BMP Specification*	BMP maintained per BMP Specification*	Comments/Corrective Action

Reference SWPPP Sections 4 through 6

Inspector Signature

APPENDIX 4

Training Records

CONSTRUCTION SITE PERSONNEL BMP TRAINING LOG

SITE: _____

DATE: _____

TRAINER: _____

TITLE: _____

TOPICS:

SWPPP Management	Roles and Responsibilities		BMP Implementation	
	BMP Inspection & Monitoring		BMP Maintenance	
	Wet Weather Monitoring		Stormwater Sampling & Analysis	
	Non-Conformance Reporting		Annual Certification	
Soil Stabilization/ Erosion Control	Scheduling		Dikes/Swales and Ditches	
	Vegetation Preservation		Slope Drains	
	Mulch/Hydroseeding/Soil Binders		Outlet Protection	
	Fiber Mats/Geotextiles/Plastic Covers			
Sediment Control	Silt Fence		Street Sweeping/Vacuuming	
	Sediment Basin/Trap		Gravel Bag Berm	
	Check Dam		Sandbag/Bale Barrier	
	Fiber Roll		Storm Drain Inlet Protection	
Wind Erosion Control	Watering			
Tracking Control	Stabilized Site Access/Roadway			
Non-Stormwater Control	Water Conservation Practices		Run-on / Clear Water Diversion	
	Dewater Operations		Illicit/Illegal Discharge Control	
	Paving/Grinding Operations		Potable Water/Irrigation	
	Stream Crossing		Vehicle/Equip Cleaning	
	Vehicle/Equip Maintenance		Vehicle/Equip Fueling	
Waste Management & Material Pollution Control	Material Delivery & Storage		Hazardous Waste Management	
	Material Use		Contaminated Soils	
	Stockpile Control Practices		Sanitary/Septic Wastes	
	Spill Prevention & Control		Concrete Waste Management	
	Solid Waste Management		Liquid Waste Management	

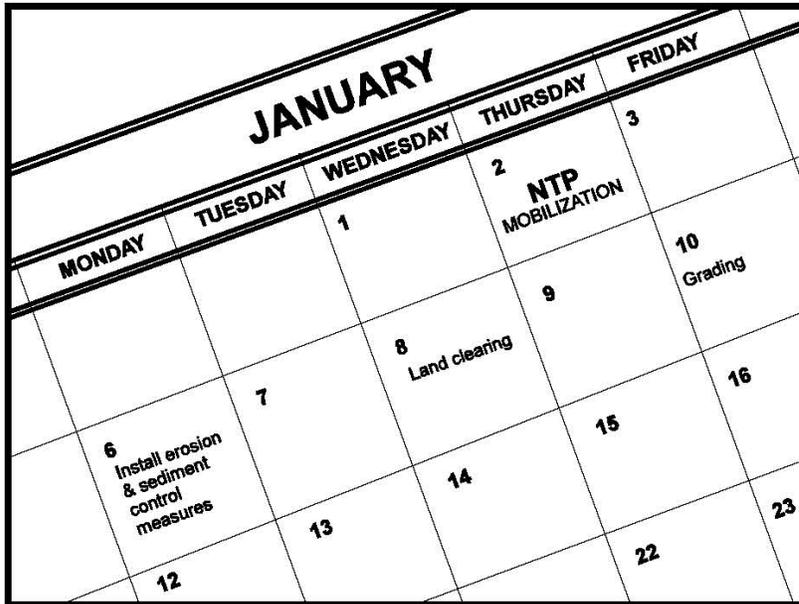
COMMENTS:

APPENDIX 5

Figures

APPENDIX 6

BMP Specifications



Description and Purpose

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Suitable Applications

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project especially during rainy season. Use of other, more costly yet less effective, erosion and sediment control BMPs may often be reduced through proper construction sequencing.

Limitations

- Environmental constraints such as nesting season prohibitions reduce the full capabilities of this BMP.

Implementation

- Avoid rainy periods. Schedule major grading operations during dry months when practical. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means or to install sediment trapping devices.
- Plan the project and develop a schedule showing each phase of construction. Clearly show how the rainy season relates to soil

Objectives

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TR	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None



disturbing and re-stabilization activities. Incorporate the construction schedule into the SWPPP.

- Include on the schedule, details on the rainy season implementation and deployment of:
 - Erosion control BMPs
 - Sediment control BMPs
 - Tracking control BMPs
 - Wind erosion control BMPs
 - Non-stormwater BMPs
 - Waste management and materials pollution control BMPs
- Include dates for activities that may require non-stormwater discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, pavement cleaning, etc.
- Work out the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, foundation pouring utilities installation, etc., to minimize the active construction area during the rainy season.
 - Sequence trenching activities so that most open portions are closed before new trenching begins.
 - Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
 - Schedule establishment of permanent vegetation during appropriate planting time for specified vegetation.
- Non-active areas should be stabilized as soon as practical after the cessation of soil disturbing activities or one day prior to the onset of precipitation.
- Monitor the weather forecast for rainfall.
- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Be prepared year round to deploy erosion control and sediment control BMPs. Erosion may be caused during dry seasons by un-seasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year round, and retain and maintain rainy season sediment trapping devices in operational condition.
- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.

Costs

Construction scheduling to reduce erosion may increase other construction costs due to reduced economies of scale in performing site grading. The cost effectiveness of scheduling techniques should be compared with the other less effective erosion and sedimentation controls to achieve a cost effective balance.

Inspection and Maintenance

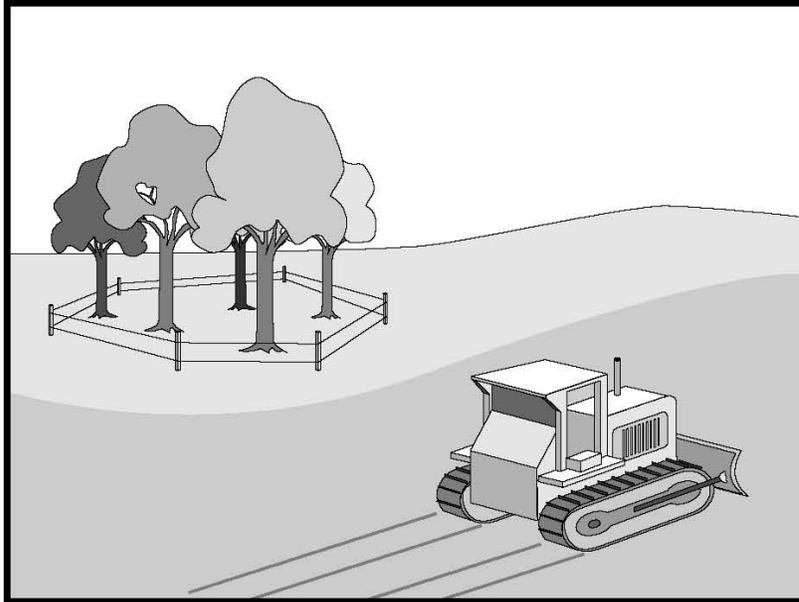
- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted.
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

References

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities Developing Pollution Prevention Plans and Best Management Practices (EPA 832-R-92-005), U.S. Environmental Protection Agency, Office of Water, September 1992.

Preservation Of Existing Vegetation EC-2



Description and Purpose

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion.

Suitable Applications

Preservation of existing vegetation is suitable for use on most projects. Large project sites often provide the greatest opportunity for use of this BMP. Suitable applications include the following:

- Areas within the site where no construction activity occurs, or occurs at a later date. This BMP is especially suitable to multi year projects where grading can be phased.
- Areas where natural vegetation exists and is designated for preservation. Such areas often include steep slopes, watercourse, and building sites in wooded areas.
- Areas where local, state, and federal government require preservation, such as vernal pools, wetlands, marshes, certain oak trees, etc. These areas are usually designated on the plans, or in the specifications, permits, or environmental documents.
- Where vegetation designated for ultimate removal can be temporarily preserved and be utilized for erosion control and sediment control.

Objectives

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None



EC-2 Preservation Of Existing Vegetation

Limitations

- Requires forward planning by the owner/developer, contractor, and design staff.
- Limited opportunities for use when project plans do not incorporate existing vegetation into the site design.
- For sites with diverse topography, it is often difficult and expensive to save existing trees while grading the site satisfactory for the planned development.

Implementation

The best way to prevent erosion is to not disturb the land. In order to reduce the impacts of new development and redevelopment, projects may be designed to avoid disturbing land in sensitive areas of the site (e.g., natural watercourses, steep slopes), and to incorporate unique or desirable existing vegetation into the site's landscaping plan. Clearly marking and leaving a buffer area around these unique areas during construction will help to preserve these areas as well as take advantage of natural erosion prevention and sediment trapping.

Existing vegetation to be preserved on the site must be protected from mechanical and other injury while the land is being developed. The purpose of protecting existing vegetation is to ensure the survival of desirable vegetation for shade, beautification, and erosion control. Mature vegetation has extensive root systems that help to hold soil in place, thus reducing erosion. In addition, vegetation helps keep soil from drying rapidly and becoming susceptible to erosion. To effectively save existing vegetation, no disturbances of any kind should be allowed within a defined area around the vegetation. For trees, no construction activity should occur within the drip line of the tree.

Timing

- Provide for preservation of existing vegetation prior to the commencement of clearing and grubbing operations or other soil disturbing activities in areas where no construction activity is planned or will occur at a later date.

Design and Layout

- Mark areas to be preserved with temporary fencing. Include sufficient setback to protect roots.
 - Orange colored plastic mesh fencing works well.
 - Use appropriate fence posts and adequate post spacing and depth to completely support the fence in an upright position.
- Locate temporary roadways, stockpiles, and layout areas to avoid stands of trees, shrubs, and grass.
- Consider the impact of grade changes to existing vegetation and the root zone.
- Maintain existing irrigation systems where feasible. Temporary irrigation may be required.
- Instruct employees and subcontractors to honor protective devices. Prohibit heavy equipment, vehicular traffic, or storage of construction materials within the protected area.

Preservation Of Existing Vegetation EC-2

Costs

There is little cost associated with preserving existing vegetation if properly planned during the project design, and these costs may be offset by aesthetic benefits that enhance property values. During construction, the cost for preserving existing vegetation will likely be less than the cost of applying erosion and sediment controls to the disturbed area. Replacing vegetation inadvertently destroyed during construction can be extremely expensive, sometimes in excess of \$10,000 per tree.

Inspection and Maintenance

During construction, the limits of disturbance should remain clearly marked at all times. Irrigation or maintenance of existing vegetation should be described in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below should be followed:

- Verify that protective measures remain in place. Restore damaged protection measures immediately.
- Serious tree injuries shall be attended to by an arborist.
- Damage to the crown, trunk, or root system of a retained tree shall be repaired immediately.
- Trench as far from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When trenching or tunneling near or under trees to be retained, place tunnels at least 18 in. below the ground surface, and not below the tree center to minimize impact on the roots.
- Do not leave tree roots exposed to air. Cover exposed roots with soil as soon as possible. If soil covering is not practical, protect exposed roots with wet burlap or peat moss until the tunnel or trench is ready for backfill.
- Cleanly remove the ends of damaged roots with a smooth cut.
- Fill trenches and tunnels as soon as possible. Careful filling and tamping will eliminate air spaces in the soil, which can damage roots.
- If bark damage occurs, cut back all loosened bark into the undamaged area, with the cut tapered at the top and bottom and drainage provided at the base of the wood. Limit cutting the undamaged area as much as possible.
- Aerate soil that has been compacted over a trees root zone by punching holes 12 in. deep with an iron bar, and moving the bar back and forth until the soil is loosened. Place holes 18 in. apart throughout the area of compacted soil under the tree crown.
- Fertilization
 - Fertilize stressed or damaged broadleaf trees to aid recovery.
 - Fertilize trees in the late fall or early spring.

EC-2 Preservation Of Existing Vegetation

- Apply fertilizer to the soil over the feeder roots and in accordance with label instructions, but never closer than 3 ft to the trunk. Increase the fertilized area by one-fourth of the crown area for conifers that have extended root systems.
- Retain protective measures until all other construction activity is complete to avoid damage during site cleanup and stabilization.

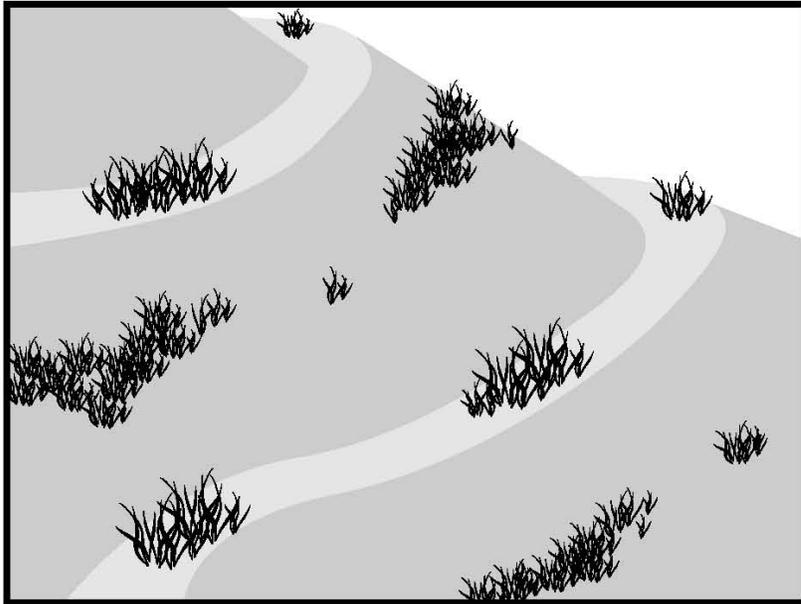
References

County of Sacramento Tree Preservation Ordinance, September 1981.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for The Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



Description and Purpose

Hydroseeding typically consists of applying a mixture of wood fiber, seed, fertilizer, and stabilizing emulsion with hydro-mulch equipment, to temporarily protect exposed soils from erosion by water and wind.

Suitable Applications

Hydroseeding is suitable for soil disturbed areas requiring temporary protection until permanent stabilization is established, and disturbed areas that will be re-disturbed following an extended period of inactivity.

Limitations

- Hydroseeding may be used alone only when there is sufficient time in the season to ensure adequate vegetation establishment and coverage to provide adequate erosion control. Otherwise, hydroseeding must be used in conjunction with mulching (i.e., straw mulch).
- Steep slopes are difficult to protect with temporary seeding.
- Temporary seeding may not be appropriate in dry periods without supplemental irrigation.
- Temporary vegetation may have to be removed before permanent vegetation is applied.
- Temporary vegetation is not appropriate for short term inactivity.

Objectives

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-5 Soil Binders
- EC-6 Straw Mulch
- EC-7 Geotextiles and Mats
- EC-8 Wood Mulching



Implementation

In order to select appropriate hydroseeding mixtures, an evaluation of site conditions shall be performed with respect to:

- Soil conditions
- Site topography
- Season and climate
- Vegetation types
- Maintenance requirements
- Sensitive adjacent areas
- Water availability
- Plans for permanent vegetation

The local office of the U.S.D.A. Natural Resources Conservation Service (NRCS) is an excellent source of information on appropriate seed mixes.

The following steps shall be followed for implementation:

- Avoid use of hydroseeding in areas where the BMP would be incompatible with future earthwork activities and would have to be removed.
- Hydroseeding can be accomplished using a multiple step or one step process. The multiple step process ensures maximum direct contact of the seeds to soil. When the one step process is used to apply the mixture of fiber, seed, etc., the seed rate shall be increased to compensate for all seeds not having direct contact with the soil.
- Prior to application, roughen the area to be seeded with the furrows trending along the contours.
- Apply a straw mulch to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow.
- All seeds shall be in conformance with the California State Seed Law of the Department of Agriculture. Each seed bag shall be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. The container shall be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained. All legume seed shall be pellet inoculated. Inoculant sources shall be species specific and shall be applied at a rate of 2 lb of inoculant per 100 lb seed.
- Commercial fertilizer shall conform to the requirements of the California Food and Agricultural Code. Fertilizer shall be pelleted or granular form.
- Follow up applications shall be made as needed to cover weak spots and to maintain adequate soil protection.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.

Costs

Average cost for installation and maintenance may vary from as low as \$300 per acre for flat slopes and stable soils, to \$1600 per acre for moderate to steep slopes and/or erosive soils.

Hydroseeding		Installed Cost per Acre
High Density	Ornamentals	\$400 - \$1600
	Turf Species	\$350
	Bunch Grasses	\$300 - \$1300
Fast Growing	Annual	\$350 - \$650
	Perennial	\$300 - \$800
Non-Competing	Native	\$300 - \$1600
	Non-Native	\$400 - \$500
Sterile	Cereal Grain	\$500

Source: Caltrans Guidance for Soil Stabilization for Temporary Slopes, Nov. 1999

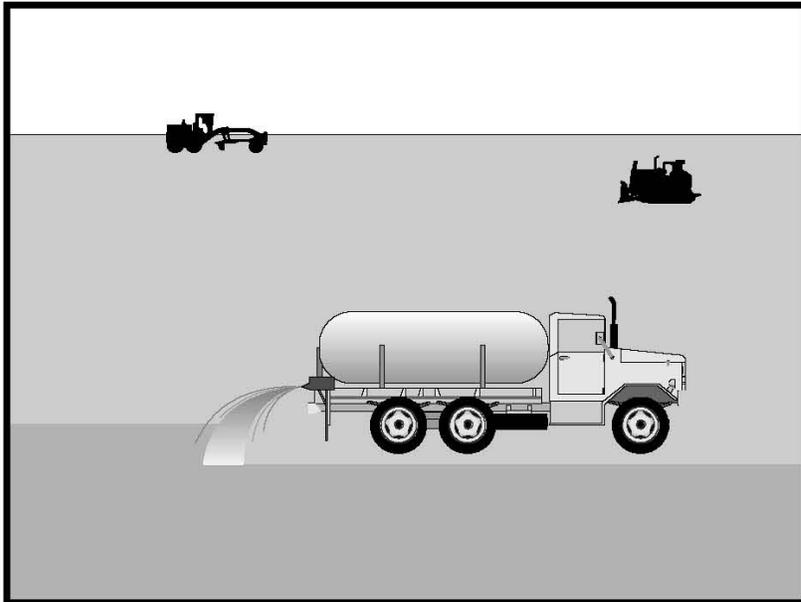
Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Areas where erosion is evident shall be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Where seeds fail to germinate, or they germinate and die, the area must be re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates.
- Irrigation systems, if applicable, should be inspected daily while in use to identify system malfunctions and line breaks. When line breaks are detected, the system must be shut down immediately and breaks repaired before the system is put back into operation.
- Irrigation systems shall be inspected for complete coverage and adjusted as needed to maintain complete coverage.

References

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.



Description and Purpose

Soil binders consist of applying and maintaining a soil stabilizer to exposed soil surfaces. Soil binders are materials applied to the soil surface to temporarily prevent water induced erosion of exposed soils on construction sites. Soil binders also prevent wind erosion.

Suitable Applications

Soil binders are typically applied to disturbed areas requiring short term temporary protection. Because soil binders can often be incorporated into the work, they are a good alternative to mulches in areas where grading activities will soon resume. Soil binders are also suitable for use on stockpiles.

Limitations

- Soil binders are temporary in nature and may need reapplication.
- Soil binders require a minimum curing time until fully effective, as prescribed by the manufacturer. Curing time may be 24 hours or longer. Soil binders may need reapplication after a storm event.
- Soil binders will generally experience spot failures during heavy rainfall events. If runoff penetrates the soil at the top of a slope treated with a soil binder, it is likely that the runoff will undercut the stabilized soil layer and discharge at a point further down slope.

Objectives

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding
- EC-6 Straw Mulch
- EC-7 Geotextiles and Mats
- EC-8 Wood Mulching



- Soil binders do not hold up to pedestrian or vehicular traffic across treated areas.
- Soil binders may not penetrate soil surfaces made up primarily of silt and clay, particularly when compacted.
- Some soil binders may not perform well with low relative humidity. Under rainy conditions, some agents may become slippery or leach out of the soil.
- Soil binders may not cure if low temperatures occur within 24 hours of application.
- The water quality impacts of soil binders are relatively unknown and some may have water quality impacts due to their chemical makeup.
- A sampling and analysis plan must be incorporated into the SWPPP as soil binders could be a source of non-visible pollutants.

Implementation

General Considerations

- Regional soil types will dictate appropriate soil binders to be used.
- A soil binder must be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, economical, and should not stain paved or painted surfaces. Soil binders should not pollute stormwater.
- Some soil binders may not be compatible with existing vegetation.
- Performance of soil binders depends on temperature, humidity, and traffic across treated areas.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.

Selecting a Soil Binder

Properties of common soil binders used for erosion control are provided on Table 1 at the end of this BMP. Use Table 1 to select an appropriate soil binder. Refer to WE-1, Wind Erosion Control, for dust control soil binders.

Factors to consider when selecting a soil binder include the following:

- Suitability to situation - Consider where the soil binder will be applied, if it needs a high resistance to leaching or abrasion, and whether it needs to be compatible with any existing vegetation. Determine the length of time soil stabilization will be needed, and if the soil binder will be placed in an area where it will degrade rapidly. In general, slope steepness is not a discriminating factor for the listed soil binders.
- Soil types and surface materials - Fines and moisture content are key properties of surface materials. Consider a soil binder's ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials.
- Frequency of application - The frequency of application can be affected by subgrade conditions, surface type, climate, and maintenance schedule. Frequent applications could

lead to high costs. Application frequency may be minimized if the soil binder has good penetration, low evaporation, and good longevity. Consider also that frequent application will require frequent equipment clean up.

Plant-Material Based (Short Lived) Binders

Guar: Guar is a non-toxic, biodegradable, natural galactomannan based hydrocolloid treated with dispersant agents for easy field mixing. It should be mixed with water at the rate of 11 to 15 lb per 1,000 gallons. Recommended minimum application rates are as follows:

Application Rates for Guar Soil Stabilizer

Slope (H:V):	Flat	4:1	3:1	2:1	1:1
lb/acre:	40	45	50	60	70

Psyllium: Psyllium is composed of the finely ground muciloid coating of plantago seeds that is applied as a dry powder or in a wet slurry to the surface of the soil. It dries to form a firm but rewettable membrane that binds soil particles together but permits germination and growth of seed. Psyllium requires 12 to 18 hours drying time. Application rates should be from 80 to 200 lb/acre, with enough water in solution to allow for a uniform slurry flow.

Starch: Starch is non-ionic, cold water soluble (pre-gelatinized) granular cornstarch. The material is mixed with water and applied at the rate of 150 lb/acre. Approximate drying time is 9 to 12 hours.

Plant-Material Based (Long Lived) Binders

Pitch and Rosin Emulsion: Generally, a non-ionic pitch and rosin emulsion has a minimum solids content of 48%. The rosin should be a minimum of 26% of the total solids content. The soil stabilizer should be non-corrosive, water dilutable emulsion that upon application cures to a water insoluble binding and cementing agent. For soil erosion control applications, the emulsion is diluted and should be applied as follows:

- For clayey soil: 5 parts water to 1 part emulsion
- For sandy soil: 10 parts water to 1 part emulsion

Application can be by water truck or hydraulic seeder with the emulsion and product mixture applied at the rate specified by the manufacturer.

Polymeric Emulsion Blend Binders

Acrylic Copolymers and Polymers: Polymeric soil stabilizers should consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55% solids. The polymeric compound should be handled and mixed in a manner that will not cause foaming or should contain an anti-foaming agent. The polymeric emulsion should not exceed its shelf life or expiration date; manufacturers should provide the expiration date. Polymeric soil stabilizer should be readily miscible in water, non-injurious to seed or animal life, non-flammable, should provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and should not re-emulsify when cured. The applied compound should air cure within a maximum of 36 to 48 hours. Liquid copolymer should be diluted at a rate of 10 parts water to 1 part polymer and the mixture applied to soil at a rate of 1,175 gallons/acre.

Liquid Polymers of Methacrylates and Acrylates: This material consists of a tackifier/sealer that is a liquid polymer of methacrylates and acrylates. It is an aqueous 100% acrylic emulsion blend of 40% solids by volume that is free from styrene, acetate, vinyl, ethoxylated surfactants or silicates. For soil stabilization applications, it is diluted with water in accordance with manufacturer’s recommendations, and applied with a hydraulic seeder at the rate of 20 gallons/acre. Drying time is 12 to 18 hours after application.

Copolymers of Sodium Acrylates and Acrylamides: These materials are non-toxic, dry powders that are copolymers of sodium acrylate and acrylamide. They are mixed with water and applied to the soil surface for erosion control at rates that are determined by slope gradient:

Slope Gradient (H:V)	lb/acre
Flat to 5:1	3.0 – 5.0
5:1 to 3:1	5.0 – 10.0
2:2 to 1:1	10.0 – 20.0

Poly-Acrylamide and Copolymer of Acrylamide: Linear copolymer polyacrylamide is packaged as a dry flowable solid. When used as a stand alone stabilizer, it is diluted at a rate of 11lb/1,000 gal of water and applied at the rate of 5.0 lb/acre.

Hydro-Colloid Polymers: Hydro-Colloid Polymers are various combinations of dry flowable poly-acrylamides, copolymers and hydro-colloid polymers that are mixed with water and applied to the soil surface at rates of 55 to 60 lb/acre. Drying times are 0 to 4 hours.

Cementitious-Based Binders

Gypsum: This is a formulated gypsum based product that readily mixes with water and mulch to form a thin protective crust on the soil surface. It is composed of high purity gypsum that is ground, calcined and processed into calcium sulfate hemihydrate with a minimum purity of 86%. It is mixed in a hydraulic seeder and applied at rates 4,000 to 12,000 lb/acre. Drying time is 4 to 8 hours.

Applying Soil Binders

After selecting an appropriate soil binder, the untreated soil surface must be prepared before applying the soil binder. The untreated soil surface must contain sufficient moisture to assist the agent in achieving uniform distribution. In general, the following steps should be followed:

- Follow manufacturer’s written recommendations for application rates, pre-wetting of application area, and cleaning of equipment after use.
- Prior to application, roughen embankment and fill areas.
- Consider the drying time for the selected soil binder and apply with sufficient time before anticipated rainfall. Soil binders should not be applied during or immediately before rainfall.
- Avoid over spray onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.

- Soil binders should not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the temperature is below 40°F during the curing period.
- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.
- Generally, soil binders require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure time.
- For liquid agents:
 - Crown or slope ground to avoid ponding.
 - Uniformly pre-wet ground at 0.03 to 0.3 gal/yd² or according to manufacturer's recommendations.
 - Apply solution under pressure. Overlap solution 6 to 12 in.
 - Allow treated area to cure for the time recommended by the manufacturer; typically at least 24 hours.
 - Apply second treatment before first treatment becomes ineffective, using 50% application rate.
 - In low humidities, reactivate chemicals by re-wetting with water at 0.1 to 0.2 gal/yd².

Costs

Costs vary according to the soil stabilizer selected for implementation. The following are approximate costs:

Soil Binder	Cost per Acre
Plant-Material Based (Short Lived) Binders	\$400
Plant-Material Based (Long Lived) Binders	\$1,200
Polymeric Emulsion Blend Binders	\$400 ⁽¹⁾
Cementitious-Based Binders	\$800

(1) \$1,200 for Acrylic polymers and copolymers

Source: Caltrans Guidance for Soil Stabilization for Temporary Slopes, Nov. 1999

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Areas where erosion is evident shall be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Reapply the selected soil binder as needed to maintain effectiveness.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Sedimentation and Erosion Control, An Inventory of Current Practices Draft, US EPA, April 1990.

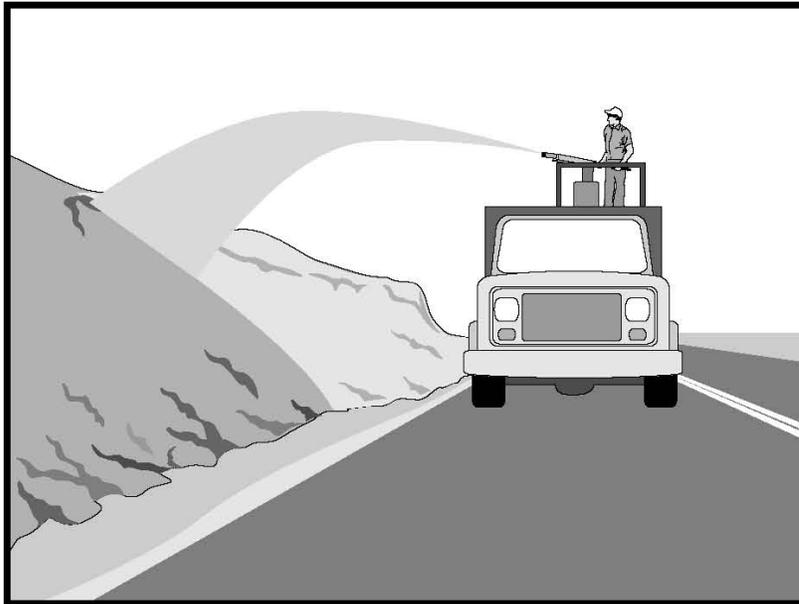
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Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Evaluation Criteria	Binder Type			
	Plant Material Based (Short Lived)	Plant Material Based (Long Lived)	Polymeric Emulsion Blends	Cementitious-Based Binders
Relative Cost	Low	Low	Low	Low
Resistance to Leaching	High	High	Low to Moderate	Moderate
Resistance to Abrasion	Moderate	Low	Moderate to High	Moderate to High
Longevity	Short to Medium	Medium	Medium to Long	Medium
Minimum Curing Time before Rain	9 to 18 hours	19 to 24 hours	0 to 24 hours	4 to 8 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Biodegradable	Biodegradable	Photodegradable/ Chemically Degradable	Photodegradable/ Chemically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher
Liquid/Powder	Powder	Liquid	Liquid/Powder	Powder
Surface Crusting	Yes, but dissolves on rewetting	Yes	Yes, but dissolves on rewetting	Yes
Clean Up	Water	Water	Water	Water
Erosion Control Application Rate	Varies ⁽¹⁾	Varies ⁽¹⁾	Varies ⁽¹⁾	4,000 to 12,000 lbs/acre

(1) See Implementation for specific rates.



Description and Purpose

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or anchoring it with a tackifier stabilizing emulsion. Straw mulch protects the soil surface from the impact of rain drops, preventing soil particles from becoming dislodged.

Suitable Applications

Straw mulch is suitable for soil disturbed areas requiring temporary protection until permanent stabilization is established. Straw mulch is typically used for erosion control on disturbed areas until soils can be prepared for permanent vegetation. Straw mulch is also used in combination with temporary and/or permanent seeding strategies to enhance plant establishment.

Limitations

- Availability of straw and straw blowing equipment may be limited just prior to the rainy season and prior to storms due to high demand.
- There is a potential for introduction of weed seed and unwanted plant material.
- When straw blowers are used to apply straw mulch, the treatment areas must be within 150 ft of a road or surface capable of supporting trucks.
- Straw mulch applied by hand is more time intensive and potentially costly.

Objectives

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding
- EC-5 Soil Binders
- EC-7 Geotextiles and Mats
- EC-8 Wood Mulching



- Wind may limit application of straw and blow straw into undesired locations.
- May have to be removed prior to permanent seeding or prior to further earthwork.
- “Punching” of straw does not work in sandy soils, necessitating the use of tackifiers.

Implementation

- Straw shall be derived from wheat, rice, or barley. Where required by the plans, specifications, permits, or environmental documents, native grass straw shall be used.
- A tackifier is the preferred method for anchoring straw mulch to the soil on slopes.
- Crimping, punch roller-type rollers, or track walking may also be used to incorporate straw mulch into the soil on slopes. Track walking shall only be used where other methods are impractical.
- Avoid placing straw onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.
- Straw mulch with tackifier shall not be applied during or immediately before rainfall.
- In San Diego, use of straw near wood framed home construction has been frowned on by the Fire Marshall.

Application Procedures

- Apply straw at a minimum rate of 4,000 lb/acre, either by machine or by hand distribution.
- Roughen embankments and fill rills before placing the straw mulch by rolling with a crimping or punching type roller or by track walking.
- Evenly distribute straw mulch on the soil surface.
- Anchor straw mulch to the soil surface by "punching" it into the soil mechanically (incorporating). Alternatively, use a tackifier to adhere straw fibers.
- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions, and longevity.
 - On small areas, a spade or shovel can be used to punch in straw mulch.
 - On slopes with soils that are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be "punched" into the ground using a knife blade roller or a straight bladed coultter, known commercially as a "crimper".
 - On small areas and/or steep slopes, straw can also be held in place using plastic netting or jute. The netting shall be held in place using 11 gauge wire staples, geotextile pins or wooden stakes as described in EC-7, Geotextiles and Mats.
 - A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier shall be selected based on longevity and ability to hold the fibers in place. A tackifier is

typically applied at a rate of 125 lb/acre. In windy conditions, the rates are typically 180 lb/acre.

Costs

Average annual cost for installation and maintenance (3-4 months useful life) is \$2,500 per acre. Application by hand is more time intensive and potentially costly.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- The key consideration in inspection and maintenance is that the straw needs to last long enough to achieve erosion control objectives.
- Maintain an unbroken, temporary mulched ground cover while disturbed soil areas are inactive. Repair any damaged ground cover and re-mulch exposed areas.
- Reapplication of straw mulch and tackifier may be required to maintain effective soil stabilization over disturbed areas and slopes.

References

Controlling Erosion of Construction Sites, Agricultural Information Bulletin #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

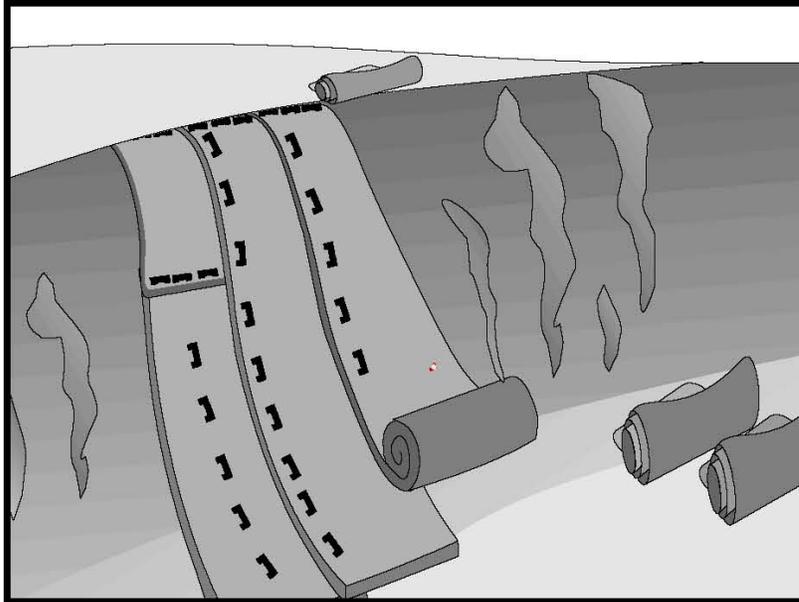
Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Soil Erosion by Water, Agricultural Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



Description and Purpose

Mattings of natural materials are used to cover the soil surface to reduce erosion from rainfall impact, hold soil in place, and absorb and hold moisture near the soil surface. Additionally, matting may be used to stabilize soils until vegetation is established.

Suitable Applications

Mattings are commonly applied on short, steep slopes where erosion hazard is high and vegetation will be slow to establish. Mattings are also used on stream banks where moving water at velocities between 3 ft/s and 6 ft/s are likely to wash out new vegetation, and in areas where the soil surface is disturbed and where existing vegetation has been removed. Matting may also be used when seeding cannot occur (e.g., late season construction and/or the arrival of an early rain season). Erosion control matting should be considered when the soils are fine grained and potentially erosive. These measures should be considered in the following situations.

- Steep slopes, generally steeper than 3:1 (H:V)
- Slopes where the erosion potential is high
- Slopes and disturbed soils where mulch must be anchored
- Disturbed areas where plants are slow to develop
- Channels with flows exceeding 3.3 ft/s

Objectives

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	3
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding
- EC-5 Soil Binders
- EC-6 Straw Mulch
- EC-8 Wood Mulching



- Channels to be vegetated
- Stockpiles
- Slopes adjacent to water bodies of Environmentally Sensitive Areas (ESAs)

Limitations

- Properly installed mattings provide excellent erosion control but do so at relatively high cost. This high cost typically limits the use of mattings to areas of concentrated channel flow and steep slopes.
- Mattings are more costly than other BMP practices, limiting their use to areas where other BMPs are ineffective (e.g. channels, steep slopes).
- Installation is critical and requires experienced contractors. The contractor should install the matting material in such a manner that continuous contact between the material and the soil occurs.
- Geotextiles and Mats may delay seed germination, due to reduction in soil temperature.
- Blankets and mats are generally not suitable for excessively rocky sites or areas where the final vegetation will be mowed (since staples and netting can catch in mowers).
- Blankets and mats must be removed and disposed of prior to application of permanent soil stabilization measures.
- Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.
- Plastic results in 100% runoff, which may cause serious erosion problems in the areas receiving the increased flow.
- The use of plastic should be limited to covering stockpiles or very small graded areas for short periods of time (such as through one imminent storm event) until alternative measures, such as seeding and mulching, may be installed.
- Geotextiles, mats, plastic covers, and erosion control covers have maximum flow rate limitations; consult the manufacturer for proper selection.
- Not suitable for areas that have heavy foot traffic (tripping hazard) – e.g., pad areas around buildings under construction.

Implementation***Material Selection***

Organic matting materials have been found to be effective where re-vegetation will be provided by re-seeding. The choice of matting should be based on the size of area, side slopes, surface conditions such as hardness, moisture, weed growth, and availability of materials.

The following natural and synthetic mattings are commonly used:

Geotextiles

- Material should be a woven polypropylene fabric with minimum thickness of 0.06 in., minimum width of 12 ft and should have minimum tensile strength of 150 lbs (warp), 80 lbs (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric should be approximately 0.07 sec^{-1} in conformance with the requirements in ASTM Designation: D4491. The fabric should have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets must be secured in place with wire staples or sandbags and by keying into tops of slopes to prevent infiltration of surface waters under geotextile. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Geotextiles may be reused if they are suitable for the use intended.

Plastic Covers

- Plastic sheeting should have a minimum thickness of 6 mils, and must be keyed in at the top of slope and firmly held in place with sandbags or other weights placed no more than 10 ft apart. Seams are typically taped or weighted down their entire length, and there should be at least a 12 in. to 24 in. overlap of all seams. Edges should be embedded a minimum of 6 in. in soil.
- All sheeting must be inspected periodically after installation and after significant rainstorms to check for erosion, undermining, and anchorage failure. Any failures must be repaired immediately. If washout or breakages occur, the material should be re-installed after repairing the damage to the slope.

Erosion Control Blankets/Mats

- Biodegradable rolled erosion control products (RECPs) are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. In order for an RECP to be considered 100% biodegradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable.
 - **Jute** is a natural fiber that is made into a yarn that is loosely woven into a biodegradable mesh. It is designed to be used in conjunction with vegetation and has longevity of approximately one year. The material is supplied in rolled strips, which should be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
 - **Excelsior** (curled wood fiber) blanket material should consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 6 in. or longer. The excelsior blanket should be of consistent thickness. The wood fiber must be evenly distributed over the entire area of the blanket. The top surface of the blanket should be covered with a photodegradable extruded plastic mesh. The blanket should be smolder resistant without the use of chemical additives and should be non-toxic and non-injurious to plant and animal life. Excelsior blankets should be furnished in rolled strips, a minimum of 48 in. wide, and should have an average weight of 0.8 lb/yd^2 , ± 10 percent, at the time of manufacture. Excelsior blankets must be secured in place with wire staples. Staples

should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- **Straw blanket** should be machine produced mats of straw with a lightweight biodegradable netting top layer. The straw should be attached to the netting with biodegradable thread or glue strips. The straw blanket should be of consistent thickness. The straw should be evenly distributed over the entire area of the blanket. Straw blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd². Straw blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- **Wood fiber blanket** is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured to the ground with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Coconut fiber blanket** should be a machine produced mat of 100 percent coconut fiber with biodegradable netting on the top and bottom. The coconut fiber should be attached to the netting with biodegradable thread or glue strips. The coconut fiber blanket should be of consistent thickness. The coconut fiber should be evenly distributed over the entire area of the blanket. Coconut fiber blanket should be furnished in rolled strips with a minimum of 6.5 ft wide, a minimum of 80 ft. long and a minimum of 0.5 lb/yd². Coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- **Coconut fiber mesh** is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a biodegradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Straw coconut fiber blanket** should be machine produced mats of 70 percent straw and 30 percent coconut fiber with a biodegradable netting top layer and a biodegradable bottom net. The straw and coconut fiber should be attached to the netting with biodegradable thread or glue strips. The straw coconut fiber blanket should be of consistent thickness. The straw and coconut fiber should be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd². Straw coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Non-biodegradable RECPs are typically composed of polypropylene, polyethylene, nylon or other synthetic fibers. In some cases, a combination of biodegradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-biodegradable as well.

- **Plastic netting** is a lightweight biaxially oriented netting designed for securing loose mulches like straw or paper to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Plastic mesh** is an open weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than ¼ in. It is used with re-vegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Synthetic fiber with netting** is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be re-vegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Bonded synthetic fibers** consist of a three dimensional geomatrix nylon (or other synthetic) matting. Typically it has more than 90 percent open area, which facilitates root growth. It's tough root reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Combination synthetic and biodegradable RECPs** consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top and a high strength continuous filament geomatrix or net stitched to the bottom. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Site Preparation

- Proper site preparation is essential to ensure complete contact of the blanket or matting with the soil.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 2 to 3 in. of topsoil.

Seeding

Seed the area before blanket installation for erosion control and revegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket

installation, all check slots and other areas disturbed during installation must be re-seeded. Where soil filling is specified, seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Fertilize and seed in accordance with seeding specifications or other types of landscaping plans. When using jute matting on a seeded area, apply approximately half the seed before laying the mat and the remainder after laying the mat. The protective matting can be laid over areas where grass has been planted and the seedlings have emerged. Where vines or other ground covers are to be planted, lay the protective matting first and then plant through matting according to design of planting.

Check Slots

Check slots are made of glass fiber strips, excelsior matting strips or tight folded jute matting blanket or strips for use on steep, highly erodible watercourses. The check slots are placed in narrow trenches 6 to 12 in. deep across the channel and left flush with the soil surface. They are to cover the full cross section of designed flow.

Laying and Securing Matting

- Before laying the matting, all check slots should be installed and the friable seedbed made free from clods, rocks, and roots. The surface should be compacted and finished according to the requirements of the manufacturer's recommendations.
- Mechanical or manual lay down equipment should be capable of handling full rolls of fabric and laying the fabric smoothly without wrinkles or folds. The equipment should meet the fabric manufacturer's recommendations or equivalent standards.

Anchoring

- U-shaped wire staples, metal geotextile stake pins, or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Wire staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Metal stake pins should be 0.188 in. diameter steel with a 1.5 in. steel washer at the head of the pin, and 8 in. in length.
- Wire staples and metal stakes should be driven flush to the soil surface.

Installation on Slopes

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 6 in. deep by 6 in. wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket down slope in the direction of water flow.
- Overlap the edges of adjacent parallel rolls 2 to 3 in. and staple every 3 ft.

- When blankets must be spliced, place blankets end over end (shingle style) with 6 in. overlap. Staple through overlapped area, approximately 12 in. apart.
- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
- Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples should be placed down the center and staggered with the staples placed along the edges. Steep slopes, 1:1 (H:V) to 2:1 (H:V), require a minimum of 2 staples/yd². Moderate slopes, 2:1 (H:V) to 3:1 (H:V), require a minimum of 1 ½ staples/yd².

Installation in Channels

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Dig initial anchor trench 12 in. deep and 6 in. wide across the channel at the lower end of the project area.
- Excavate intermittent check slots, 6 in. deep and 6 in. wide across the channel at 25 to 30 ft intervals along the channels.
- Cut longitudinal channel anchor trenches 4 in. deep and 4 in. wide along each side of the installation to bury edges of matting, whenever possible extend matting 2 to 3 in. above the crest of the channel side slopes.
- Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 12 in. intervals. Note: matting will initially be upside down in anchor trench.
- In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 3 in.
- Secure these initial ends of mats with anchors at 12 in. intervals, backfill and compact soil.
- Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 3 in. overlap.
- Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 12 in. intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.
- Alternate method for non-critical installations: Place two rows of anchors on 6 in. centers at 25 to 30 ft. intervals in lieu of excavated check slots.
- Staple shingled lap spliced ends a minimum of 12 in. apart on 12 in. intervals.
- Place edges of outside mats in previously excavated longitudinal slots; anchor using prescribed staple pattern, backfill, and compact soil.
- Anchor, fill, and compact upstream end of mat in a 12 in. by 6 in. terminal trench.

- Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
- Seed and fill turf reinforcement matting with soil, if specified.

Soil Filling (if specified for turf reinforcement)

- Always consult the manufacturer's recommendations for installation.
- Do not drive tracked or heavy equipment over mat.
- Avoid any traffic over matting if loose or wet soil conditions exist.
- Use shovels, rakes, or brooms for fine grading and touch up.
- Smooth out soil filling just exposing top netting of mat.

Temporary Soil Stabilization Removal

- Temporary soil stabilization removed from the site of the work must be disposed of if necessary.

Costs

Relatively high compared to other BMPs. Biodegradable materials: \$0.50 - \$0.57/yd². Permanent materials: \$3.00 - \$4.50/yd². Staples: \$0.04 - \$0.05/staple. Approximate costs for installed materials are shown below:

Rolled Erosion Control Products		Installed Cost per Acre
Biodegradable	Jute Mesh	\$6,500
	Curled Wood Fiber	\$10,500
	Straw	\$8,900
	Wood Fiber	\$8,900
	Coconut Fiber	\$13,000
	Coconut Fiber Mesh	\$31,200
	Straw Coconut Fiber	\$10,900
Non-Biodegradable	Plastic Netting	\$2,000
	Plastic Mesh	\$3,200
	Synthetic Fiber with Netting	\$34,800
	Bonded Synthetic Fibers	\$50,000
	Combination with Biodegradable	\$32,000

Source: Caltrans Guidance for Soil Stabilization for Temporary Slopes, Nov. 1999

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season, and at two-week intervals during the non-rainy season.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.
- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.
- Make sure matting is uniformly in contact with the soil.
- Check that all the lap joints are secure.
- Check that staples are flush with the ground.
- Check that disturbed areas are seeded.

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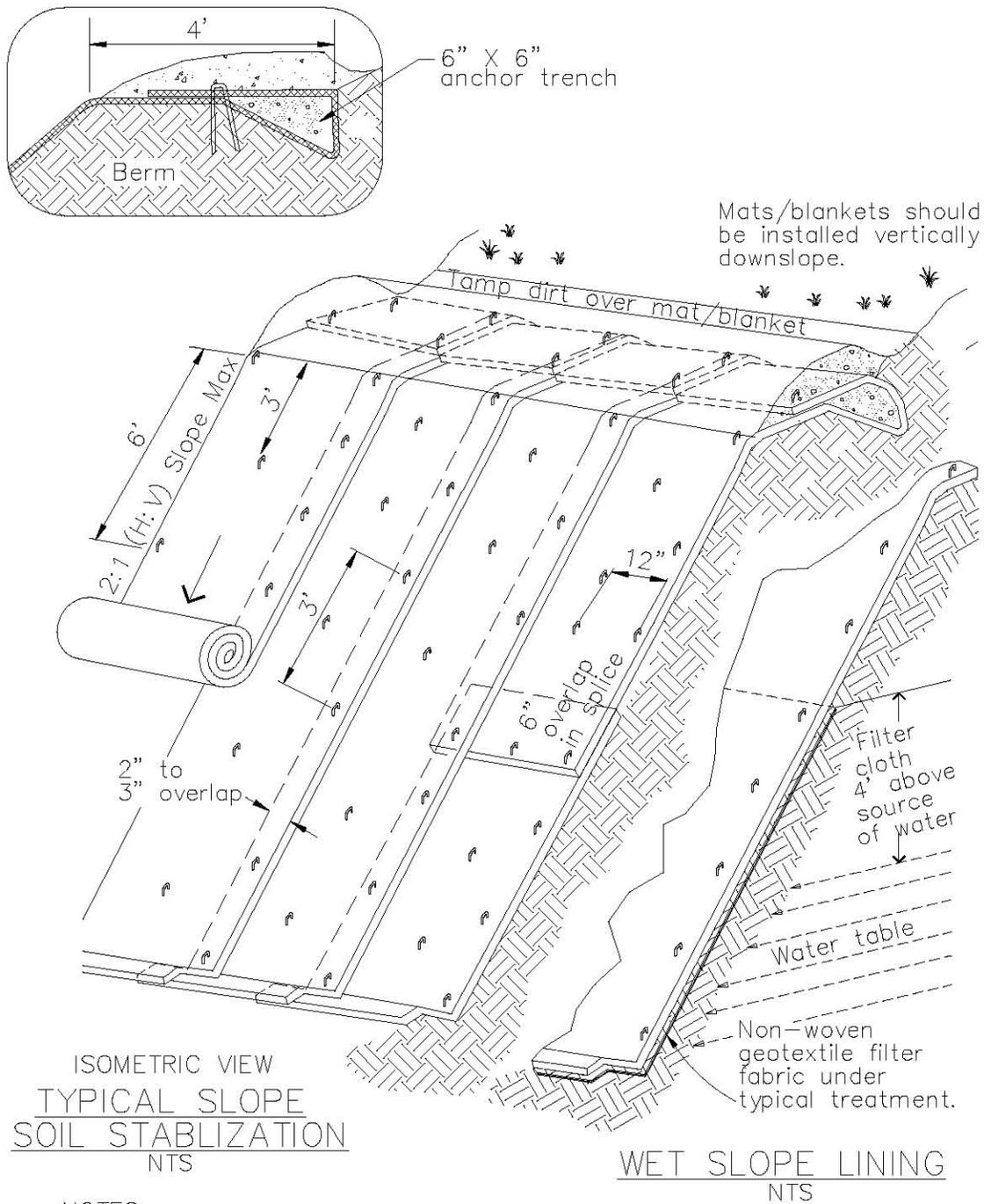
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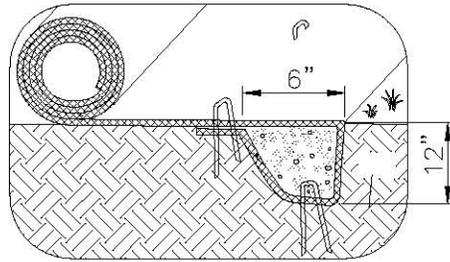
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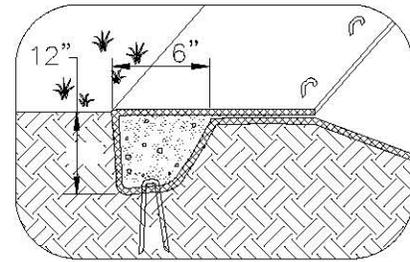
NOTES:

1. Slope surface shall be free of rocks, clods, sticks and grass. Mats/blankets shall have good soil contact.
2. Lay blankets loosely and stake or staple to maintain direct contact with the soil. Do not stretch.
3. Install per manufacturer's recommendations

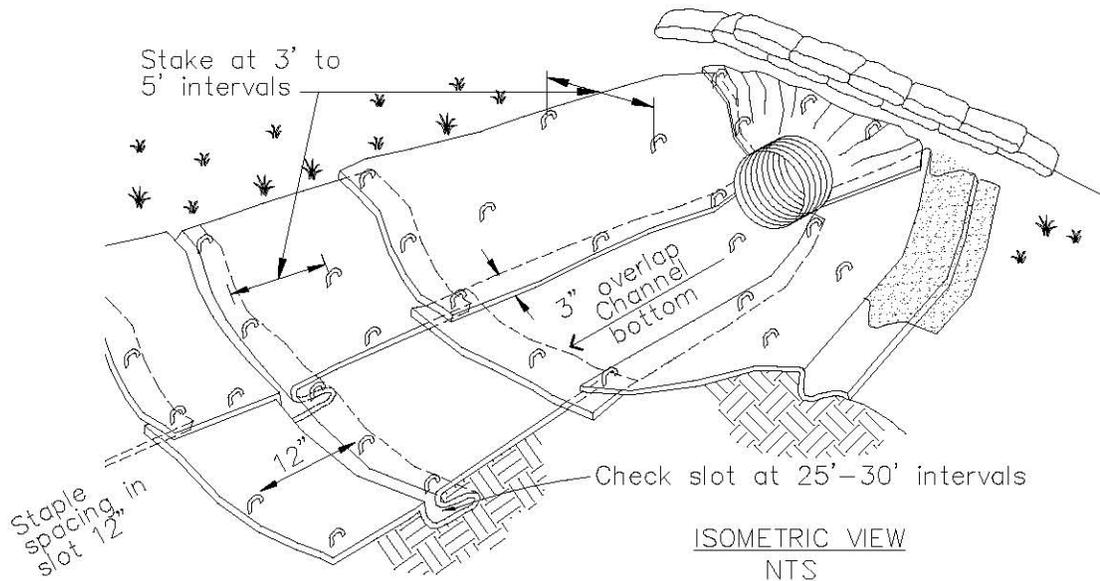
TYPICAL INSTALLATION DETAIL



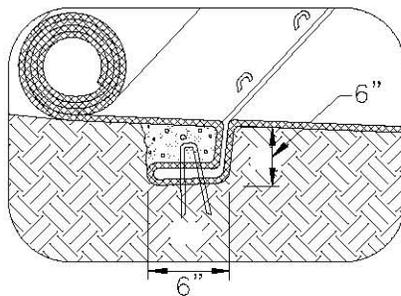
INITIAL CHANNEL ANCHOR TRENCH
NTS



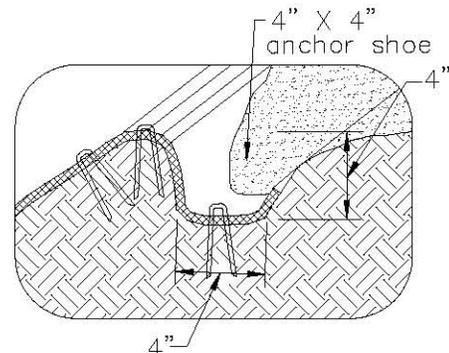
TERMINAL SLOPE AND CHANNEL
ANCHOR TRENCH
NTS



ISOMETRIC VIEW
NTS



INTERMITTENT CHECK SLOT
NTS

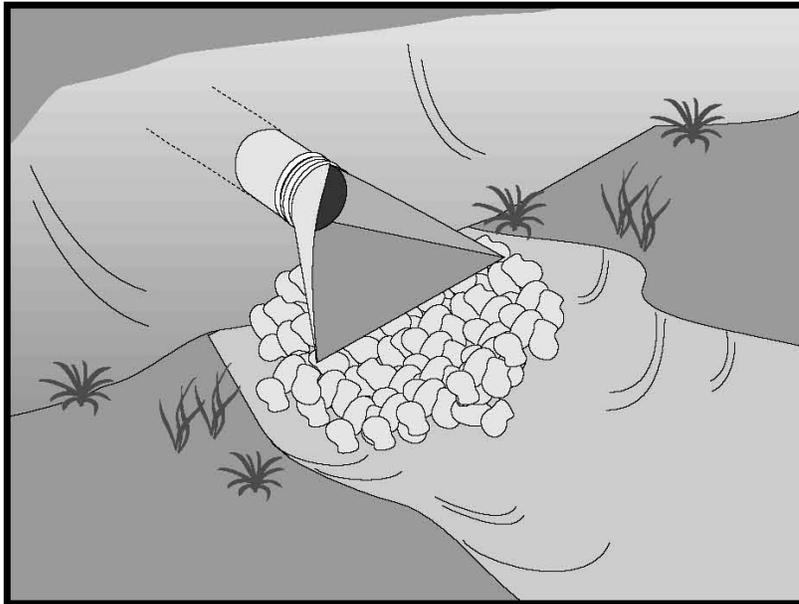


LONGITUDINAL ANCHOR TRENCH
NTS

NOTES:

1. Check slots to be constructed per manufacturers specifications.
2. Staking or stapling layout per manufacturers specifications.
3. Install per manufacturer's recommendations

TYPICAL INSTALLATION DETAIL



Description and Purpose

Outlet protection is a physical device composed of rock, grouted riprap, or concrete rubble, which is placed at the outlet of a pipe or channel to prevent scour of the soil caused by concentrated, high velocity flows.

Suitable Applications

Whenever discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach. This includes temporary diversion structures to divert runoff during construction.

- These devices may be used at the following locations:
 - Outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits, or channels.
 - Outlets located at the bottom of mild to steep slopes.
 - Discharge outlets that carry continuous flows of water.
 - Outlets subject to short, intense flows of water, such as flash floods.
 - Points where lined conveyances discharge to unlined conveyances

Limitations

- Large storms or high flows can wash away the rock outlet protection and leave the area susceptible to erosion.

Objectives

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None



- Sediment captured by the rock outlet protection may be difficult to remove without removing the rock.
- Outlet protection may negatively impact the channel habitat.
- Grouted riprap may break up in areas of freeze and thaw.
- If there is not adequate drainage, and water builds up behind grouted riprap, it may cause the grouted riprap to break up due to the resulting hydrostatic pressure.

Implementation***General***

Outlet protection is needed where discharge velocities and energies at the outlets of culverts, conduits or channels are sufficient to erode the immediate downstream reach. This practice protects the outlet from developing small eroded pools (plunge pools), and protects against gully erosion resulting from scouring at a culvert mouth.

Design and Layout

As with most channel design projects, depth of flow, roughness, gradient, side slopes, discharge rate, and velocity should be considered in the outlet design. Compliance to local and state regulations should also be considered while working in environmentally sensitive streambeds. General recommendations for rock size and length of outlet protection mat are shown in the rock outlet protection figure in this BMP and should be considered minimums. The apron length and rock size gradation are determined using a combination of the discharge pipe diameter and estimate discharge rate: Select the longest apron length and largest rock size suggested by the pipe size and discharge rate. Where flows are conveyed in open channels such as ditches and swales, use the estimated discharge rate for selecting the apron length and rock size. Flows should be same as the culvert or channel design flow but never the less than the peak 5 year flow for temporary structures planned for one rainy season, or the 10 year peak flow for temporary structures planned for two or three rainy seasons.

- There are many types of energy dissipaters, with rock being the one that is represented in the attached figure.
- Best results are obtained when sound, durable, and angular rock is used.
- Install riprap, grouted riprap, or concrete apron at selected outlet. Riprap aprons are best suited for temporary use during construction. Grouted or wired tied rock riprap can minimize maintenance requirements.
- Rock outlet protection is usually less expensive and easier to install than concrete aprons or energy dissipaters. It also serves to trap sediment and reduce flow velocities.
- Carefully place riprap to avoid damaging the filter fabric.
 - Stone 4 in. to 6 in. may be carefully dumped onto filter fabric from a height not to exceed 12 in.
 - Stone 8 in. to 12 in. must be hand placed onto filter fabric, or the filter fabric may be covered with 4 in. of gravel and the 8 in. to 12 in. rock may be dumped from a height not to exceed 16 in.

- Stone greater than 12 in. shall only be dumped onto filter fabric protected with a layer of gravel with a thickness equal to one half the D_{50} rock size, and the dump height limited to twice the depth of the gravel protection layer thickness.
- For proper operation of apron: Align apron with receiving stream and keep straight throughout its length. If a curve is needed to fit site conditions, place it in upper section of apron.
- Outlets on slopes steeper than 10 percent should have additional protection.

Costs

Costs are low if material is readily available. If material is imported, costs will be higher. Average installed cost is \$150 per device.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Inspect BMPs subjected to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect apron for displacement of the riprap and damage to the underlying fabric. Repair fabric and replace riprap that has washed away. If riprap continues to wash away, consider using larger material.
- Inspect for scour beneath the riprap and around the outlet. Repair damage to slopes or underlying filter fabric immediately.
- Temporary devices should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction.

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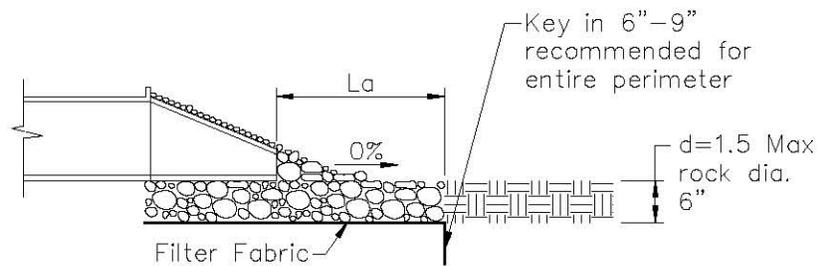
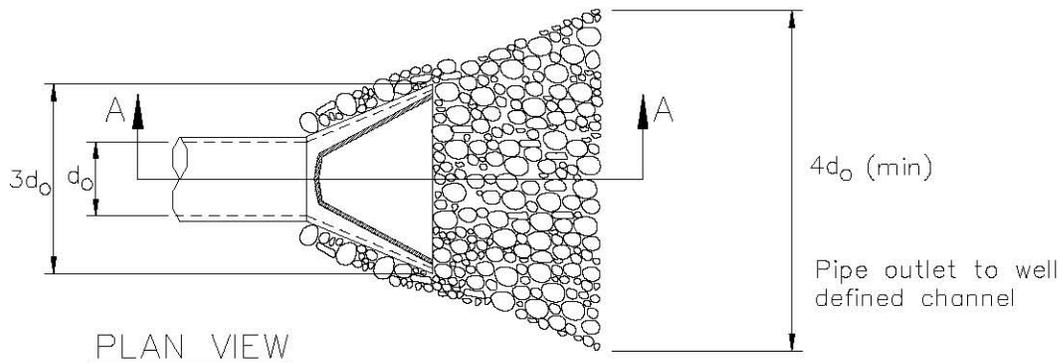
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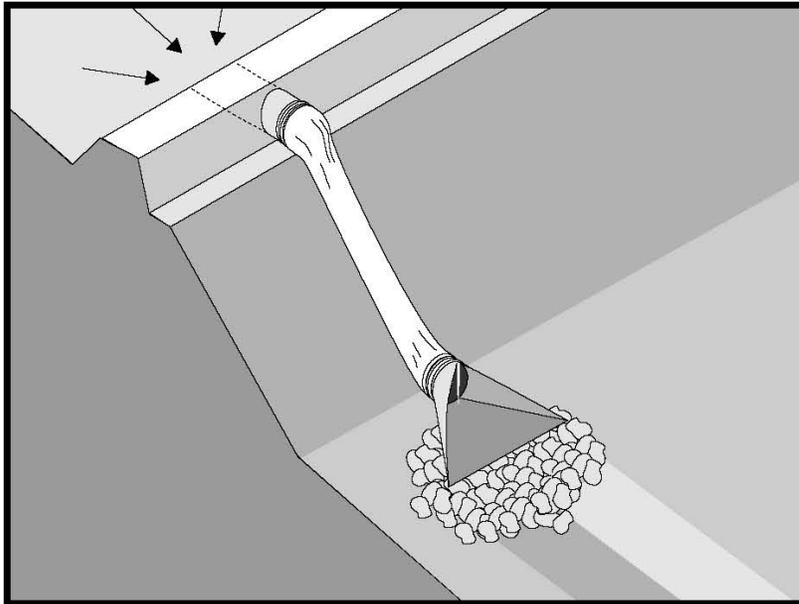
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Pipe Diameter inches	Discharge ft ³ /s	Apron Length, L _a ft	Rip Rap D ₅₀ Diameter Min inches
12	5	10	4
	10	13	6
18	10	10	6
	20	16	8
	30	23	12
24	40	26	16
	30	16	8
	40	26	8
	50	26	12
	60	30	16

For larger or higher flows consult a Registered Civil Engineer
Source: USDA - SCS



Description and Purpose

A slope drain is a pipe used to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device, or stabilized area. Slope drains are used with earth dikes and drainage ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes.

Suitable Applications

- Where concentrated flow of surface runoff must be conveyed down a slope in order to prevent erosion.
- Drainage for top of slope diversion dikes or swales.
- Drainage for top of cut and fill slopes where water can accumulate.
- Emergency spillway for a sediment basin.

Limitations

Installation is critical for effective use of the pipe slope drain to minimize potential gully erosion.

- Maximum drainage area per slope drain is 10 acres. (For large areas use a paved chute, rock lined channel, or additional pipes.)
- Severe erosion may result when slope drains fail by overtopping, piping, or pipe separation.

Objectives

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-9 Earth Dike, Drainage Swales



- During large storms, pipe slope drains may become clogged or over charged, forcing water around the pipe and causing extreme slope erosion.
- If the sectional down drain is not sized correctly, the runoff can spill over the drain sides causing gully erosion and potential failure of the structure.
- Dissipation of high flow velocities at the pipe outlet is required to avoid downstream erosion.

Implementation***General***

The slope drain is applicable for any construction site where concentrated surface runoff can accumulate and must be conveyed down the slope in order to prevent erosion. The slope drain is effective because it prevents the stormwater from flowing directly down the slope by confining all the runoff into an enclosed pipe or channel. Due to the time lag between grading slopes and installation of permanent stormwater collection systems and slope stabilization measures, temporary provisions to intercept runoff are sometimes necessary. Particularly in steep terrain, slope drains can protect unstabilized areas from erosion.

Installation

The slope drain may be a rigid pipe, such as corrugated metal, a flexible conduit, or a lined terrace drain with the inlet placed on the top of a slope and the outlet at the bottom of the slope. This BMP typically is used in combination with a diversion control, such as an earth dike or drainage swale at the top of the slope.

The following criteria must be considered when siting slope drains.

- Permanent structures included in the project plans can often serve as construction BMPs if implemented early. However, the permanent structure must meet or exceed the criteria for the temporary structure.
- Inlet structures must be securely entrenched and compacted to avoid severe gully erosion.
- Slope drains must be securely anchored to the slope and must be adequately sized to carry the capacity of the design storm and associated forces.
- Outlets must be stabilized with riprap, concrete or other type of energy dissipator, or directed into a stable sediment trap or basin. See EC-10, Velocity Dissipation Devices.
- Debris racks are recommended at the inlet. Debris racks located several feet upstream of the inlet can usually be larger than racks at the inlet, and thus provide enhanced debris protection and less plugging.
- Safety racks are also recommended at the inlet and outlet of pipes where children or animals could become entrapped.
- Secure inlet and surround with dikes to prevent gully erosion and anchor pipe to slope.
- When using slope drains, limit drainage area to 10 acres per pipe. For larger areas, use a rock lined channel or a series of pipes.

- Size to convey at least the peak flow of a 10-year storm. The design storm is conservative due to the potential impact of system failures.
- Maximum slope generally limited to 2:1 (H:V) as energy dissipation below steeper slopes is difficult.
- Direct surface runoff to slope drains with interceptor dikes. See BMP EC-9, Earth Dikes and Drainage Swales. Top of interceptor dikes should be 12 in. higher than the top of the slope drain.
- Slope drains can be placed on or buried underneath the slope surface.
- Recommended materials include both metal and plastic pipe, either corrugated or smooth wall. Concrete pipe can also be used.
- When installing slope drains:
 - Install slope drains perpendicular to slope contours.
 - Compact soil around and under entrance, outlet, and along length of pipe.
 - Securely anchor and stabilize pipe and appurtenances into soil.
 - Check to ensure that pipe connections are watertight.
 - Protect area around inlet with filter cloth. Protect outlet with riprap or other energy dissipation device. For high energy discharges, reinforce riprap with concrete or use reinforced concrete device.
 - Protect outlet of slope drains using a flared end section when outlet discharges to a flexible energy dissipation device.
 - A flared end section installed at the inlet will improve flow into the slope drain and prevent erosion at the pipe entrance. Use a flared end section with a 6 in. minimum toe plate to help prevent undercutting. The flared section should slope towards the pipe inlet.

Design and Layout

The capacity for temporary drains should be sufficient to convey at least the peak runoff from a 10-year rainfall event. The pipe size may be computed using the Rational Method or a method established by the local municipality. Higher flows must be safely stored or routed to prevent any offsite concentration of flow and any erosion of the slope. The design storm is purposely conservative due to the potential impacts associated with system failures.

As a guide, temporary pipe slope drains should not be sized smaller than shown in the following table:

Minimum Pipe Diameter (Inches)	Maximum Drainage Area (Acres)
12	1.0
18	3.0
21	5.0
24	7.0
30	10.0

Larger drainage areas can be treated if the area can be subdivided into areas of 10 acres or less and each area is treated as a separate drainage. Drainage areas exceeding 10 acres must be designed by a Registered Civil Engineer and approved by the agency that issued the grading permit.

Materials:

Soil type, rainfall patterns, construction schedule, local requirements, and available supply are some of the factors to be considered when selecting materials. The following types of slope drains are commonly used:

- **Rigid Pipe:** This type of slope drain is also known as a pipe drop. The pipe usually consists of corrugated metal pipe or rigid plastic pipe. The pipe is placed on undisturbed or compacted soil and secured onto the slope surface or buried in a trench. Concrete thrust blocks must be used when warranted by the calculated thrust forces. Collars should be properly installed and secured with metal strappings or watertight collars.
- **Flexible Pipe:** The flexible pipe slope drain consists of a flexible tube of heavy-duty plastic, rubber, or composite material. The tube material is securely anchored onto the slope surface. The tube should be securely fastened to the metal inlet and outlet conduit sections with metal strappings or watertight collars.
- **Section Downdrains:** The section downdrain consists of pre-fabricated, section conduit of half round or third round material. The sectional downdrain performs similar to a flume or chute. The pipe must be placed on undisturbed or compacted soil and secured into the slope.
- **Concrete-lined Terrace Drain:** This is a concrete channel for draining water from a terrace on a slope to the next level. These drains are typically specified as permanent structures and, if installed early, can serve as slope drains during construction, which should be designed according to local drainage design criteria.

Costs

- Cost varies based on pipe selection and selected outlet protection.

Corrugated Steel Pipes, Per Foot	
Size	Supplied and Installed Cost (No Trenching Included)
12"	\$19.60 per LF
15"	\$22.00
18"	\$26.00
24"	\$32.00
30"	\$50.00
PVC Pipes, Per Foot	
Size	Supplied and Installed Cost (No Trenching Included)
12"	\$24.50
14"	\$49.00
16"	\$51.00
18"	\$54.00
20"	\$66.00
24"	\$93.00
30"	\$130.00

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Inspect BMPs subjected to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect outlet for erosion and downstream scour. If eroded, repair damage and install additional energy dissipation measures. If downstream scour is occurring, it may be necessary to reduce flows being discharged into the channel unless other preventative measures are implemented.
- Insert inlet for clogging or undercutting. Remove debris from inlet to maintain flows. Repair undercutting at inlet and if needed, install flared section or rip rap around the inlet to prevent further undercutting.
- Inspect pipes for leakage. Repair leaks and restore damaged slopes.
- Inspect slope drainage for accumulations of debris and sediment.
- Remove built up sediment from entrances and outlets as required. Flush drains if necessary; capture and settle out sediment from discharge.

- Make sure water is not ponding onto inappropriate areas (e.g., active traffic lanes, material storage areas, etc.).
- Pipe anchors must be checked to ensure that the pipe remains anchored to the slope. Install additional anchors if pipe movement is detected.

References

Draft – Sedimentation and Erosion Control, An Inventory of Current Practices, U.S.E.P.A., April 1990.

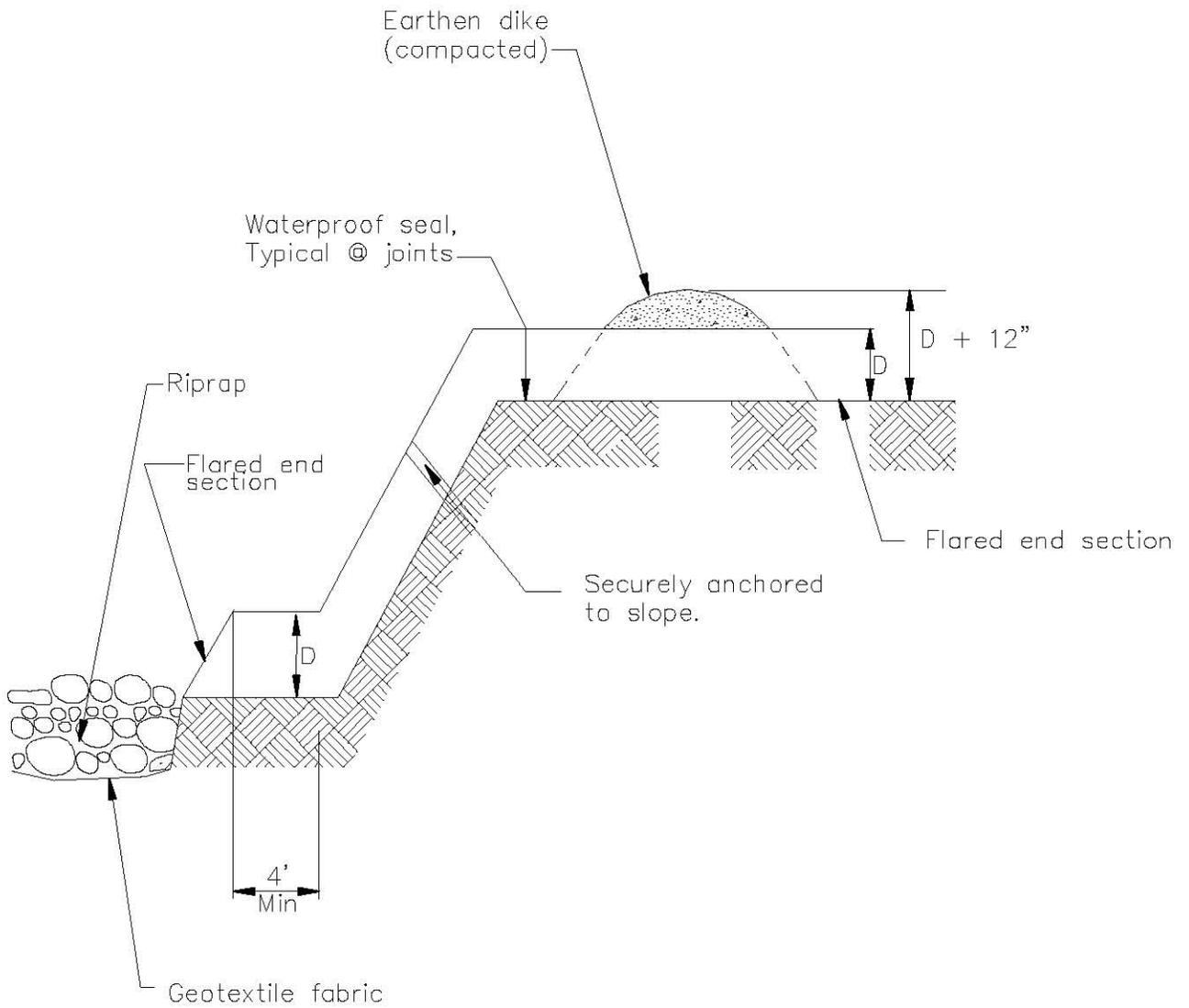
National Association of Home Builders (NAHB). Stormwater Runoff & Nonpoint Source Pollution Control Guide for Builders and Developers. National Association of Home Builders, Washington, D.C., 1995

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

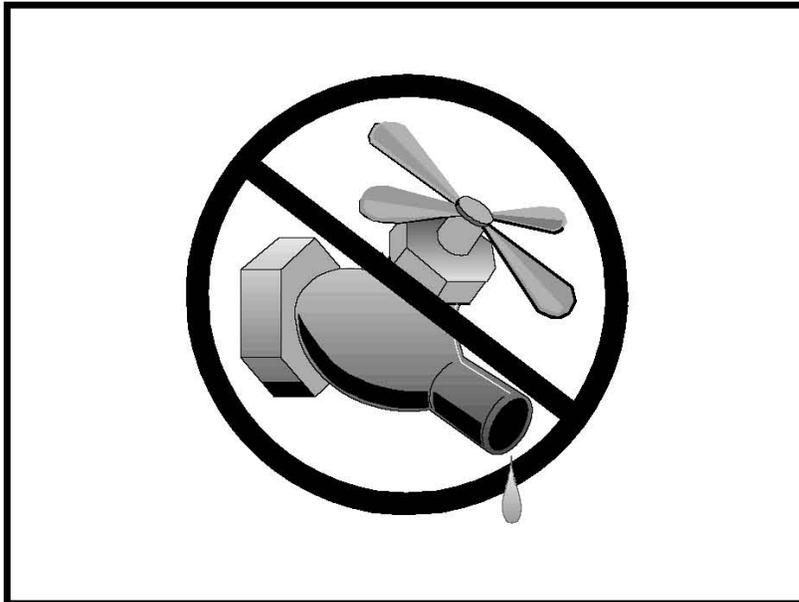
Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



TYPICAL SLOPE DRAIN
NOT TO SCALE



Description and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Suitable Applications

Water conservation practices are suitable for all construction sites where water is used, including piped water, metered water, trucked water, and water from a reservoir.

Limitations

- None identified.

Implementation

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Washing of vehicles and equipment on the construction site is discouraged.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.

Objectives

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None



- Direct construction water runoff to areas where it can soak into the ground or be collected and reused.
- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.
- Lock water tank valves to prevent unauthorized use.

Costs

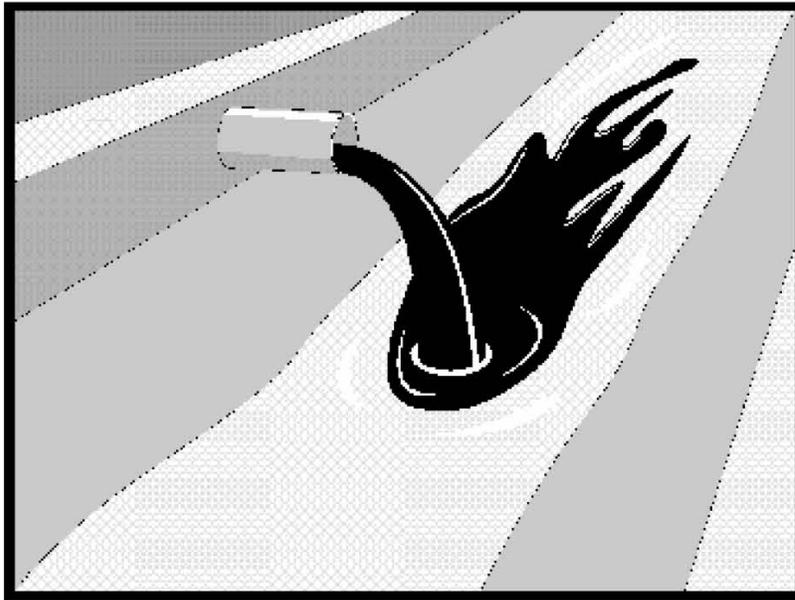
The cost is small to none compared to the benefits of conserving water.

Inspection and Maintenance

- Inspect and verify that activity based BMPs are in place prior to the commencement of authorized non-stormwater discharges.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges are occurring.
- Repair water equipment as needed to prevent unintended discharges.
 - Water trucks
 - Water reservoirs (water buffalos)
 - Irrigation systems
 - Hydrant connections

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Description and Purpose

Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Illicit connection/discharge and reporting is applicable anytime an illicit connection or discharge is discovered or illegally dumped material is found on the construction site.

Limitations

Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor. If pre-existing hazardous materials or wastes are known to exist onsite, they should be identified in the SWPPP and handled as set forth in the SWPPP.

Implementation

Planning

- Review the SWPPP. Pre-existing areas of contamination should be identified and documented in the SWPPP.
- Inspect site before beginning the job for evidence of illicit connections, illegal dumping or discharges. Document any pre-existing conditions and notify the owner.

Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None



- Inspect site regularly during project execution for evidence of illicit connections, illegal dumping or discharges.
- Observe site perimeter for evidence for potential of illicitly discharged or illegally dumped material, which may enter the job site.

Identification of Illicit Connections and Illegal Dumping or Discharges

- **General** – unlabeled and unidentifiable material should be treated as hazardous.
- **Solids** - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- **Liquids** - signs of illegal liquid dumping or discharge can include:
 - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils
 - Pungent odors coming from the drainage systems
 - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
 - Abnormal water flow during the dry weather season
- **Urban Areas** - Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
 - Abnormal water flow during the dry weather season
 - Unusual flows in sub drain systems used for dewatering
 - Pungent odors coming from the drainage systems
 - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
 - Excessive sediment deposits, particularly adjacent to or near active offsite construction projects
- **Rural Areas** - Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:
 - Abnormal water flow during the non-irrigation season
 - Non-standard junction structures
 - Broken concrete or other disturbances at or near junction structures

Reporting

Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery. For illicit connections or discharges to the storm drain system, notify the local stormwater management agency. For illegal dumping, notify the local law enforcement agency.

Cleanup and Removal

The responsibility for cleanup and removal of illicit or illegal dumping or discharges will vary by location. Contact the local stormwater management agency for further information.

Costs

Costs to look for and report illicit connections and illegal discharges and dumping are low. The best way to avoid costs associated with illicit connections and illegal discharges and dumping is to keep the project perimeters secure to prevent access to the site, to observe the site for vehicles that should not be there, and to document any waste or hazardous materials that exist onsite before taking possession of the site.

Inspection and Maintenance

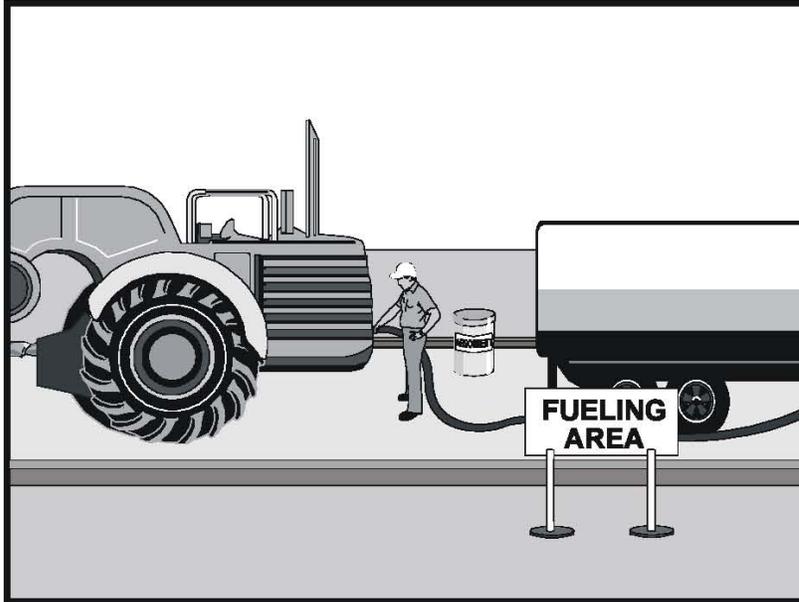
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect the site regularly to check for any illegal dumping or discharge.
- Prohibit employees and subcontractors from disposing of non-job related debris or materials at the construction site.
- Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks, and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment fueling takes place.

Limitations

Onsite vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment offsite for fueling. Sending vehicles and equipment offsite should be done in conjunction with TR-1, Stabilized Construction Entrance/ Exit.

Implementation

- Use offsite fueling stations as much as possible. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at a site.
- Discourage “topping-off” of fuel tanks.

Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None



- Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks, and should be disposed of properly after use.
- Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.
- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fueling and cleanup procedures.
- When fueling must take place onsite, designate an area away from drainage courses to be used. Fueling areas should be identified in the SWPPP.
- Dedicated fueling areas should be protected from stormwater runoff and runoff, and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and dikes to prevent runoff, runoff, and to contain spills.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- Federal, state, and local requirements should be observed for any stationary above ground storage tanks.

Costs

- All of the above measures are low cost except for the capital costs of above ground tanks that meet all local environmental, zoning, and fire codes.

Inspection and Maintenance

- Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately or problem vehicles or equipment should be removed from the project site.
- Keep ample supplies of spill cleanup materials onsite.
- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.

References

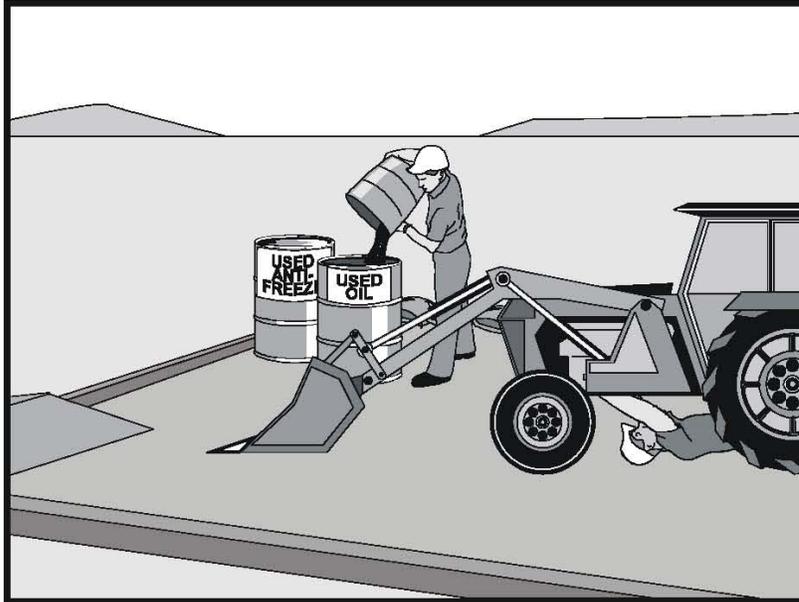
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle & Equipment Maintenance NS-10



Description and Purpose

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a “dry and clean site”. The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Suitable Applications

These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles/equipment offsite should be done in conjunction with TR-1, Stabilized Construction Entrance/Exit.

Outdoor vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). For further information on vehicle or equipment servicing, see NS-8, Vehicle and Equipment Cleaning, and NS-9, Vehicle and Equipment Fueling.

Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None



NS-10 Vehicle & Equipment Maintenance

Implementation

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runoff and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the adsorbent materials promptly and dispose of properly.
- Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately.
- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- Drip pans or plastic sheeting should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Consider use of new, alternative greases and lubricants, such as adhesive greases, for chassis lubrication and fifth-wheel lubrication.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.
- Repair leaks of fluids and oil immediately.

Vehicle & Equipment Maintenance NS-10

Listed below is further information if you must perform vehicle or equipment maintenance onsite.

Safer Alternative Products

- Consider products that are less toxic or hazardous than regular products. These products are often sold under an “environmentally friendly” label.
- Consider use of grease substitutes for lubrication of truck fifth-wheels. Follow manufacturers label for details on specific uses.
- Consider use of plastic friction plates on truck fifth-wheels in lieu of grease. Follow manufacturers label for details on specific uses.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, trichloroethane, or methylene chloride. Many of these cleaners are listed in California Toxic Rule as priority pollutants. These materials are harmful and must not contaminate stormwater. They must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents. The “chlor” term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling and Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous wastes separate, do not mix used oil solvents, and keep chlorinated solvents (like, -trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around. Provide cover and secondary containment until these materials can be removed from the site.

Oil filters can be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Costs

All of the above are low cost measures. Higher costs are incurred to setup and maintain onsite maintenance areas.

NS-10 Vehicle & Equipment Maintenance

Inspection and Maintenance

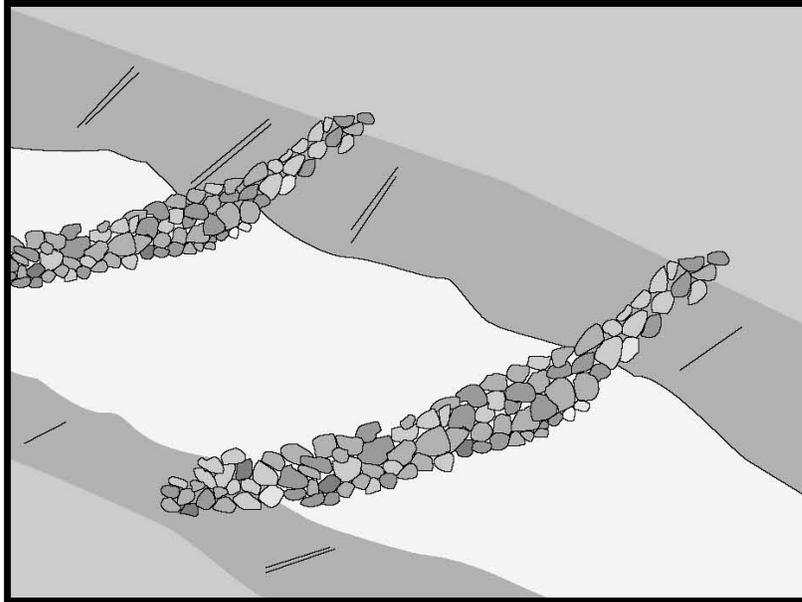
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Keep ample supplies of spill cleanup materials onsite.
- Maintain waste fluid containers in leak proof condition.
- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately or the problem vehicle(s) or equipment should be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Description and Purpose

A check dam is a small barrier constructed of rock, gravel bags, sandbags, fiber rolls, or reusable products, placed across a constructed swale or drainage ditch. Check dams reduce the effective slope of the channel, thereby reducing the velocity of flowing water, allowing sediment to settle and reducing erosion.

Suitable Applications

Check dams may be appropriate in the following situations:

- To promote sedimentation behind the dam.
- To prevent erosion by reducing the velocity of channel flow in small intermittent channels and temporary swales.
- In small open channels that drain 10 acres or less.
- In steep channels where stormwater runoff velocities exceed 5 ft/s.
- During the establishment of grass linings in drainage ditches or channels.
- In temporary ditches where the short length of service does not warrant establishment of erosion-resistant linings.

Limitations

- Not to be used in live streams or in channels with extended base flows.

Objectives

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier



- Not appropriate in channels that drain areas greater than 10 acres.
- Not appropriate in channels that are already grass-lined unless erosion is expected, as installation may damage vegetation.
- Require extensive maintenance following high velocity flows.
- Promotes sediment trapping which can be re-suspended during subsequent storms or removal of the check dam.

Implementation

General

Check dams reduce the effective slope and create small pools in swales and ditches that drain 10 acres or less. Reduced slopes reduce the velocity of stormwater flows, thus reducing erosion of the swale or ditch and promoting sedimentation. Use of check dams for sedimentation will likely result in little net removal of sediment because of the small detention time and probable scour during longer storms. Using a series of check dams will generally increase their effectiveness. A sediment trap (SE-3) may be placed immediately upstream of the check dam to increase sediment removal efficiency.

Design and Layout

Check dams work by decreasing the effective slope in ditches and swales. An important consequence of the reduced slope is a reduction in capacity of the ditch or swale. This reduction in capacity must be considered when using this BMP, as reduced capacity can result in overtopping of the ditch or swale and resultant consequences. In some cases, such as a “permanent” ditch or swale being constructed early and used as a “temporary” conveyance for construction flows, the ditch or swale may have sufficient capacity such that the temporary reduction in capacity due to check dams is acceptable. When check dams reduce capacities beyond acceptable limits, there are several options:

- Don't use check dams. Consider alternative BMPs.
- Increase the size of the ditch or swale to restore capacity.

Maximum slope and velocity reduction is achieved when the toe of the upstream dam is at the same elevation as the top of the downstream dam. The center section of the dam should be lower than the edge sections so that the check dam will direct flows to the center of the ditch or swale.

Check dams are usually constructed of rock, gravel bags, sandbags, and fiber rolls. A number of products manufactured specifically for use as check dams are also being used, and some of these products can be removed and reused. Check dams can also be constructed of logs or lumber, and have the advantage of a longer lifespan when compared to gravel bags, sandbags, and fiber rolls. Straw bales can also be used for check dams and can work if correctly installed; but in practice, straw bale check dams have a high failure rate. Check dams should not be constructed from straw bales or silt fences, since concentrated flows quickly wash out these materials.

Rock check dams are usually constructed of 8 to 12 in. rock. The rock is placed either by hand or mechanically, but never just dumped into the channel. The dam must completely span the ditch

or swale to prevent washout. The rock used must be large enough to stay in place given the expected design flow through the channel.

Log check dams are usually constructed of 4 to 6 in. diameter logs. The logs should be embedded into the soil at least 18 in. Logs can be bolted or wired to vertical support logs that have been driven or buried into the soil.

Gravel bag and sandbag check dams are constructed by stacking bags across the ditch or swale, shaped as shown in the drawings at the end of this fact sheet.

Manufactured products should be installed in accordance with the manufacturer's instructions.

If grass is planted to stabilize the ditch or swale, the check dam should be removed when the grass has matured (unless the slope of the swales is greater than 4%).

The following guidance should be followed for the design and layout of check dams:

- Install the first check dam approximately 16 ft from the outfall device and at regular intervals based on slope gradient and soil type.
- Check dams should be placed at a distance and height to allow small pools to form between each check dam.
- Backwater from a downstream check dam should reach the toes of the upstream check dam.
- A sediment trap provided immediately upstream of the check dam will help capture sediment. Due to the potential for this sediment to be resuspended in subsequent storms, the sediment trap must be cleaned following each storm event.
- High flows (typically a 2-year storm or larger) should safely flow over the check dam without an increase in upstream flooding or damage to the check dam.
- Where grass is used to line ditches, check dams should be removed when grass has matured sufficiently to protect the ditch or swale.
- Gravel bags may be used as check dams with the following specifications:

Materials

Gravel bags used for check dams should conform to the requirements of SE-6, Gravel Bag Berms. Sandbags used for check dams should conform to SE-8, Sandbag Barrier. Fiber rolls used for check dams should conform to SE-5, Fiber Rolls. Straw bales used for check dams should conform to SE-9, Straw Bale Barrier.

Installation

- Rock should be placed individually by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage.
- Tightly abut bags and stack according to detail shown in the figure at the end of this section. Gravel bags and sandbags should not be stacked any higher than 3 ft.
- Fiber rolls and straw bales must be trenched in and firmly staked in place.

Costs

Cost consists of only installation costs if materials are readily available. If material must be imported, costs may increase. For material costs, see SE-5, SE-6, SE-8 and SE-9.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Replace missing rock, bags, bales, etc. Replace bags or bales that have degraded or have become damaged.
- If the check dam is used as a sediment capture device, sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- If the check dam is used as a grade control structure, sediment removal is not required as long as the system continues to control the grade.
- Remove accumulated sediment prior to permanent seeding or soil stabilization.
- Remove check dam and accumulated sediment when check dams are no longer needed.

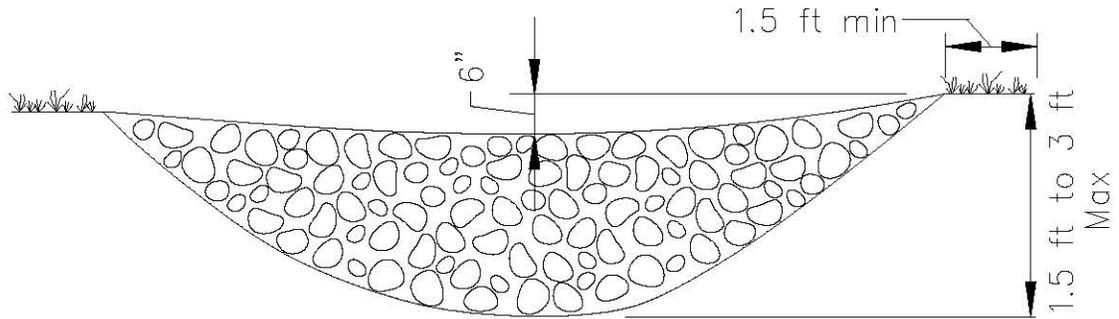
References

Draft – Sedimentation and Erosion Control, and Inventory of Current Practices, USEPA, April 1990.

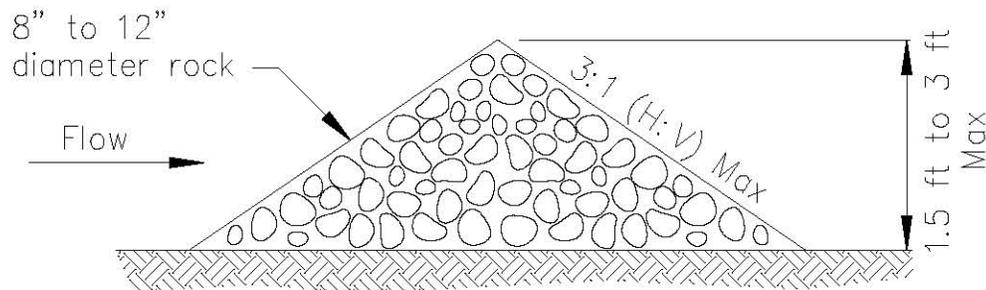
Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

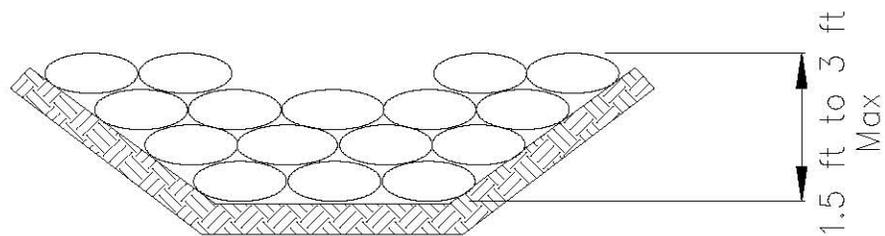


ELEVATION

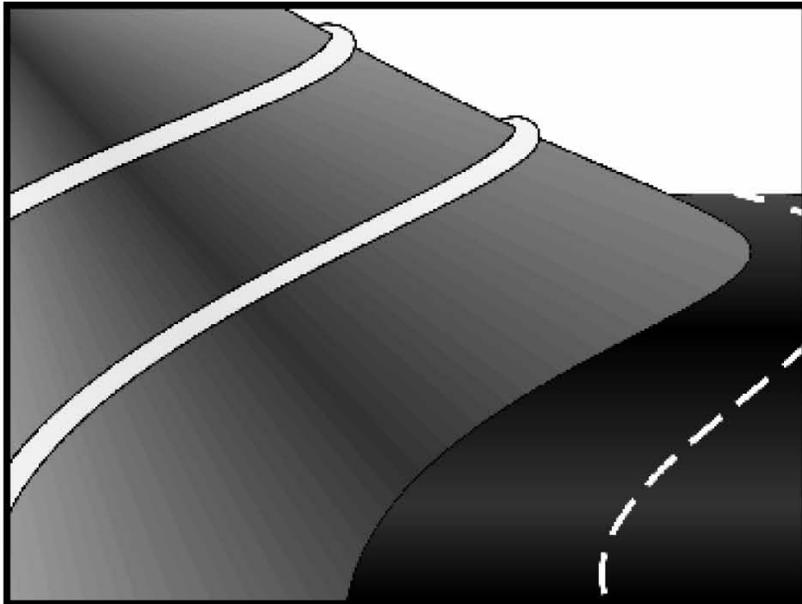


TYPICAL ROCK CHECK DAM SECTION

ROCK CHECK DAM
NOT TO SCALE



GRAVEL BAG CHECK DAM ELEVATION
NOT TO SCALE



Description and Purpose

A fiber roll consists of straw, flax, or other similar materials bound into a tight tubular roll. When fiber rolls are placed at the toe and on the face of slopes, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff. By interrupting the length of a slope, fiber rolls can also reduce erosion.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
- At the end of a downward slope where it transitions to a steeper slope
- Along the perimeter of a project
- As check dams in unlined ditches
- Down-slope of exposed soil areas
- Around temporary stockpiles

Limitations

- Fiber rolls are not effective unless trenched

Objectives

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-9 Straw Bale Barrier



- Fiber rolls at the toe of slopes greater than 5:1 (H:V) should be a minimum of 20 in. diameter or installations achieving the same protection (i.e. stacked smaller diameter fiber rolls, etc.).
- Difficult to move once saturated.
- If not properly staked and trenched in, fiber rolls could be transported by high flows.
- Fiber rolls have a very limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.

Implementation

Fiber Roll Materials

- Fiber rolls should be either prefabricated rolls or rolled tubes of erosion control blanket.

Assembly of Field Rolled Fiber Roll

- Roll length of erosion control blanket into a tube of minimum 8 in. diameter.
- Bind roll at each end and every 4 ft along length of roll with jute-type twine.

Installation

- Locate fiber rolls on level contours spaced as follows:
 - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.
 - Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).
 - Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).
- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Stake fiber rolls into a 2 to 4 in. deep trench with a width equal to the diameter of the fiber roll.
 - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.
 - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.

Removal

- Fiber rolls are typically left in place.

- If fiber rolls are removed, collect and dispose of sediment accumulation, and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

Costs

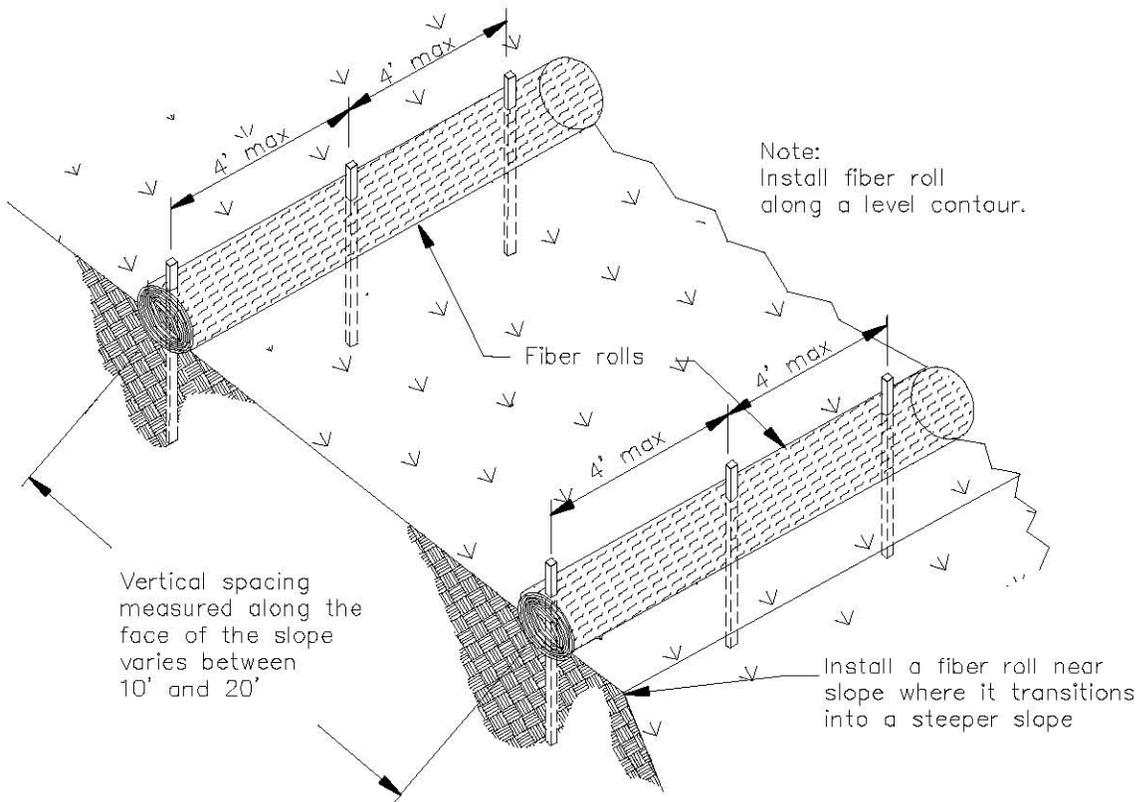
Material costs for fiber rolls range from \$20 - \$30 per 25 ft roll.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-half the designated sediment storage depth, usually one-half the distance between the top of the fiber roll and the adjacent ground surface. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- If fiber rolls are used for erosion control, such as in a mini check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.

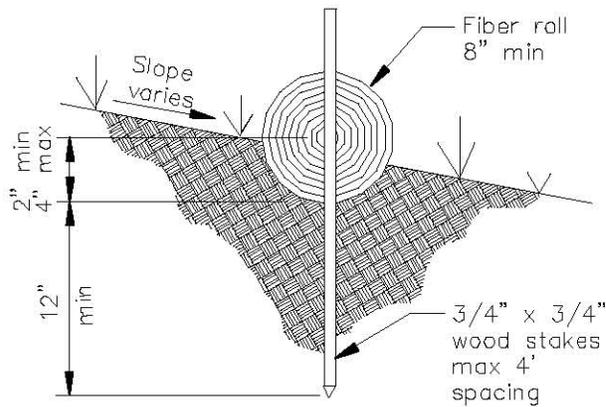
References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



TYPICAL FIBER ROLL INSTALLATION

N.T.S.



ENTRENCHMENT DETAIL

N.T.S.



Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused, and perhaps save money.
- Inspect potential sediment tracking locations daily.
- Visible sediment tracking should be swept or vacuumed on a daily basis.

Objectives

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TR	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None



SE-7 Street Sweeping and Vacuuming

- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.
- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from \$58/hour (3 yd³ hopper) to \$88/hour (9 yd³ hopper), plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

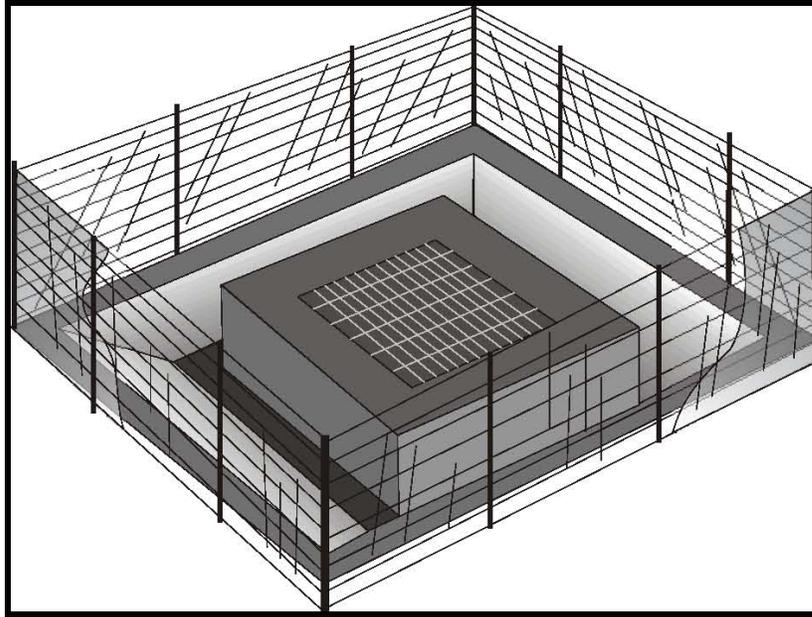
Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- When actively in use, points of ingress and egress must be inspected daily.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Labor Surcharge and Equipment Rental Rates, State of California Department of Transportation (Caltrans), April 1, 2002 – March 31, 2003.



Description and Purpose

Storm drain inlet protection consists of a sediment filter or an impounding area around or upstream of a storm drain, drop inlet, or curb inlet. Storm drain inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Some filter configurations also remove sediment by filtering, but usually the ponding action results in the greatest sediment reduction.

Suitable Applications

Every storm drain inlet receiving sediment-laden runoff should be protected.

Limitations

- Drainage area should not exceed 1 acre.
- Straw bales, while potentially effective, have not produced in practice satisfactory results, primarily due to improper installation.
- Requires an adequate area for water to pond without encroaching into portions of the roadway subject to traffic.
- Inlet protection usually requires other methods of temporary protection to prevent sediment-laden stormwater and non-stormwater discharges from entering the storm drain system.
- Sediment removal may be difficult in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are

Objectives

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-9 Straw Bale Barrier



expected, use other onsite sediment trapping techniques in conjunction with inlet protection.

- Frequent maintenance is required.
- For drainage areas larger than 1 acre, runoff should be routed to a sediment-trapping device designed for larger flows. See BMPs SE-2, Sediment Basin, and SE-3, Sediment Traps.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected, and overflow capability is needed.

Implementation

General

Large amounts of sediment may enter the storm drain system when storm drains are installed before the upslope drainage area is stabilized, or where construction is adjacent to an existing storm drain. In cases of extreme sediment loading, the storm drain itself may clog and lose a major portion of its capacity. To avoid these problems, it is necessary to prevent sediment from entering the system at the inlets.

Inlet control measures presented in this handbook should not be used for inlets draining more than one acre. Runoff from larger disturbed areas should be first routed through SE-2, Sediment Basin or SE-3, Sediment Trap. Different types of inlet protection are appropriate for different applications depending on site conditions and the type of inlet. Inlet protection methods not presented in this handbook should be approved by the local stormwater management agency.

Design and Layout

Identify existing and planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed and which method to use.

- Limit upstream drainage area to 1 acre maximum. For larger drainage areas, use SE-2, Sediment Basin, or SE-3, Sediment Trap, upstream of the inlet protection device.
- The key to successful and safe use of storm drain inlet protection devices is to know where runoff will pond or be diverted.
 - Determine the acceptable location and extent of ponding in the vicinity of the drain inlet. The acceptable location and extent of ponding will influence the type and design of the storm drain inlet protection device.
 - Determine the extent of potential runoff diversion caused by the storm drain inlet protection device. Runoff ponded by inlet protection devices may flow around the device and towards the next downstream inlet. In some cases, this is acceptable; in other cases, serious erosion or downstream property damage can be caused by these diversions. The possibility of runoff diversions will influence whether or not storm drain inlet protection is suitable; and, if suitable, the type and design of the device.
- The location and extent of ponding, and the extent of diversion, can usually be controlled through appropriate placement of the inlet protection device. In some cases, moving the

inlet protection device a short distance upstream of the actual inlet can provide more efficient sediment control, limit ponding to desired areas, and prevent or control diversions.

- Four types of inlet protection are presented below. However, it is recognized that other effective methods and proprietary devices exist and may be selected.
 - Filter Fabric Fence: Appropriate for drainage basins with less than a 5% slope, sheet flows, and flows under 0.5 cfs.
 - Excavated Drop Inlet Sediment Trap: An excavated area around the inlet to trap sediment (SE-3).
 - Gravel bag barrier: Used to create a small sediment trap upstream of inlets on sloped, paved streets. Appropriate for sheet flow or when concentrated flow may exceed 0.5 cfs, and where overtopping is required to prevent flooding.
 - Block and Gravel Filter: Appropriate for flows greater than 0.5 cfs.
- Select the appropriate type of inlet protection and design as referred to or as described in this fact sheet.
- Provide area around the inlet for water to pond without flooding structures and property.
- Grates and spaces around all inlets should be sealed to prevent seepage of sediment-laden water.
- Excavate sediment sumps (where needed) 1 to 2 ft with 2:1 side slopes around the inlet.

Installation

- ***DI Protection Type 1 - Filter Fabric Fence*** - The filter fabric fence (Type 1) protection is shown in the attached figure. Similar to constructing a silt fence; see BMP SE-1, Silt Fence. Do not place filter fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced.
 1. Excavate a trench approximately 6 in. wide and 6 in. deep along the line of the silt fence inlet protection device.
 2. Place 2 in. by 2 in. wooden stakes around the perimeter of the inlet a maximum of 3 ft apart and drive them at least 18 in. into the ground or 12 in. below the bottom of the trench. The stakes must be at least 48 in.
 3. Lay fabric along bottom of trench, up side of trench, and then up stakes. See SE-1, Silt Fence, for details. The maximum silt fence height around the inlet is 24 in.
 4. Staple the filter fabric (for materials and specifications, see SE-1, Silt Fence) to wooden stakes. Use heavy-duty wire staples at least 1 in. in length.
 5. Backfill the trench with gravel or compacted earth all the way around.
- ***DI Protection Type 2 - Excavated Drop Inlet Sediment Trap*** - The excavated drop inlet sediment trap (Type 2) is shown in the attached figures. Install filter fabric fence in

accordance with DI Protection Type 1. Size excavated trap to provide a minimum storage capacity calculated at the rate 67 yd³/acre of drainage area.

- **DI Protection Type 3 - Gravel bag** - The gravel bag barrier (Type 3) is shown in the figures. Flow from a severe storm should not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with SE-6, Gravel Bag Berm. Gravel bags should be used due to their high permeability.
 1. Use sand bag made of geotextile fabric (not burlap) and fill with 0.75 in. rock or 0.25 in. pea gravel.
 2. Construct on gently sloping street.
 3. Leave room upstream of barrier for water to pond and sediment to settle.
 4. Place several layers of sand bags – overlapping the bags and packing them tightly together.
 5. Leave gap of one bag on the top row to serve as a spillway. Flow from a severe storm (e.g., 10 year storm) should not overtop the curb.
- **DI Protection Type 4 – Block and Gravel Filter** - The block and gravel filter (Type 4) is shown in the figures. Block and gravel filters are suitable for curb inlets commonly used in residential, commercial, and industrial construction.
 1. Place hardware cloth or comparable wire mesh with 0.5 in. openings over the drop inlet so that the wire extends a minimum of 1 ft beyond each side of the inlet structure. If more than one strip is necessary, overlap the strips. Place filter fabric over the wire mesh.
 2. Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, so that the open ends face outward, not upward. The ends of adjacent blocks should abut. The height of the barrier can be varied, depending on design needs, by stacking combinations of blocks that are 4 in., 8 in., and 12 in. wide. The row of blocks should be at least 12 in. but no greater than 24 in. high.
 3. Place wire mesh over the outside vertical face (open end) of the concrete blocks to prevent stone from being washed through the blocks. Use hardware cloth or comparable wire mesh with 0.5 in. opening.
 4. Pile washed stone against the wire mesh to the top of the blocks. Use 0.75 to 3 in.

Costs

- Average annual cost for installation and maintenance (one year useful life) is \$200 per inlet.

Inspection and Maintenance

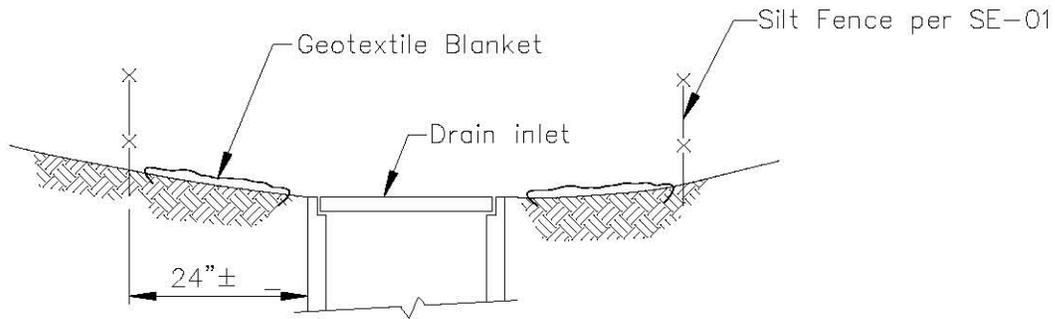
- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- **Filter Fabric Fences.** If the fabric becomes clogged, torn, or degrades, it should be replaced. Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes.
- **Gravel Filters.** If the gravel becomes clogged with sediment, it must be carefully removed from the inlet and either cleaned or replaced. Since cleaning gravel at a construction site may be difficult, consider using the sediment-laden stone as fill material and put fresh stone around the inlet. Inspect bags for holes, gashes, and snags, and replace bags as needed. Check gravel bags for proper arrangement and displacement.
- **Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness.** Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- **Remove storm drain inlet protection once the drainage area is stabilized.**
 - Clean and regrade area around the inlet and clean the inside of the storm drain inlet as it must be free of sediment and debris at the time of final inspection.

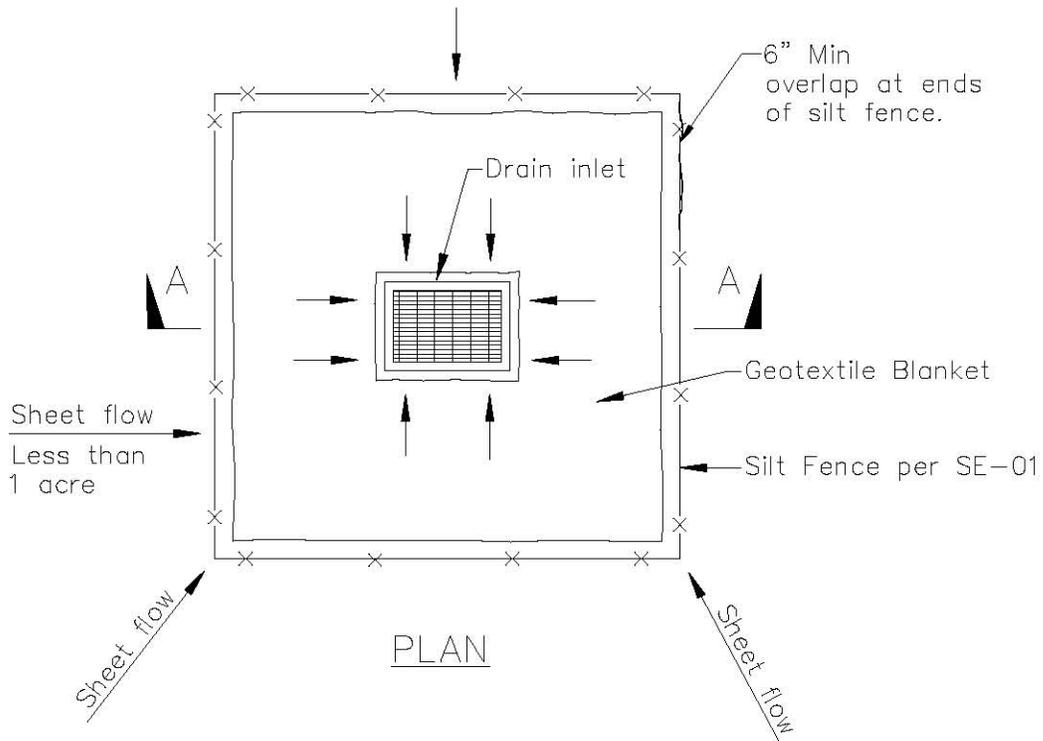
References

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Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.



SECTION A-A

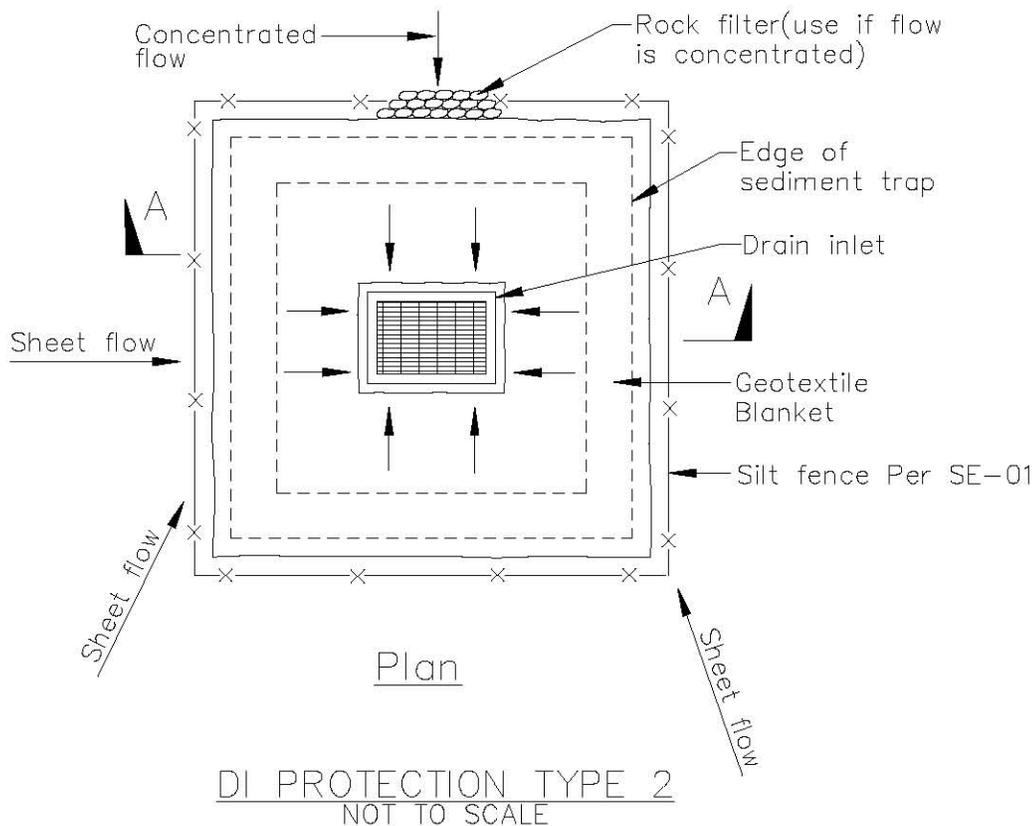
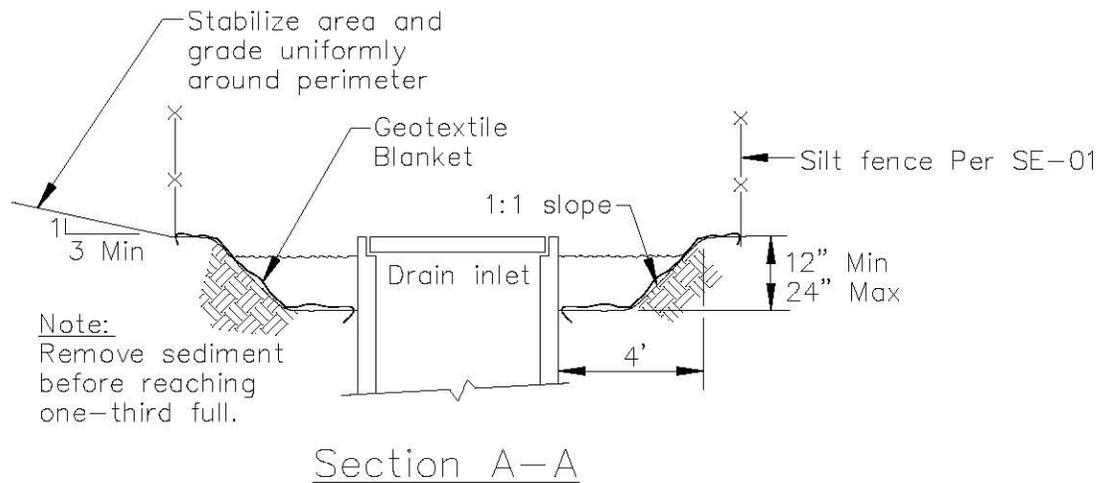


PLAN

DI PROTECTION TYPE 1
NOT TO SCALE

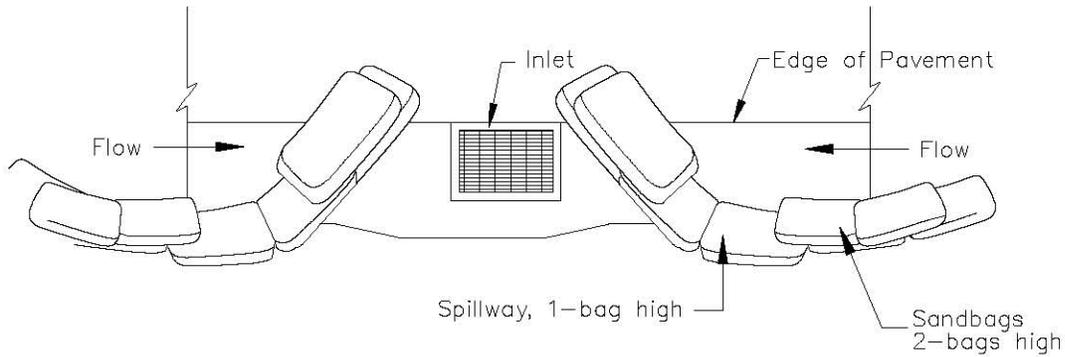
NOTES:

1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not applicable with concentrated flows.

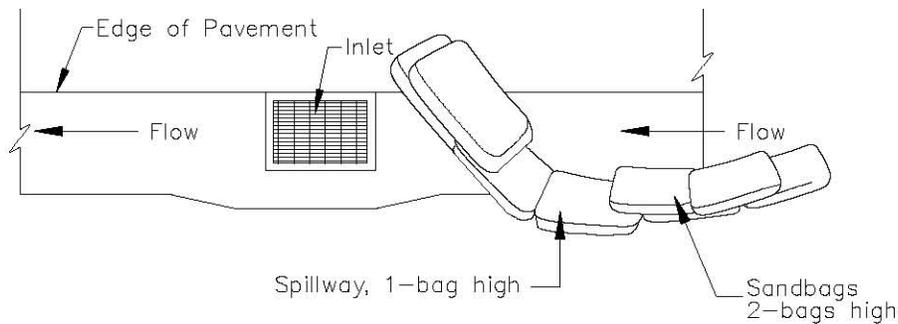


Notes

1. For use in cleared and grubbed and in graded areas.
2. Shape basin so that longest inflow area faces longest length of trap.
3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.



TYPICAL PROTECTION FOR INLET ON SUMP

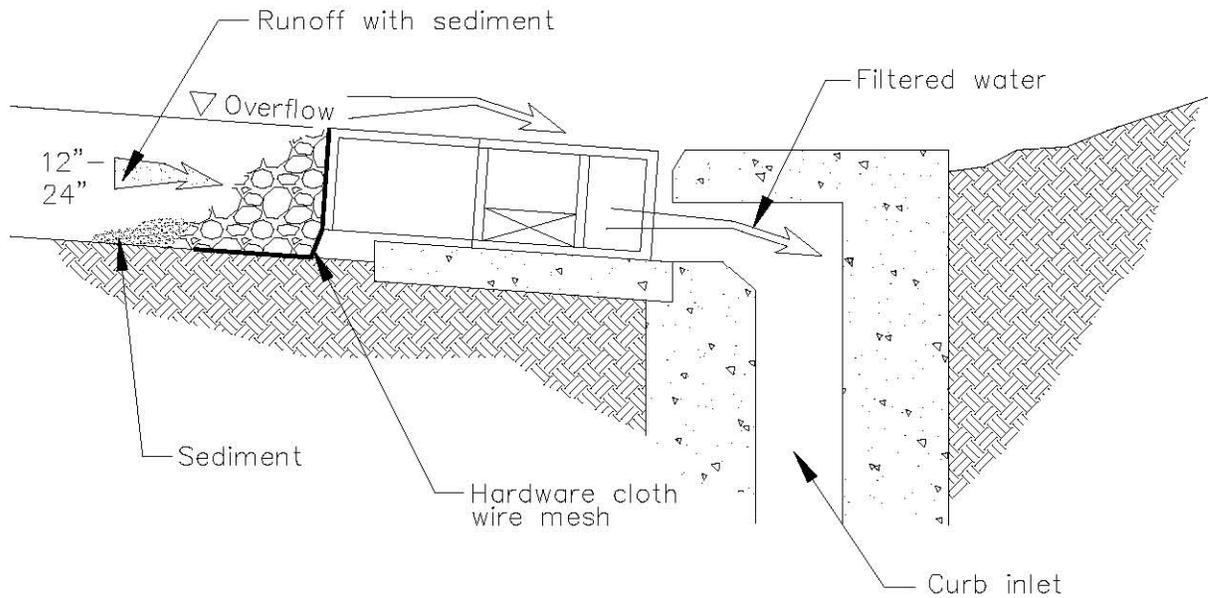
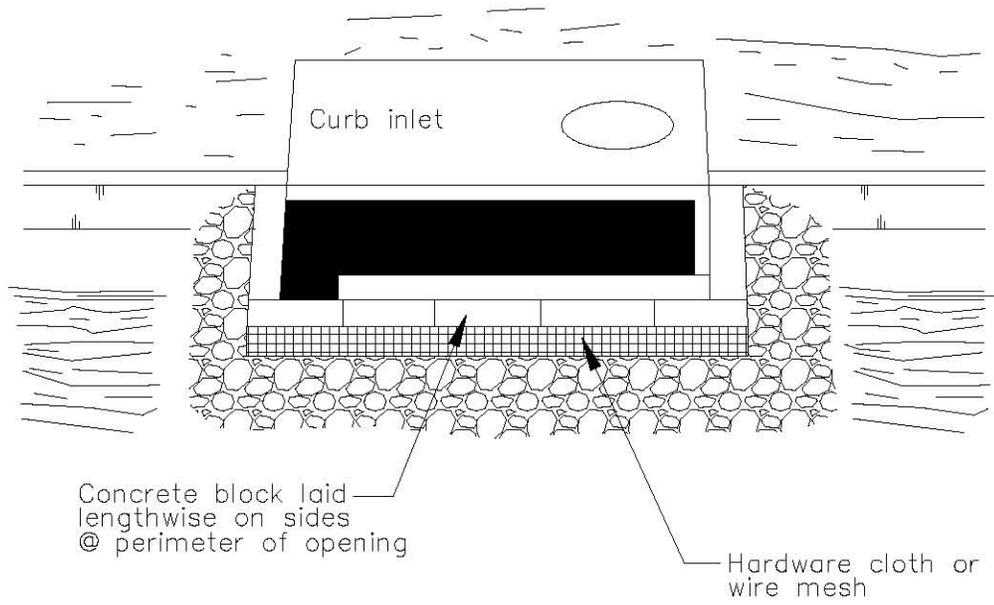


TYPICAL PROTECTION FOR INLET ON GRADE

NOTES:

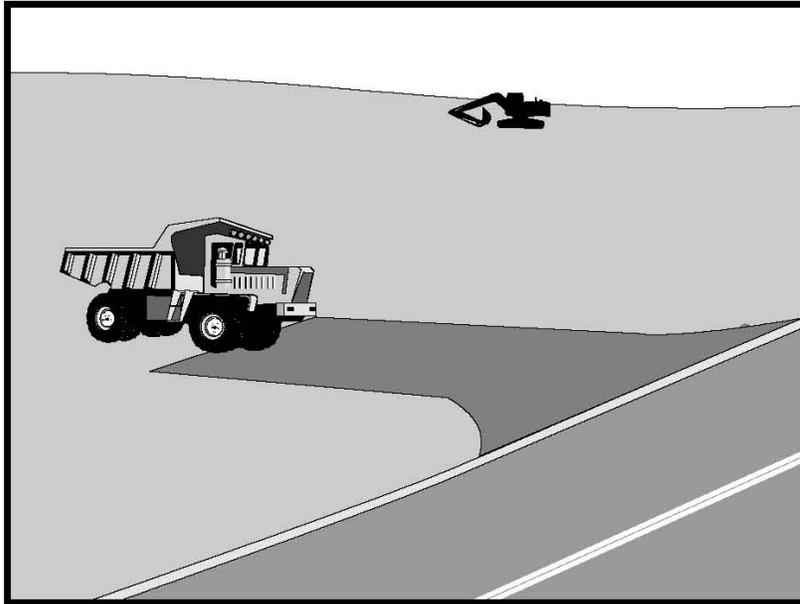
1. Intended for short-term use.
2. Use to inhibit non-storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed
5. Not applicable in areas with high silts and clays without filter fabric.

DI PROTECTION TYPE 3
NOT TO SCALE



DI PROTECTION — TYPE 4
NOT TO SCALE

Stabilized Construction Entrance/Exit TC-1



Objectives

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Suitable Applications

Use at construction sites:

- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.
- Where dust is a problem during dry weather conditions.

Limitations

- Entrances and exits require periodic top dressing with additional stones.
- This BMP should be used in conjunction with street sweeping on adjacent public right of way.
- Entrances and exits should be constructed on level ground only.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water runoff.



Stabilized Construction Entrance/Exit TC-1

Implementation

General

A stabilized construction entrance is a pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights of way or streets. Reducing tracking of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust.

Where traffic will be entering or leaving the construction site, a stabilized construction entrance should be used. NPDES permits require that appropriate measures be implemented to prevent tracking of sediments onto paved roadways, where a significant source of sediments is derived from mud and dirt carried out from unpaved roads and construction sites.

Stabilized construction entrances are moderately effective in removing sediment from equipment leaving a construction site. The entrance should be built on level ground. Advantages of the Stabilized Construction Entrance/Exit is that it does remove some sediment from equipment and serves to channel construction traffic in and out of the site at specified locations. Efficiency is greatly increased when a washing rack is included as part of a stabilized construction entrance/exit.

Design and Layout

- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft minimum, and 30 ft minimum width.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized entrance/exit will help remove additional sediment and to keep adjacent streets clean.
- Provide ample turning radii as part of the entrance.
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment trapping device before discharge.
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.
- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. Do not use asphalt concrete (AC) grindings for stabilized construction access/roadway.

Stabilized Construction Entrance/Exit TC-1

- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Require that all employees, subcontractors, and suppliers utilize the stabilized construction access.
- Implement SE-7, Street Sweeping and Vacuuming, as needed.
- All exit locations intended to be used for more than a two-week period should have stabilized construction entrance/exit BMPs.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMPs are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment.
- Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment.
- Keep all temporary roadway ditches clear.
- Check for damage and repair as needed.
- Replace gravel material when surface voids are visible.
- Remove all sediment deposited on paved roadways within 24 hours.
- Remove gravel and filter fabric at completion of construction

Costs

Average annual cost for installation and maintenance may vary from \$1,200 to \$4,800 each, averaging \$2,400 per entrance. Costs will increase with addition of washing rack, and sediment trap. With wash rack, costs range from \$1,200 - \$6,000 each, averaging \$3,600 per entrance.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, USEPA Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

Stabilized Construction Entrance/Exit TC-1

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

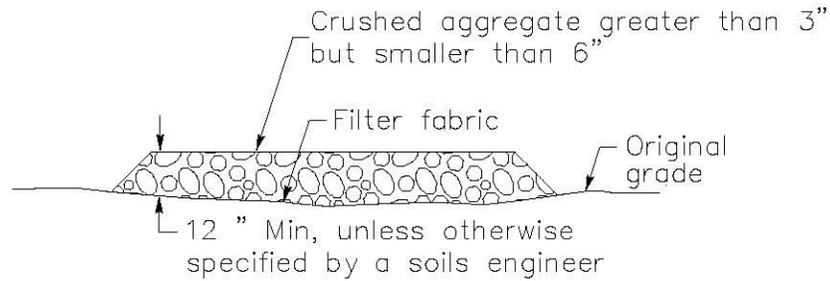
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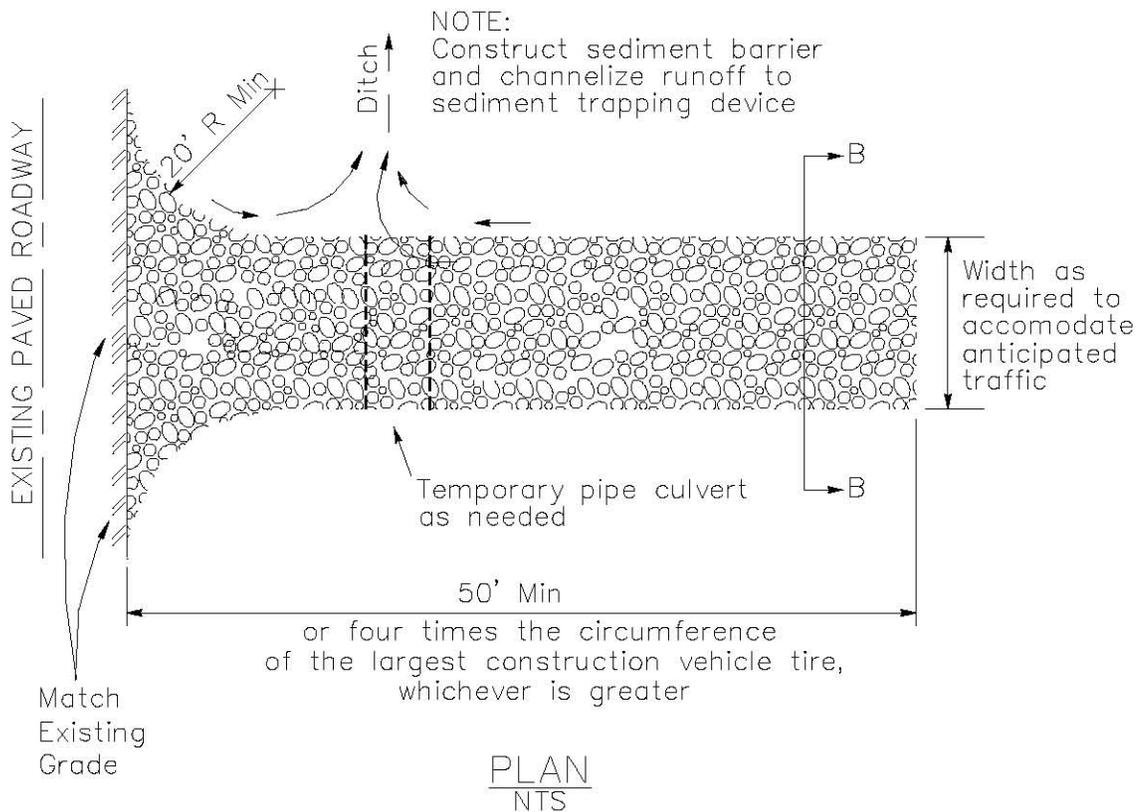
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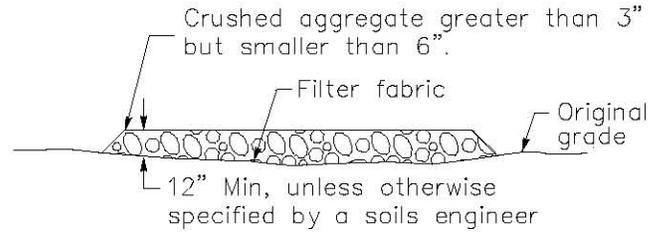
Stabilized Construction Entrance/Exit TC-1



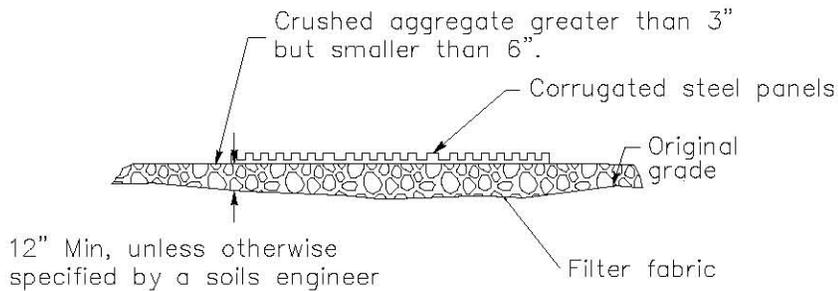
SECTION B-B
NTS



Stabilized Construction Entrance/Exit TC-1



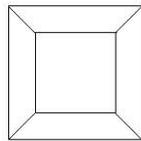
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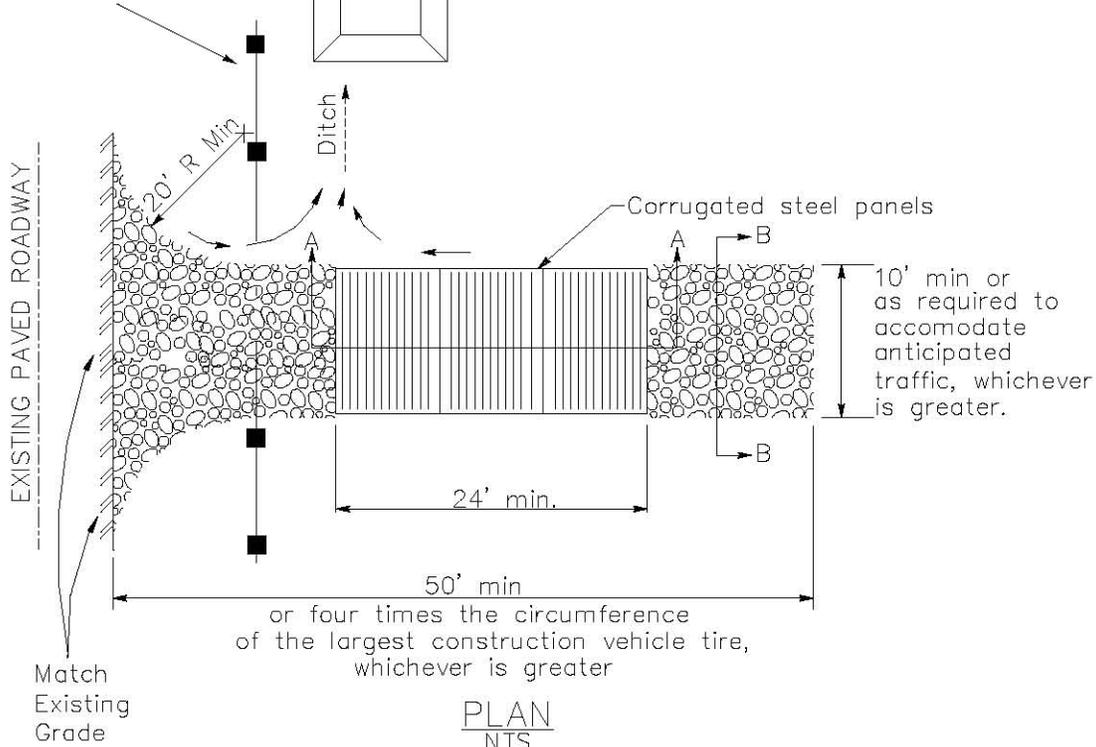
SECTION A-A
NOT TO SCALE

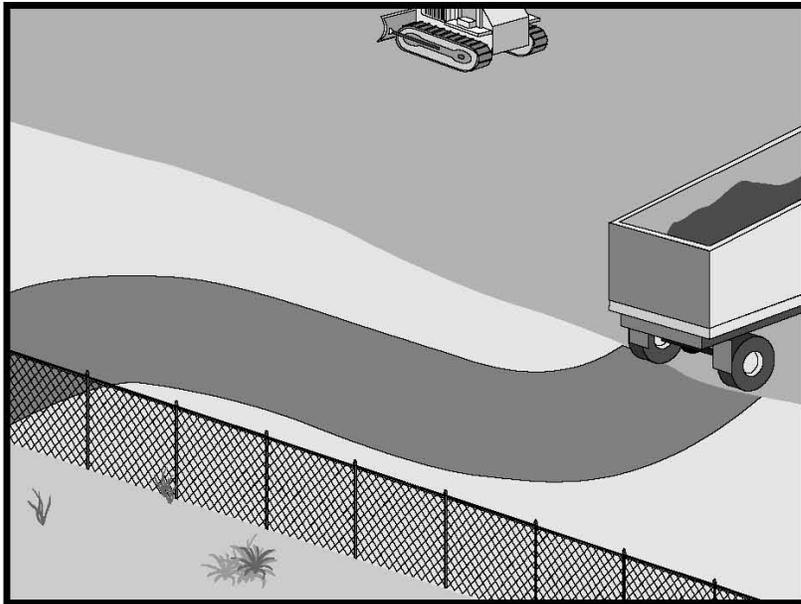
NOTE:

Construct sediment barrier and channelize runoff to sediment trapping device



Sediment trapping device





Objectives

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Access roads, subdivision roads, parking areas, and other onsite vehicle transportation routes should be stabilized immediately after grading, and frequently maintained to prevent erosion and control dust.

Suitable Applications

This BMP should be applied for the following conditions:

- Temporary Construction Traffic:
 - Phased construction projects and offsite road access
 - Construction during wet weather
- Construction roadways and detour roads:
 - Where mud tracking is a problem during wet weather
 - Where dust is a problem during dry weather
 - Adjacent to water bodies
 - Where poor soils are encountered

Limitations

- The roadway must be removed or paved when construction is complete.



TC-2 **Stabilized Construction Roadway**

- Certain chemical stabilization methods may cause stormwater or soil pollution and should not be used. See WE-1, Wind Erosion Control.
- Management of construction traffic is subject to air quality control measures. Contact the local air quality management agency.
- Materials will likely need to be removed prior to final project grading and stabilization.
- Use of this BMP may not be applicable to very short duration projects.

Implementation

General

Areas that are graded for construction vehicle transport and parking purposes are especially susceptible to erosion and dust. The exposed soil surface is continually disturbed, leaving no opportunity for vegetative stabilization. Such areas also tend to collect and transport runoff waters along their surfaces. During wet weather, they often become muddy quagmires that generate significant quantities of sediment that may pollute nearby streams or be transported offsite on the wheels of construction vehicles. Dirt roads can become so unstable during wet weather that they are virtually unusable.

Efficient construction road stabilization not only reduces onsite erosion but also can significantly speed onsite work, avoid instances of immobilized machinery and delivery vehicles, and generally improve site efficiency and working conditions during adverse weather

Installation/Application Criteria

Permanent roads and parking areas should be paved as soon as possible after grading. As an alternative where construction will be phased, the early application of gravel or chemical stabilization may solve potential erosion and stability problems. Temporary gravel roadway should be considered during the rainy season and on slopes greater than 5%.

Temporary roads should follow the contour of the natural terrain to the maximum extent possible. Slope should not exceed 15%. Roadways should be carefully graded to drain transversely. Provide drainage swales on each side of the roadway in the case of a crowned section or one side in the case of a super elevated section. Simple gravel berms without a trench can also be used.

Installed inlets should be protected to prevent sediment laden water from entering the storm sewer system (SE-10, Storm Drain Inlet Protection). In addition, the following criteria should be considered.

- Road should follow topographic contours to reduce erosion of the roadway.
- The roadway slope should not exceed 15%.
- Chemical stabilizers or water are usually required on gravel or dirt roads to prevent dust (WE-1, Wind Erosion Control).
- Properly grade roadway to prevent runoff from leaving the construction site.
- Design stabilized access to support heaviest vehicles and equipment that will use it.

- Stabilize roadway using aggregate, asphalt concrete, or concrete based on longevity, required performance, and site conditions. The use of cold mix asphalt or asphalt concrete (AC) grindings for stabilized construction roadway is not allowed.
- Coordinate materials with those used for stabilized construction entrance/exit points.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, impact weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Keep all temporary roadway ditches clear.
- When no longer required, remove stabilized construction roadway and re-grade and repair slopes.
- Periodically apply additional aggregate on gravel roads.
- Active dirt construction roads are commonly watered three or more times per day during the dry season.

Costs

Gravel construction roads are moderately expensive, but cost is often balanced by reductions in construction delay. No additional costs for dust control on construction roads should be required above that needed to meet local air quality requirements.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

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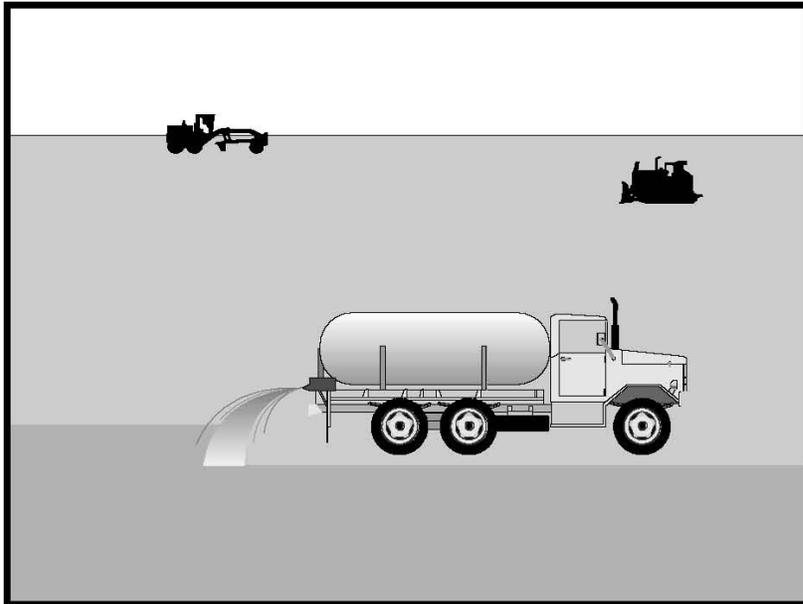
Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

TC-2 Stabilized Construction Roadway

Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



Description and Purpose

Wind erosion or dust control consists of applying water or other dust palliatives as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

Suitable Applications

Wind erosion control BMPs are suitable during the following construction activities:

- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Sediment tracking onto paved roads
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period and should be applied daily (or more often) to be effective.
- Over watering may cause erosion.

Objectives

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None



- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Effectiveness depends on soil, temperature, humidity, and wind velocity.
- Chemically treated sub grades may make the soil water repellent, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- Asphalt, as a mulch tack or chemical mulch, requires a 24-hour curing time to avoid adherence to equipment, worker shoes, etc. Application should be limited because asphalt surfacing may eventually migrate into the drainage system.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.

Implementation

General

California's Mediterranean climate, with short wet seasons and long hot dry seasons, allows the soils to thoroughly dry out. During these dry seasons, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment.

Dust control, as a BMP, is a practice that is already in place for many construction activities. Los Angeles, the North Coast, and Sacramento, among others, have enacted dust control ordinances for construction activities that cause dust to be transported beyond the construction project property line.

Recently, the State Air Resources Control Board has, under the authority of the Clean Air Act, started to address air quality in relation to inhalable particulate matter less than 10 microns (PM-10). Approximately 90 percent of these small particles are considered to be dust. Existing dust control regulations by local agencies, municipal departments, public works department, and public health departments are in place in some regions within California.

Many local agencies require dust control in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. The following are measures that local agencies may have already implemented as requirements for dust control from contractors:

- Construction and Grading Permits: Require provisions for dust control plans.
- Opacity Emission Limits: Enforce compliance with California air pollution control laws.
- Increase Overall Enforcement Activities: Priority given to cases involving citizen complaints.
- Maintain Field Application Records: Require records of dust control measures from contractor;
- Stormwater Pollution Prevention Plan: (SWPPP): Integrate dust control measures into SWPPP.

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table shows dust control practices that can be applied to site conditions that cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures would include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph, and controlling the number and activity of vehicles on a site at any given time.

SITE CONDITION	DUST CONTROL PRACTICES								
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Silt Fences	Temporary Gravel Construction Entrances/Equipment Wash Down	Haul Truck Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	X	X	X	X	X				X
Disturbed Areas Subject to Traffic			X	X	X		X		X
Material Stock Pile Stabilization			X	X		X			X
Demolition			X				X	X	
Clearing/Excavation			X	X		X			X
Truck Traffic on Unpaved Roads			X	X	X		X	X	
Mud/Dirt Carry Out					X		X		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (EC-1, Scheduling).
- Quickly stabilize exposed soils using vegetation, mulching, spray-on adhesives, calcium chloride, sprinkling, and stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Direct most construction traffic to stabilized roadways within the project site.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.

- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality Control Board requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, “NON-POTABLE WATER - DO NOT DRINK.”
- Materials applied as temporary soil stabilizers and soil binders also generally provide wind erosion control benefits.
- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for wet suppression or chemical stabilization of exposed soils.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and vehicle wash down areas.
- Stabilize inactive construction sites using vegetation or chemical stabilization methods.
- Limit the amount of areas disturbed by clearing and earth moving operations by scheduling these activities in phases.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater.

Costs

Installation costs for water and chemical dust suppression are low, but annual costs may be quite high since these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Check areas protected to ensure coverage.
- Most dust control measures require frequent, often daily, or multiple times per day attention.

References

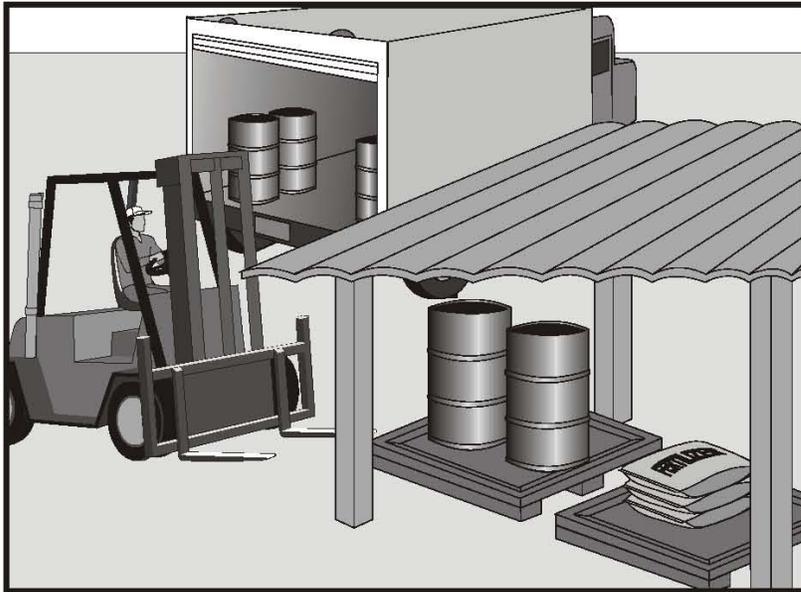
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California Air Pollution Control Laws, California Air Resources Board, 1992.

Caltrans, Standard Specifications, Sections 10, “Dust Control”; Section 17, “Watering”; and Section 18, “Dust Palliative”.

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM₁₀), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in a designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and concrete components

Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None



- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Temporary storage area should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be supplied for all materials stored.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located near the construction entrances, away from waterways, if possible.
 - Avoid transport near drainage paths or waterways.
 - Surround with earth berms. See EC-9, Earth Dikes and Drainage Swales.
 - Place in an area which will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.
- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the rainy season, consider storing materials in a covered area. Store materials in secondary containments such as earthen dike, horse trough, or even a children's wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in "bus boy" trays or concrete mixing trays.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and, when possible, in secondary containment.

- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids to reduce corrosion. Domed plastic covers are inexpensive and snap to the top of drums, preventing water from collecting.
- Chemicals should be kept in their original labeled containers.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Throughout the rainy season, each temporary containment facility should be covered during non-working days, prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.
- Stockpiles should be protected in accordance with WM-3, Stockpile Management.
- Materials should be stored indoors within existing structures or sheds when available.
- Proper storage instructions should be posted at all times in an open and conspicuous location.
- An ample supply of appropriate spill clean up material should be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous materials.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.
- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.
- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Keep an ample supply of spill cleanup materials near the storage area.
- Keep storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

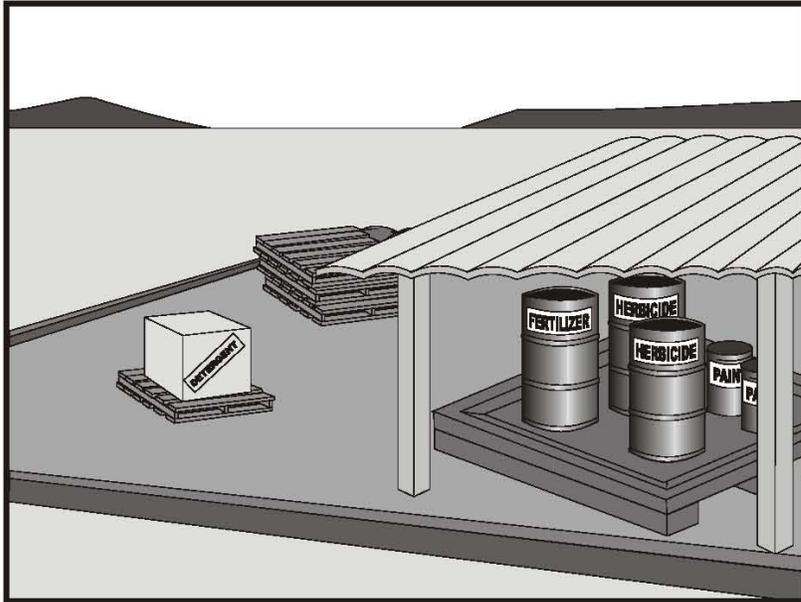
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None



Limitations

Safer alternative building and construction products may not be available or suitable in every instance.

Implementation

The following steps should be taken to minimize risk:

- Minimize use of hazardous materials onsite.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydro seeding. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted, or into a concrete washout pit or temporary sediment trap. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.

- Require contractors to complete the “Report of Chemical Spray Forms” when spraying herbicides and pesticides.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Maintenance of this best management practice is minimal.
- Spot check employees and subcontractors throughout the job to ensure appropriate practices are being employed.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Stockpile Management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called “cold mix” asphalt), and pressure treated wood.

Suitable Applications

Implement in all projects that stockpile soil and other materials.

Limitations

None identified.

Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

- Locate stockpiles a minimum of 50 ft away from concentrated flows of stormwater, drainage courses, and inlets.
- Protect all stockpiles from stormwater runoff using a temporary perimeter sediment barrier such as berms, dikes, fiber rolls, silt fences, sandbag, gravel bags, or straw bale barriers.

Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None



- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.

Protection of Non-Active Stockpiles

Non-active stockpiles of the identified materials should be protected further as follows:

Soil stockpiles

- During the rainy season, soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- During the non-rainy season, soil stockpiles should be covered or protected with a temporary perimeter sediment barrier prior to the onset of precipitation.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base

- During the rainy season, the stockpiles should be covered or protected with a temporary perimeter sediment barrier at all times.
- During the non-rainy season, the stockpiles should be covered or protected with a temporary perimeter sediment barrier prior to the onset of precipitation.

Stockpiles of “cold mix”

- During the rainy season, cold mix stockpiles should be placed on and covered with plastic or comparable material at all times.
- During the non-rainy season, cold mix stockpiles should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Stockpiles/Storage of pressure treated wood with copper, chromium, and arsenic or ammonical, copper, zinc, and arsenate

- During the rainy season, treated wood should be covered with plastic or comparable material at all times.
- During the non-rainy season, treated wood should be covered with plastic or comparable material at all times and cold mix stockpiles should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Protection of Active Stockpiles

Active stockpiles of the identified materials should be protected further as follows:

- All stockpiles should be protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of “cold mix” should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Costs

All of the above are low cost measures.

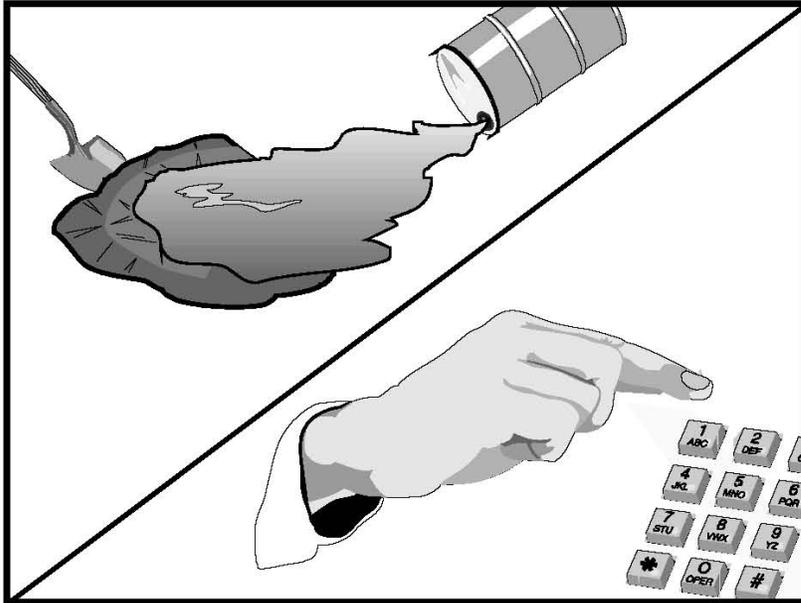
Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation

- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None



- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a “significant spill” is for each material they use, and what is the appropriate response for “significant” and “insignificant” spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- Have contractor’s superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runoff during rainfall to the extent that it doesn’t compromise clean up activities.
- Do not bury or wash spills with water.

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.
- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.
- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Absorbent materials should be promptly removed and disposed of properly.
- Follow the practice below for a minor spill:
 - Contain the spread of the spill.
 - Recover spilled materials.
 - Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

- Spills should be cleaned up immediately:
 - Contain spread of the spill.
 - Notify the project foreman immediately.
 - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
 - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
 - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:
 - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
 - Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.
 - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
 - Notification should first be made by telephone and followed up with a written report.
 - The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
 - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runoff of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runoff of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

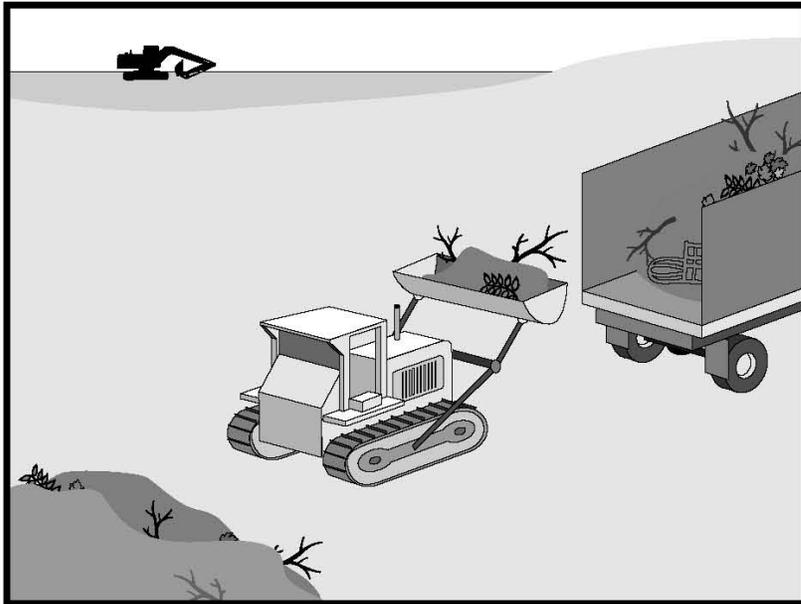
- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials

Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None



- Highway planting wastes, including vegetative material, plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runoff should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs

All of the above are low cost measures.

Inspection and Maintenance

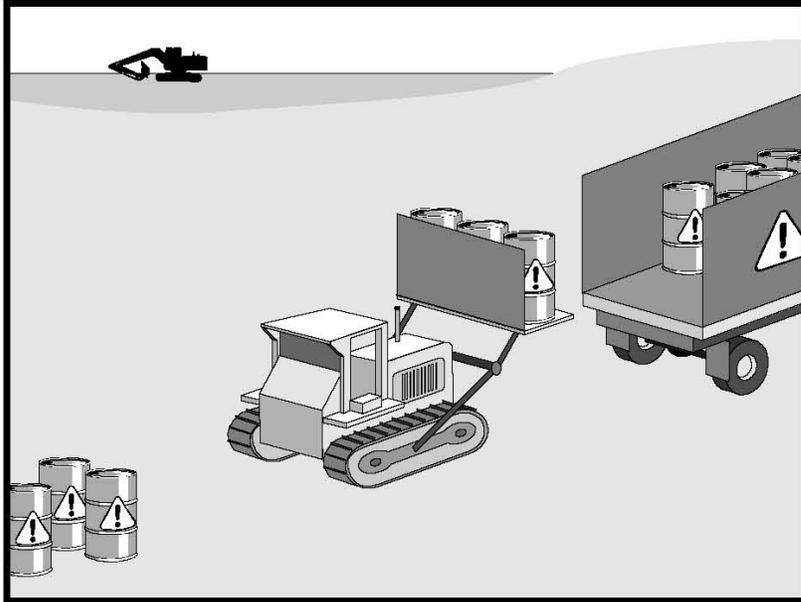
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Inspect construction waste area regularly.
- Arrange for regular waste collection.

References

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective**
- Secondary Objective**

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum Products
- Concrete Curing Compounds
- Palliatives
- Septic Wastes
- Stains
- Wood Preservatives
- Asphalt Products
- Pesticides
- Acids
- Paints
- Solvents
- Roofing Tar
- Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None



In addition, sites with existing structures may contain wastes, which must be disposed of in accordance with federal, state, and local regulations. These wastes include:

- Sandblasting grit mixed with lead-, cadmium-, or chromium-based paints
- Asbestos
- PCBs (particularly in older transformers)

Limitations

- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Nothing in this BMP relieves the contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
- This BMP does not cover aerielly deposited lead (ADL) soils. For ADL soils refer to WM-7, Contaminated Soil Management.

Implementation

The following steps will help reduce stormwater pollution from hazardous wastes:

Material Use

- Wastes should be stored in sealed containers constructed of a suitable material and should be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172, 173, 178, and 179.
- All hazardous waste should be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers should be stored in temporary containment facilities that should comply with the following requirements:
 - Temporary containment facility should provide for a spill containment volume equal to 1.5 times the volume of all containers able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.
 - Temporary containment facility should be impervious to the materials stored there for a minimum contact time of 72 hours.
 - Temporary containment facilities should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be placed into drums after each rainfall. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids should be sent to an approved disposal site.
 - Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.

- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Throughout the rainy season, temporary containment facilities should be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs.
- Drums should not be overfilled and wastes should not be mixed.
- Unless watertight, containers of dry waste should be stored on pallets.
- Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over application is expensive and environmentally harmful. Apply surface dressings in several smaller applications, as opposed to one large application. Allow time for infiltration and avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains. People applying pesticides must be certified in accordance with federal and state regulations.
- Paint brushes and equipment for water and oil based paints should be cleaned within a contained area and should not be allowed to contaminate site soils, watercourses, or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused should be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths should be disposed of as solid waste.
- Do not clean out brushes or rinse paint containers into the dirt, street, gutter, storm drain, or stream. “Paint out” brushes as much as possible. Rinse water-based paints to the sanitary sewer. Filter and reuse thinners and solvents. Dispose of excess oil-based paints and sludge as hazardous waste.
- The following actions should be taken with respect to temporary contaminant:
 - Ensure that adequate hazardous waste storage volume is available.
 - Ensure that hazardous waste collection containers are conveniently located.
 - Designate hazardous waste storage areas onsite away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.
 - Minimize production or generation of hazardous materials and hazardous waste on the job site.
 - Use containment berms in fueling and maintenance areas and where the potential for spills is high.
 - Segregate potentially hazardous waste from non-hazardous construction site debris.
 - Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.

- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Place hazardous waste containers in secondary containment.
- Do not allow potentially hazardous waste materials to accumulate on the ground.
- Do not mix wastes.
- Use all of the product before disposing of the container.
- Do not remove the original product label; it contains important safety and disposal information.

Waste Recycling Disposal

- Select designated hazardous waste collection areas onsite.
- Hazardous materials and wastes should be stored in covered containers and protected from vandalism.
- Place hazardous waste containers in secondary containment.
- Do not mix wastes, this can cause chemical reactions, making recycling impossible and complicating disposal.
- Recycle any useful materials such as used oil or water-based paint.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Arrange for regular waste collection before containers overflow.
- Make sure that hazardous waste (e.g., excess oil-based paint and sludge) is collected, removed, and disposed of only at authorized disposal areas.

Disposal Procedures

- Waste should be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.
- A Department of Health Services certified laboratory should sample waste to determine the appropriate disposal facility.
- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- The contractor's superintendent or representative should oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Warning signs should be placed in areas recently treated with chemicals.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, clean up immediately.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Hazardous waste should be regularly collected.
- A foreman or construction supervisor should monitor onsite hazardous waste storage and disposal procedures.
- Waste storage areas should be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.
- Hazardous spills should be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.

- The National Response Center, at (800) 424-8802, should be notified of spills of federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302. Also notify the Governors Office of Emergency Services Warning Center at (916) 845-8911.
- A copy of the hazardous waste manifests should be provided.

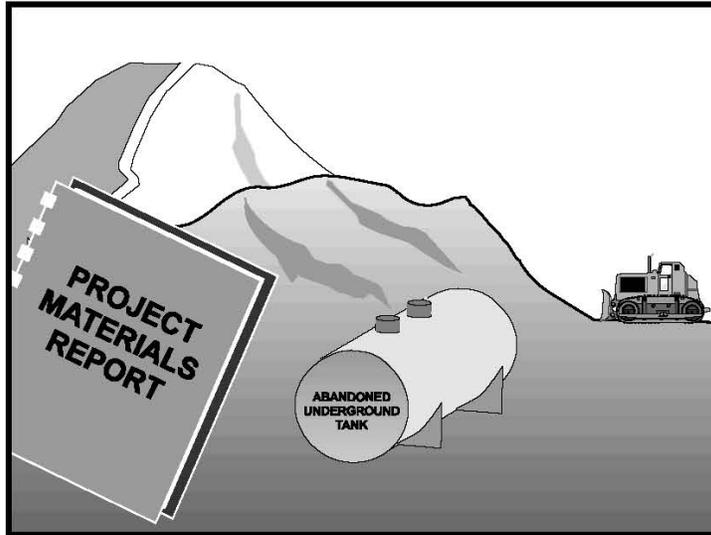
References

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Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective
- Secondary Objective

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting excavations regularly, and remediating contaminated soil promptly.

Suitable Applications

Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, aerial deposition, past use and leaks from underground storage tanks.

Limitations

Contaminated soils that cannot be treated onsite must be disposed of offsite by a licensed hazardous waste hauler. The presence of contaminated soil may indicate contaminated water as well. See NS-2, Dewatering Operations, for more information.

The procedures and practices presented in this BMP are general. The contractor should identify appropriate practices and procedures for the specific contaminants known to exist or discovered onsite.

Implementation

Most owners and developers conduct pre-construction environmental assessments as a matter of routine. Contaminated soils are often identified during project planning and development with known locations identified in the plans, specifications and in the SWPPP. The contractor should review applicable reports and investigate appropriate call-outs in the plans, specifications, and

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None



SWPPP. Recent court rulings holding contractors liable for cleanup costs when they unknowingly move contaminated soil highlight the need for contractors to confirm a site assessment is completed before earth moving begins.

The following steps will help reduce stormwater pollution from contaminated soil:

- Conduct thorough, pre-construction inspections of the site and review documents related to the site. If inspection or reviews indicated presence of contaminated soils, develop a plan before starting work.
- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
- Prevent leaks and spills. Contaminated soil can be expensive to treat and dispose of properly. However, addressing the problem before construction is much less expensive than after the structures are in place.
- The contractor may further identify contaminated soils by investigating:
 - Past site uses and activities
 - Detected or undetected spills and leaks
 - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements
 - Contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
 - Suspected soils should be tested at a certified laboratory.

Education

- Have employees and subcontractors complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified, prior to performing any excavation work at the locations containing material classified as hazardous.
- Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

Handling Procedures for Material with Aerially Deposited Lead (ADL)

- Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.
- Excavation, transportation, and placement operations should result in no visible dust.
- Caution should be exercised to prevent spillage of lead containing material during transport.

- Quality should be monitored during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

- Minimize onsite storage. Contaminated soil should be disposed of properly in accordance with all applicable regulations. All hazardous waste storage will comply with the requirements in Title 22, CCR, Sections 66265.250 to 66265.260.
- Test suspected soils at an approved certified laboratory.
- Work with the local regulatory agencies to develop options for treatment or disposal if the soil is contaminated.
- Avoid temporary stockpiling of contaminated soils or hazardous material.
- Take the following precautions if temporary stockpiling is necessary:
 - Cover the stockpile with plastic sheeting or tarps.
 - Install a berm around the stockpile to prevent runoff from leaving the area.
 - Do not stockpile in or near storm drains or watercourses.
- Remove contaminated material and hazardous material on exteriors of transport vehicles and place either into the current transport vehicle or into the excavation prior to the vehicle leaving the exclusion zone.
- Monitor the air quality continuously during excavation operations at all locations containing hazardous material.
- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
- Collect water from decontamination procedures and treat or dispose of it at an appropriate disposal site.
- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.
- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
- Excavate, transport, and dispose of contaminated material and hazardous material in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
 - United States Department of Transportation (USDOT)
 - United States Environmental Protection Agency (USEPA)
 - California Environmental Protection Agency (CAL-EPA)

- California Division of Occupation Safety and Health Administration (CAL-OSHA)
- Local regulatory agencies

Procedures for Underground Storage Tank Removals

- Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies that have jurisdiction over such work.
- To determine if it contains hazardous substances, arrange to have tested, any liquid or sludge found in the underground tank prior to its removal.
- Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).
- The underground storage tank, any liquid or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal and transported to disposal facilities permitted to accept such waste.

Water Control

- All necessary precautions and preventive measures should be taken to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to, berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, should be discharged to clean, closed top, watertight transportable holding tanks, treated, and disposed of in accordance with federal, state, and local laws.

Costs

Prevention of leaks and spills is inexpensive. Treatment or disposal of contaminated soil can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Arrange for contractor's Water Pollution Control Manager, foreman, and/or construction supervisor to monitor onsite contaminated soil storage and disposal procedures.
- Monitor air quality continuously during excavation operations at all locations containing hazardous material.
- Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.

- Implement WM-4, Spill Prevention and Control, to prevent leaks and spills as much as possible.

References

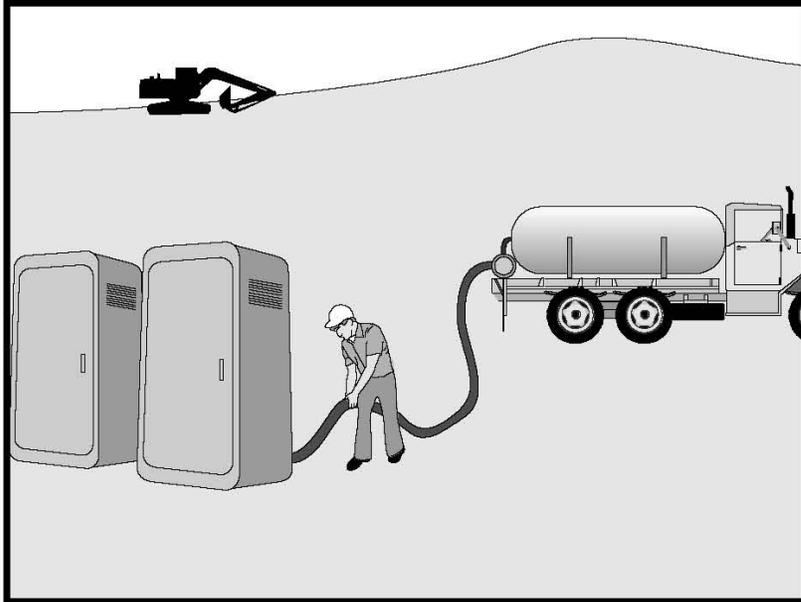
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Sanitary/Septic Waste Management WM-9



Description and Purpose

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.
- Wastewater should not be discharged or buried within the project site.

Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None



WM-9 Sanitary/Septic Waste Management

- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary facilities should be located in a convenient location.
- Untreated raw wastewater should never be discharged or buried.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an onsite disposal system (OSDS), such as a septic system, local health agency requirements must be followed.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities overflow.

Education

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Arrange for regular waste collection.
- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.

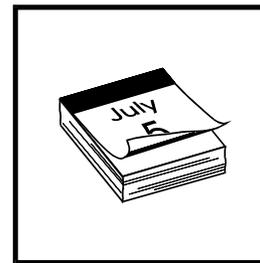
Sanitary/Septic Waste Management WM-9

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

JANUARY				
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
		1	2 NTP MOBILIZATION	3
	7	8 Land clearing	9	10 Grading
6 Install erosion & sediment control measures		14	15	16
12	13		22	23



Standard Symbol

- BMP Objectives**
- Soil Stabilization
 - Sediment Control
 - Tracking Control
 - Wind Erosion Control
 - Non-Storm Water Management
 - Materials and Waste Management

Definition and Purpose This best management practice (BMP) involves developing, for every project, a schedule that includes sequencing of construction activities with the implementation of construction site BMPs such as temporary soil stabilization (erosion control) and temporary sediment controls measures. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

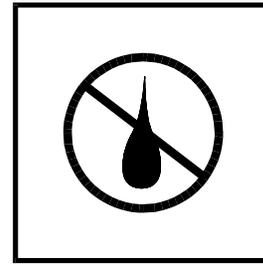
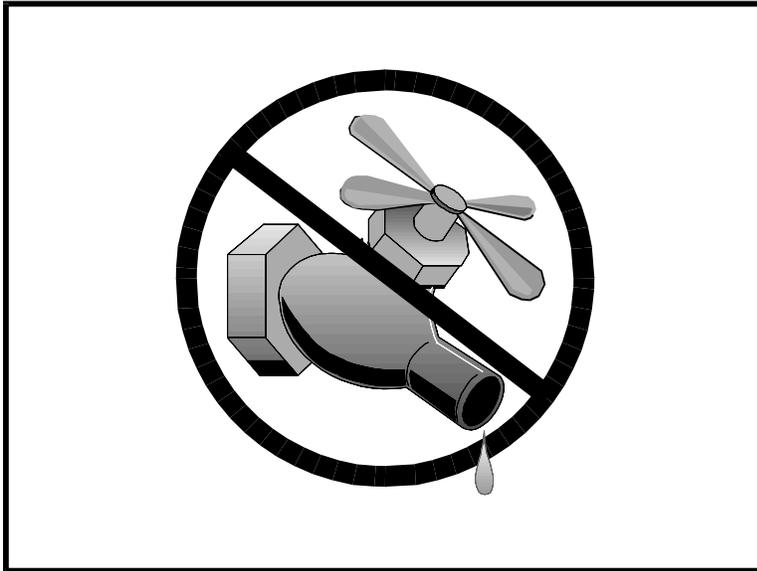
Appropriate Applications Construction sequencing shall be scheduled to minimize land disturbance for all projects during the rainy and non-rainy season. Appropriate BMPs shall be implemented during both rainy and non-rainy seasons.

Limitations None identified.

- Standards and Specifications**
- Developing a schedule and planning the project are the very first steps in an effective storm water program. The schedule shall clearly show how the rainy season relates to soil-disturbing and re-stabilization activities. The construction schedule shall be incorporated into the SWPPP or WPCP.
 - The schedule shall include detail on the rainy season implementation and deployment of:
 - Temporary soil stabilization BMPs.
 - Temporary sediment control BMPs.
 - Tracking control BMPs.
 - Wind erosion control BMPs.

- Non-storm water BMPs.
- Waste management and materials pollution control BMPs.
- Schedule shall also include dates for significant long-term operations or activities that may have planned non-storm water discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, bridge cleaning, etc.
- Schedule work to minimize soil disturbing activities during the rainy season.
- Develop the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, pouring foundations, installing utilities, etc., to minimize the active construction area during the rainy season.
- Schedule major grading operations for the non-rainy season when practical.
- Stabilize non-active areas within 14 days from the cessation of soil-disturbing activities or one day prior to the onset of precipitation, whichever occurs first.
- Monitor the weather forecast for rainfall.
- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment controls and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Be prepared year-round to deploy soil stabilization and sediment control practices as required by Section 2 of this Manual. Erosion may be caused during dry seasons by unseasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year-round, and retain and maintain rainy season sediment trapping devices in operational condition.
- Sequence trenching activities so that most open portions are closed before new trenching begins.
- Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
- Consider scheduling when establishing permanent vegetation (appropriate planting time for specified vegetation).
- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.

- Maintenance and Inspection
- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
 - Amend the schedule when changes are warranted or when directed by the Resident Engineer (RE).
 - The Special Provisions require annual submittal of a rainy season implementation schedule. Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and/or the transport of pollutants off site.

Appropriate Applications

- Water conservation practices are implemented on all construction sites and wherever water is used.
- Applies to all construction projects.

Limitations

- None identified.

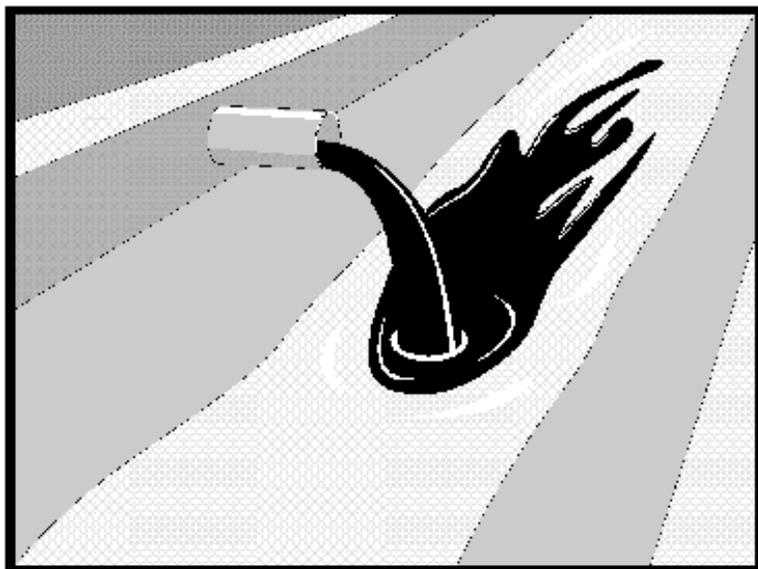
Standards and Specifications

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Vehicles and equipment washing on the construction site is discouraged.
- Avoid using water to clean construction areas. Do not use water to clean pavement. Paved areas shall be swept and vacuumed.
- Direct construction water runoff to areas where it can infiltrate into the ground.
- Apply water for dust control in accordance with the Standard Specifications Section 10, and WE-1, “Wind Erosion Control.”
- Report discharges to RE immediately.

- Maintenance and Inspection
- Inspect water equipment at least weekly.
 - Repair water equipment as needed.

Illicit Connection/Illegal Discharge Detection and Reporting

NS-6



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents to the Resident Engineer (RE).

Appropriate Applications

- Illicit connection/illegal discharge detection and reporting is applicable anytime an illicit connection or discharge is discovered or illegally dumped material is found on the construction site.

- This best management practice (BMP) applies to all construction projects.

Limitations

- Unlabeled or non-identifiable material shall be assumed to be hazardous.
- Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor.

- Procedures and practices presented in this BMP are general. Contractor shall use extreme caution, immediately notify the RE when illicit connections or illegal dumping or discharges are discovered, and take no further action unless directed by the RE.

- If pre-existing hazardous materials or wastes are known to exist onsite, the contractor's responsibility will be detailed in separate special provisions.

Illicit Connection/Illegal Discharge Detection and Reporting

NS-6

Standards and Specifications *Planning*

- Inspect site before beginning the job for evidence of illicit connections or illegal dumping or discharges.
- Inspect site regularly during project execution for evidence of illicit connections or illegal dumping or discharges.
- Observe site perimeter for evidence or potential of illicitly discharged or illegally dumped material, which may enter the job site.

Identification of illicit connections and illegal dumping or discharges.

- Solids - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- Liquids – signs of illegal liquid dumping or discharge can include:
 - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils.
 - Pungent odors coming from the drainage systems.
 - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes.
 - Abnormal water flow during the dry weather season.
- Urban Areas - Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
 - Abnormal water flow during the dry weather season.
 - Unusual flows in subdrain systems used for dewatering.
 - Pungent odors coming from the drainage systems.
 - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes.
 - Excessive sediment deposits, particularly adjacent to or near active off-site construction projects.

Illicit Connection/Illegal Discharge Detection and Reporting

NS-6

- Rural Areas - Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:

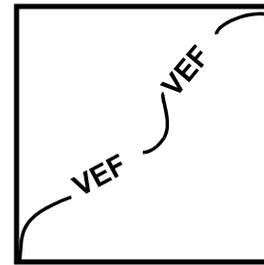
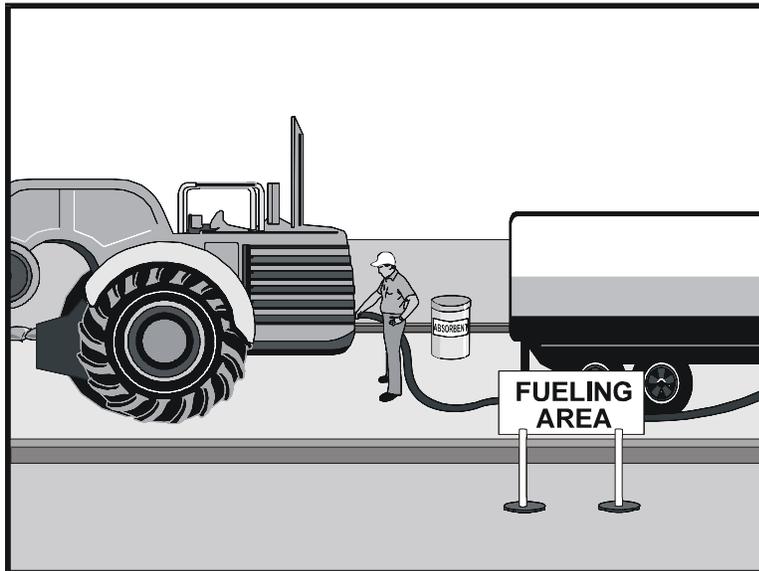
- Abnormal water flow during the dry weather season.
- Non-standard junction structures.
- Broken concrete or other disturbances at or near junction structures.

Reporting

- Notify the RE of any illicit connections and illegal dumping or discharge incidents at the time of discovery. The RE will notify the District Construction Storm Water Coordinator and the Construction Hazmat Coordinator for reporting.

Cleanup and Removal The contractor is not responsible for investigation and clean up of illicit or illegal dumping or discharges not generated by the contractor. Caltrans may direct contractor to clean up non-hazardous dumped or discharged material on the construction site.





Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose Vehicle and equipment fueling procedures and practices are designed to minimize or eliminate the discharge of fuel spills and leaks into storm drain systems or to watercourses.

Appropriate Applications These procedures are applied on all construction sites where vehicle and equipment fueling takes place.

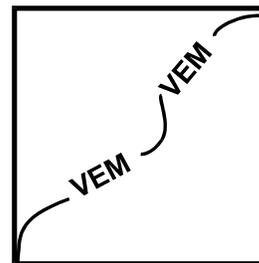
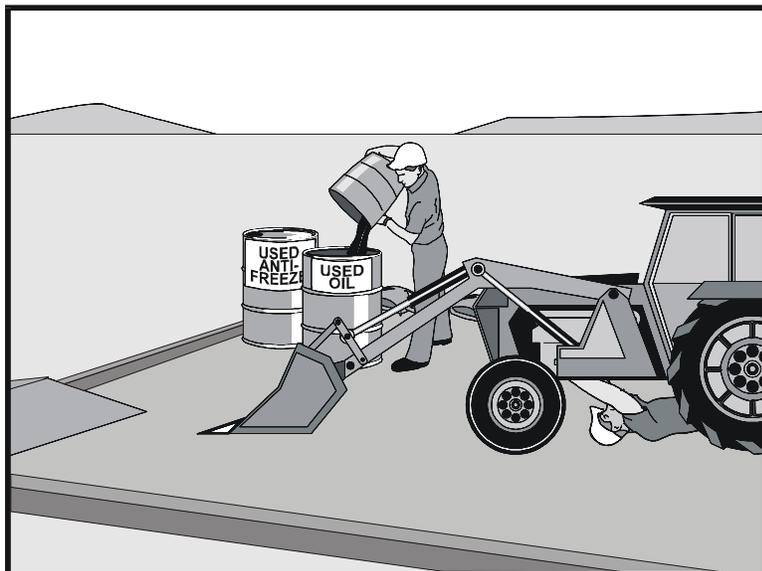
Limitations ■ Onsite vehicle and equipment fueling shall only be used where it's impractical to send vehicles and equipment off-site for fueling.

- Standards and Specifications**
- When fueling must occur onsite, the contractor shall select and designate an area to be used, subject to approval of the Resident Engineer (RE).
 - Absorbent spill clean-up materials and spill kits shall be available in fueling areas and on fueling trucks and shall be disposed of properly after use.
 - Drip pans or absorbent pads shall be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
 - Dedicated fueling areas shall be protected from storm water run-on and runoff, and shall be located at least 15 m (50 ft) from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
 - Nozzles used in vehicle and equipment fueling shall be equipped with an automatic shut-off to control drips. Fueling operations shall not be left unattended.
 - Protect fueling areas with berms and/or dikes to prevent run-on, runoff, and to contain spills.

- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD). Ensure the nozzle is secured upright when not in use.
- Fuel tanks shall not be "topped-off."
- Vehicles and equipment shall be inspected on each day of use for leaks. Leaks shall be repaired immediately or problem vehicles or equipment shall be removed from the project site.
- Absorbent spill clean-up materials shall be available in fueling and maintenance areas and used on small spills instead of hosing down or burying techniques. The spent absorbent material shall be removed promptly and disposed of properly.
- Federal, state, and local requirements shall be observed for any stationary above ground storage tanks. Refer to WM-1, "Material Delivery and Storage."
- Mobile fueling of construction equipment throughout the site shall be minimized. Whenever practical, equipment shall be transported to the designated fueling area.

Maintenance and Inspection

- Fueling areas and storage tanks shall be inspected regularly.
- Keep an ample supply of spill cleanup material on the site.
- Immediately cleanup spills and properly dispose of contaminated soil and cleanup materials.



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

Procedures and practices to minimize or eliminate the discharge of pollutants to the storm drain systems or to watercourses from vehicle and equipment maintenance procedures.

Appropriate Applications

These procedures are applied on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

- None identified.

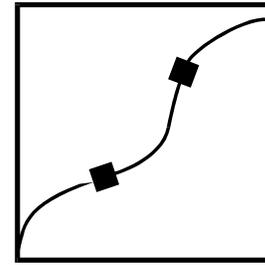
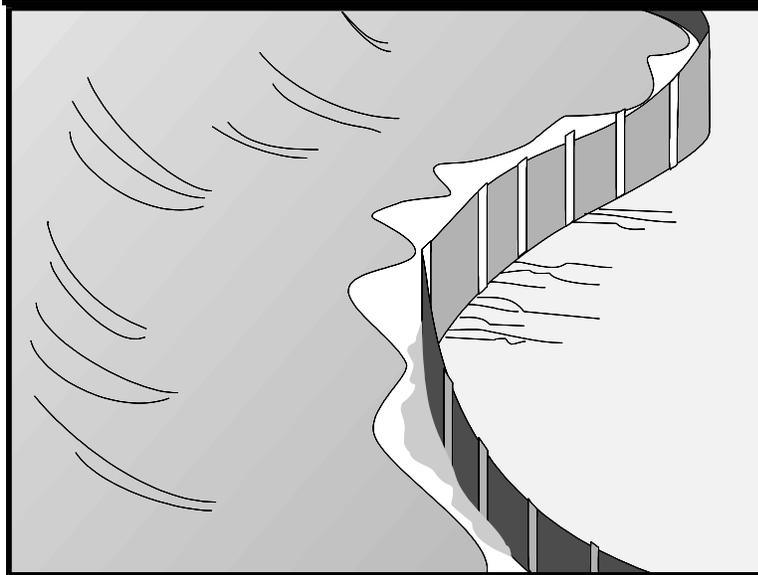
Standards and Specifications

- Drip pans or absorbent pads shall be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- All maintenance areas are required to have spill kits and/or use other spill protection devices.
- Dedicated maintenance areas shall be protected from storm water run-on and runoff, and shall be located at least 15 m (50 ft) from downstream drainage facilities and watercourses.
- Drip Pans or plastic sheeting shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.
- Absorbent spill clean-up materials shall be available in maintenance areas and shall be disposed of properly after use. Substances used to coat asphalt transport trucks and asphalt-spreading equipment shall be non-toxic.
- Use off-site maintenance facilities whenever practical.

- For long-term projects, consider constructing roofs or using portable tents over maintenance areas.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not dump fuels and lubricants onto the ground.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose or recycle used batteries.
- Do not bury used tires.
- Repair of fluid and oil leaks immediately.
- Provide spill containment dikes or secondary containment around stored oil and chemical drums.

Maintenance and Inspection

- Maintain waste fluid containers in leak proof condition.
- Vehicle and equipment maintenance areas shall be inspected regularly.
- Vehicles and equipment shall be inspected on each day of use. Leaks shall be repaired immediately or the problem vehicle(s) or equipment shall be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose A silt fence is a temporary linear sediment barrier of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff. Silt fences allow sediment to settle from runoff before water leaves the construction site.

Appropriate Applications Silt fences are placed:

- Below the toe of exposed and erodible slopes.
- Down-slope of exposed soil areas.
- Around temporary stockpiles.
- Along streams and channels.
- Along the perimeter of a project.

Limitations

- Not effective unless trenched and keyed in.
- Not intended for use as mid-slope protection on slopes greater than 1:4 (V:H).
- Must be maintained.
- Must be removed and disposed of.
- Don't use below slopes subject to creep, slumping, or landslides.
- Don't use in streams, channels, drain inlets, or anywhere flow is concentrated.
- Don't use silt fences to divert flow.

Standards and Specifications **Design and Layout**

- The maximum length of slope draining to any point along the silt fence shall be 61 m (200 ft) or less.
- Slope of area draining to silt fence shall be less than 1:1 (V:H).
- Limit to locations suitable for temporary ponding or deposition of sediment.
- Fabric life span generally limited to between five and eight months. Longer periods may require fabric replacement.
- Silt fences shall not be used in concentrated flow areas.
- Lay out in accordance with Pages 5 and 6 of this BMP.
- For slopes steeper than 1:2 (V:H) and that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to install additional protection immediately adjacent to the bottom of the slope, prior to installing silt fence. Additional protection may be a chain link fence or a cable fence.
- For slopes adjacent to water bodies or Environmentally Sensitive Areas (ESAs), additional temporary soil stabilization BMPs shall be used.

Materials

- Silt fence fabric shall be woven polypropylene with a minimum width of 900 mm (36 inches) and a minimum tensile strength of 0.45-kN. The fabric shall conform to the requirements in ASTM designation D4632 and shall have an integral reinforcement layer. The reinforcement layer shall be a polypropylene, or equivalent, net provided by the manufacturer. The permittivity of the fabric shall be between 0.1 sec^{-1} and 0.15 sec^{-1} in conformance with the requirements in ASTM designation D4491. Contractor must submit certificate of compliance in accordance with Standard Specifications Section 6-1.07.
- Wood stakes shall be commercial quality lumber of the size and shape shown on the plans. Each stake shall be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.
- Bar reinforcement may be used, and its size shall be equal to a number four (4) or greater. End protection shall be provided for any exposed bar reinforcement.
- Staples used to fasten the fence fabric to the stakes shall be not less than 45 mm (1.75 inches) long and shall be fabricated from 1.57 mm (0.06 inch) or heavier wire. The wire used to fasten the tops of the stakes together when

joining two sections of fence shall be 3.05 mm (0.12 inch) or heavier wire. Galvanizing of the fastening wire is not required.

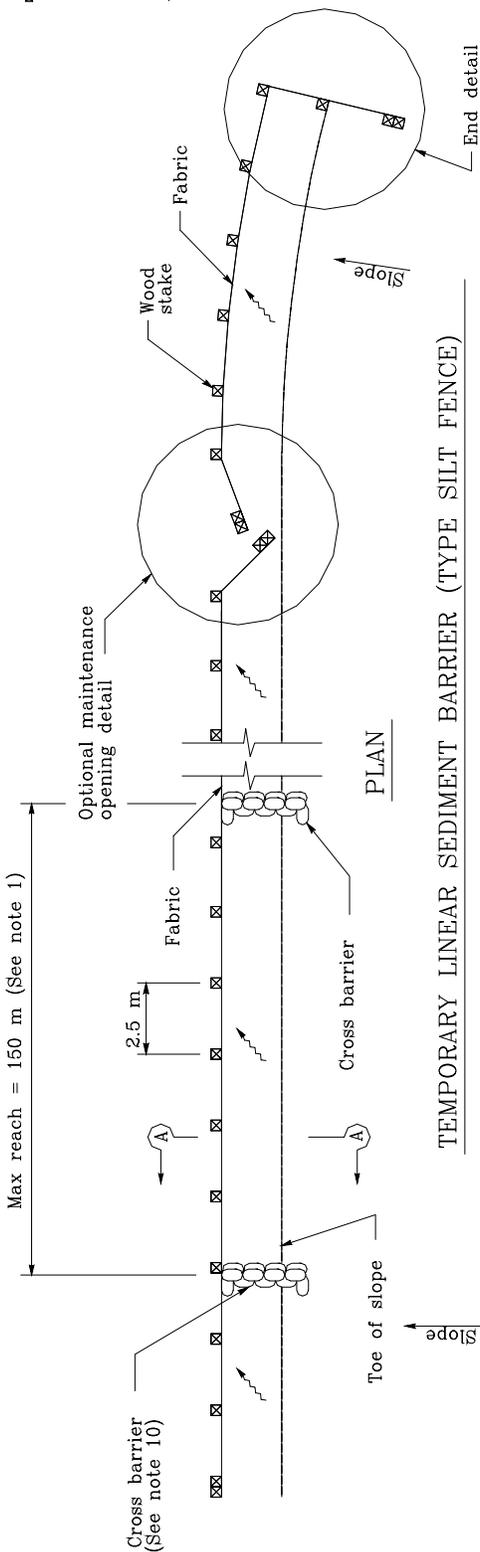
Installation

- Generally, silt fences shall be used in conjunction with soil stabilization source controls up slope to provide effective erosion and sediment control.
- Bottom of the silt fence shall be keyed-in a minimum of 150 mm (12 inches).
- Trenches shall not be excavated wider and deeper than necessary for proper installation of the temporary linear sediment barriers.
- Excavation of the trenches shall be performed immediately before installation of the temporary linear sediment barriers.
- Construct silt fences with a set-back of at least 1m (3 ft) from the toe of a slope. Where a silt fence is determined to be not practical due to specific site conditions, the silt fence may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practical.
- Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier; in no case shall the reach exceed 150 meters (490 ft).
- Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
- Install in accordance with Pages 5 and 6 of this BMP.

Maintenance and Inspection

- Repair undercut silt fences.
- Repair or replace split, torn, slumping, or weathered fabric.
- Inspect silt fence when rain is forecast. Perform necessary maintenance, or maintenance required by the Resident Engineer (RE).
- Inspect silt fence following rainfall events. Perform maintenance as necessary, or as required by the RE.
- Maintain silt fences to provide an adequate sediment holding capacity. Sediment shall be removed when the sediment accumulation reaches one-third (1/3) of the barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the right-of-way in conformance with the Standard Specifications.
- Silt fences that are damaged and become unsuitable for the intended purpose, as determined by the RE, shall be removed from the site of work, disposed of outside the highway right-of-way in conformance with the Standard Specifications, and replaced with new silt fence barriers.

- Holes, depressions or other ground disturbance caused by the removal of the temporary silt fences shall be backfilled and repaired in conformance with the Standard Specifications.
- Remove silt fence when no longer needed or as required by the RE. Fill and compact post holes and anchorage trench, remove sediment accumulation, and grade fence alignment to blend with adjacent ground.

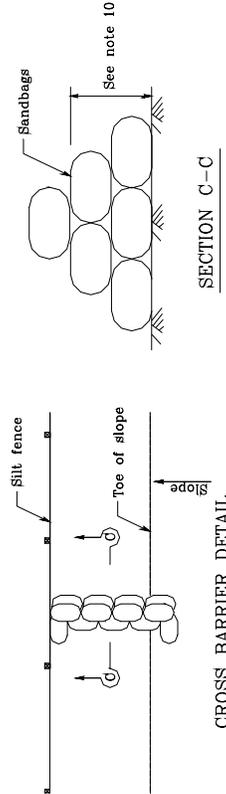
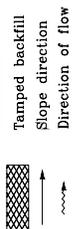


TEMPORARY LINEAR SEDIMENT BARRIER (TYPE SILT FENCE)

NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the linear barrier, in no case shall the reach length exceed 150m.
2. The last 2.5 m of fence shall be turned up slope.
3. Stake dimensions are nominal.
4. Dimension may vary to fit field condition.
5. Stakes shall be spaced at 2.5 m maximum and shall be positioned on downstream side of fence.
6. Stakes to overlap and fence fabric to fold around each stake one full turn. Secure fabric to stake with 4 staples.
7. Stakes shall be driven tightly together to prevent potential flow-through of sediment at joint. The tops of the stakes shall be secured with wire.
8. For end stake, fence fabric shall be folded around two stakes one full turn and secured with 4 staples.
9. Minimum 4 staples per stake. Dimensions shown are typical.
10. Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
11. Maintenance openings shall be constructed in a manner to ensure sediment remains behind silt fence.
12. Joining sections shall not be placed at sump locations.
13. Sandbag rows and layers shall be offset to eliminate gaps.

LEGEND

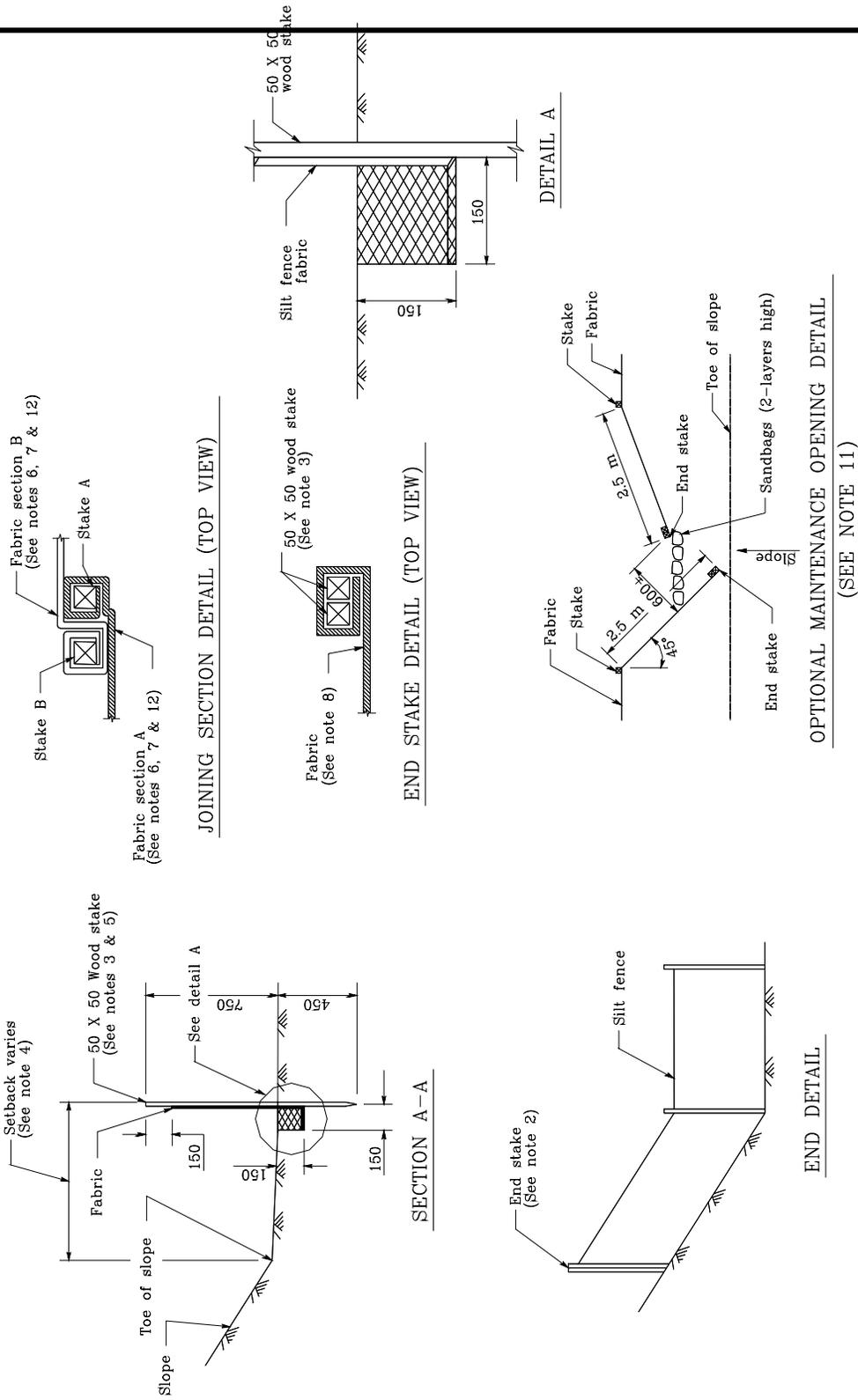


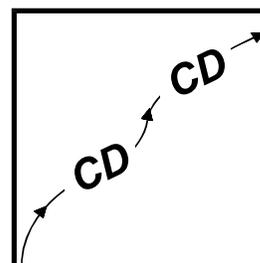
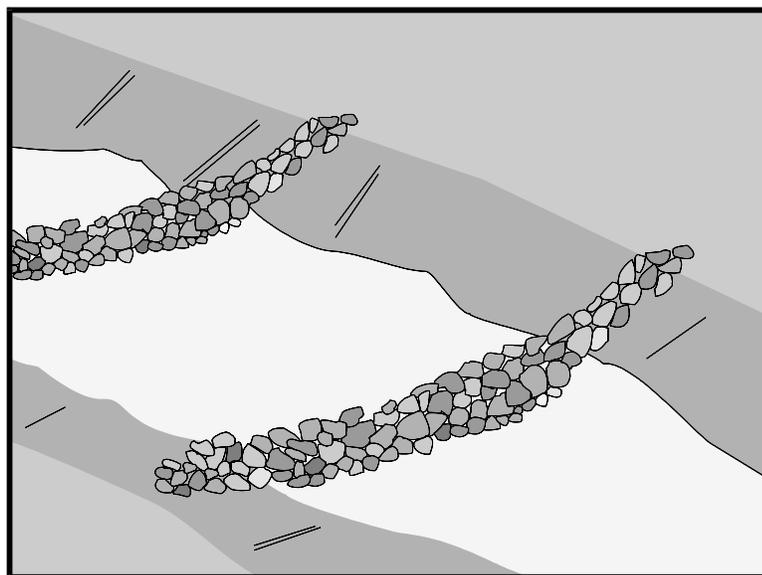
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY LINEAR SEDIMENT BARRIER (TYPE SILT FENCE)

NO SCALE

ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN





Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose Check dams reduce scour and channel erosion by reducing flow velocity and encouraging sediment settlement. A check dam is a small device constructed of rock, gravel bags, sandbags, fiber rolls, or other proprietary product placed across a natural or man-made channel or drainage ditch.

- Appropriate Applications**
- Check dams may be installed:
 - In small open channels that drain 4 ha (10 ac) or less.
 - In steep channels where storm water runoff velocities exceed 1.5 m/s (4.9 ft/sec).
 - During the establishment of grass linings in drainage ditches or channels.
 - In temporary ditches where the short length of service does not warrant establishment of erosion-resistant linings.
 - This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).

- Limitations**
- Not to be used in live streams.
 - Not appropriate in channels that drain areas greater than 4 ha (10 ac).
 - Not to be placed in channels that are already grass lined unless erosion is expected, as installation may damage vegetation.
 - Require extensive maintenance following high velocity flows.
 - Promotes sediment trapping, which can be re-suspended during subsequent storms or removal of the check dam.

Standards and Specifications

- Not to be constructed from straw bales or silt fence.
- Check dams shall be placed at a distance and height to allow small pools to form behind them. Install the first check dam approximately 5 meters (16 ft) from the outfall device and at regular intervals based on slope gradient and soil type.
- For multiple check dam installation, backwater from downstream check dam shall reach the toe of the upstream dam.
- High flows (typically a 2-year storm or larger) shall safely flow over the check dam without an increase in upstream flooding or damage to the check dam.
- Where grass is used to line ditches, check dams shall be removed when grass has matured sufficiently to protect the ditch or swale.
- Rock shall be placed individually by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage.
- Fiber rolls may be used as check dams if approved by the RE or the Construction NPDES Coordinator. Refer to SC-5 “Fiber Rolls.”
- Gravel bags may be used as check dams with the following specifications:

Materials

- **Bag Material:** Bags shall be either polypropylene, polyethylene or polyamide woven fabric, minimum unit weight 135 g/m² (four ounces per square yard), mullen burst strength exceeding 2,070 kPa (300 psi) in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.
- **Bag Size:** Each gravel-filled bag shall have a length of 450 mm (18 in), width of 300 mm (12 in), thickness of 75 mm (3 in), and mass of approximately 15 kg (33 lb). Bag dimensions are nominal, and may vary based on locally available materials. Alternative bag sizes shall be submitted to the RE for approval prior to deployment.
- **Fill Material:** Fill material shall be between 10 mm and 20 mm (0.4 and 0.8 inch) in diameter, and shall be clean and free from clay balls, organic matter, and other deleterious materials. The opening of gravel-filled bags shall be secured such that gravel does not escape. Gravel-filled bags shall be between 13 kg and 22 kg (28 and 48 lb) in mass. Fill material is subject to approval by the RE.

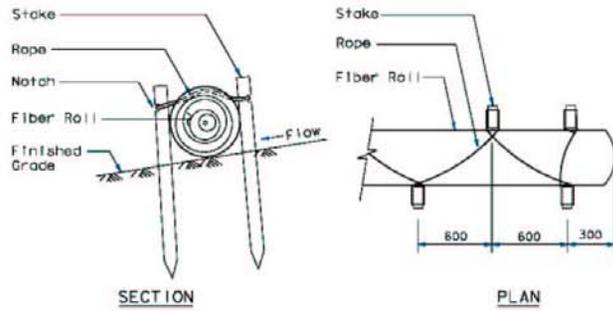
Installation

- Install along a level contour.
- Tightly abut bags and stack gravel bags using a pyramid approach.

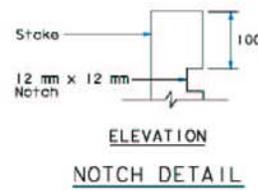
Gravel bags shall not be stacked any higher than 1 meter (3.2 ft).

- Upper rows of gravel bags shall overlap joints in lower rows.
- **Maintenance and Inspection** Inspect check dams after each significant rainfall event. Repair damage as needed or as required by the RE.
- Remove sediment when depth reaches one-third of the check dam height.
- Remove accumulated sediment prior to permanent seeding or soil stabilization.
- Remove check dam and accumulated sediment when check dams are no longer needed or when required by the RE.
- Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.

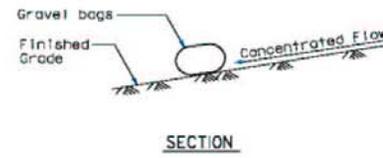
Check Dams



STAKING AND LASHING DETAIL



NOTCH DETAIL

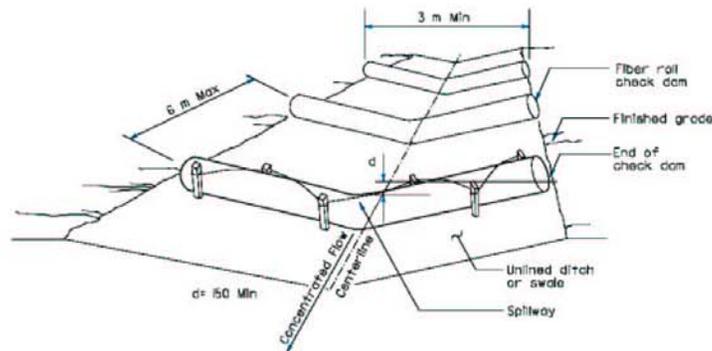


SECTION

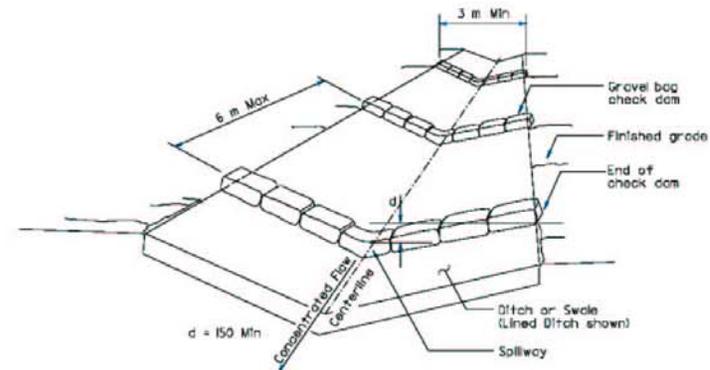
NOTE

1. Spillway depth 'd' shall be maintained to prevent flanking of concentrated flow around the ends of check dam.

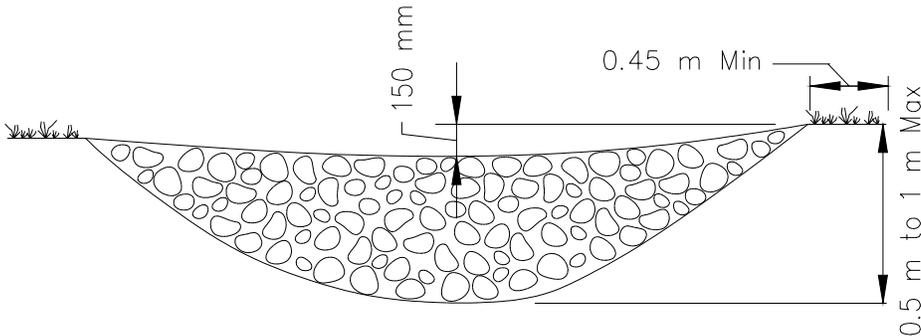
TEMPORARY CHECK DAM (TYPE 2)



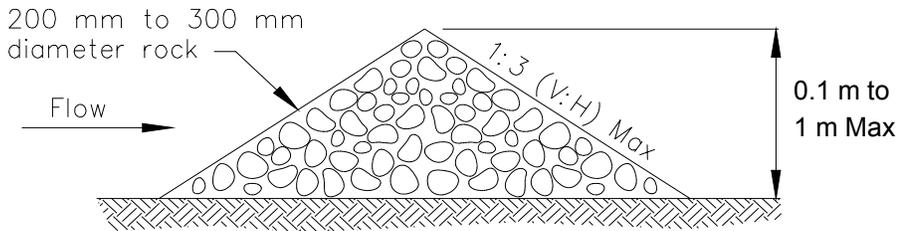
PERSPECTIVE
TEMPORARY CHECK DAM (TYPE 1)



PERSPECTIVE
TEMPORARY CHECK DAM (TYPE 2)



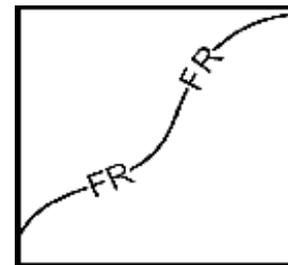
ELEVATION



TYPICAL ROCK CHECK DAM SECTION

ROCK CHECK DAM
NOT TO SCALE

|



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose A fiber roll consists of wood excelsior, rice or wheat straw, or coconut fibers that is rolled or bound into a tight tubular roll and placed on the toe and face of slopes to intercept runoff, reduce its flow velocity, release the runoff as sheet flow and provide removal of sediment from the runoff. Fiber rolls may also be used for inlet protection and as check dams under certain situations.

- Appropriate Applications**
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the RE.
 - Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
 - Below the toe of exposed and erodible slopes.
 - Fiber rolls may be used as check dams in unlined ditches if approved by the Resident Engineer (RE) or the District Construction Storm Water Coordinator (refer to SC-4 “Check Dams”).
 - Fiber rolls may be used for drain inlet protection if approved by the RE or the District Construction Storm Water Coordinator (refer to SC-10 “Storm Drain Inlet Protection”).
 - Down-slope of exposed soil areas.
 - Around temporary stockpiles.
 - Along the perimeter of a project.

- Limitations**
- Runoff and erosion may occur if fiber roll is not adequately trenched in.
 - Fiber rolls at the toe of slopes greater than 1:5 may require the use of 500 mm (20" diameter) or installations achieving the same protection (i.e., stacked smaller diameter fiber rolls, etc.).
 - Fiber rolls may be used for drainage inlet protection if they can be properly anchored.
 - Difficult to move once saturated.
 - Fiber rolls could be transported by high flows if not properly staked and trenched in.
 - Fiber rolls have limited sediment capture zone.
 - Do not use fiber rolls on slopes subject to creep, slumping, or landslide.

Standards and Specifications

Fiber Roll Materials

- Fiber rolls shall be either:
 - (1) Prefabricated rolls.
 - (2) Rolled tubes of erosion control blanket.

Assembly of Field Rolled Fiber Roll

- Roll length of erosion control blanket into a tube of minimum 200 mm (8 in) diameter.
- Bind roll at each end and every 1.2 m (4 ft) along length of roll with jute-type twine.

Installation

- Slope inclination of 1:4 or flatter: fiber rolls shall be placed on slopes 6.0 m apart.
- Slope inclination of 1:4 to 1:2: fiber rolls shall be placed on slopes 4.5 m apart.
- Slope inclination 1:2 or greater: fiber rolls shall be placed on slopes 3.0 m apart.
- Stake fiber rolls into a 50 to 100 mm (2 to 4 in) trench.

- Drive stakes at the end of each fiber roll and spaced 600 mm (2 ft) apart if Type 2 installation is used (refer to Page 4). Otherwise, space stakes 1.2 m (4 ft) maximum on center if installed as shown on Pages 5 and 6.
- Use wood stakes with a nominal classification of 19 by 19 mm (3/4 by 3/4 in), and minimum length of 600 mm (24 in).
- If more than one fiber roll is placed in a row, the rolls shall be overlapped; not abutted.

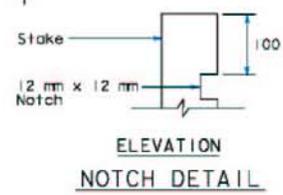
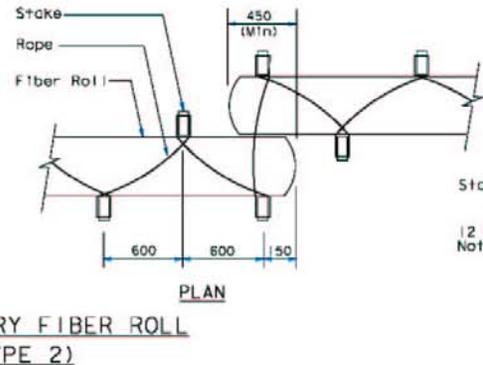
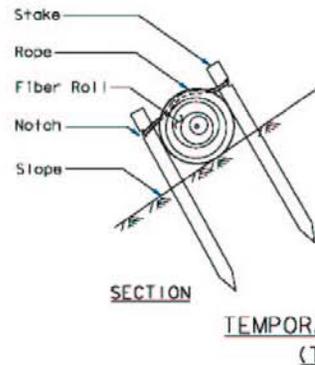
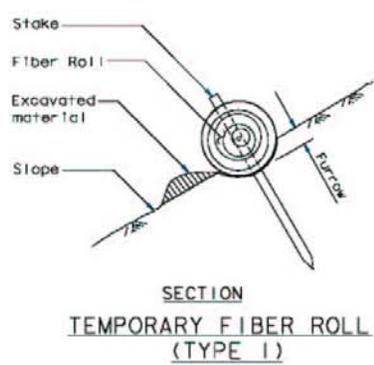
Removal

- Fiber rolls are typically left in place.
- If fiber rolls are removed, collect and dispose of sediment accumulation, and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

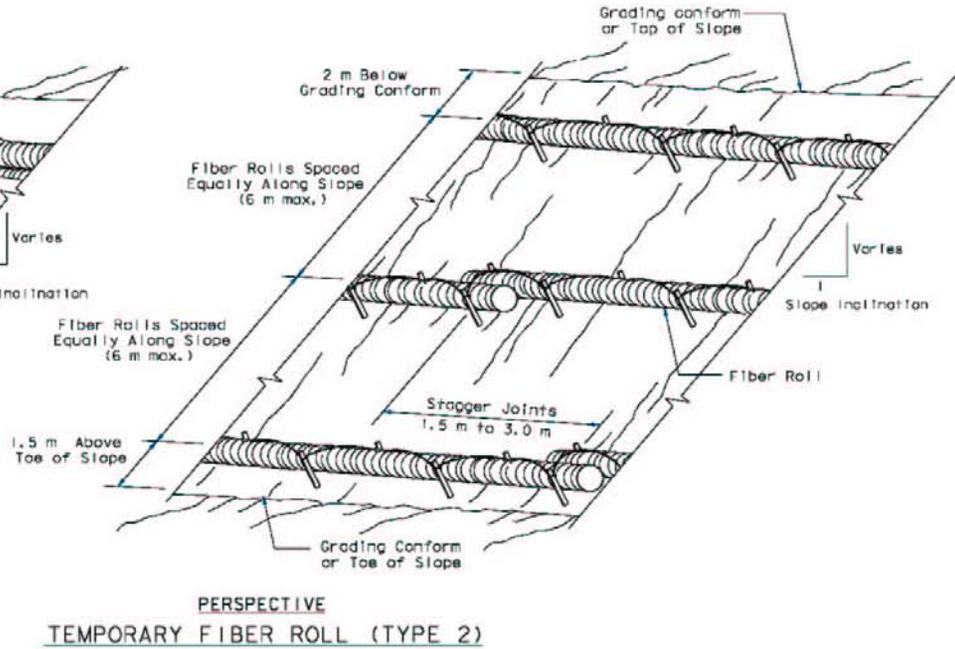
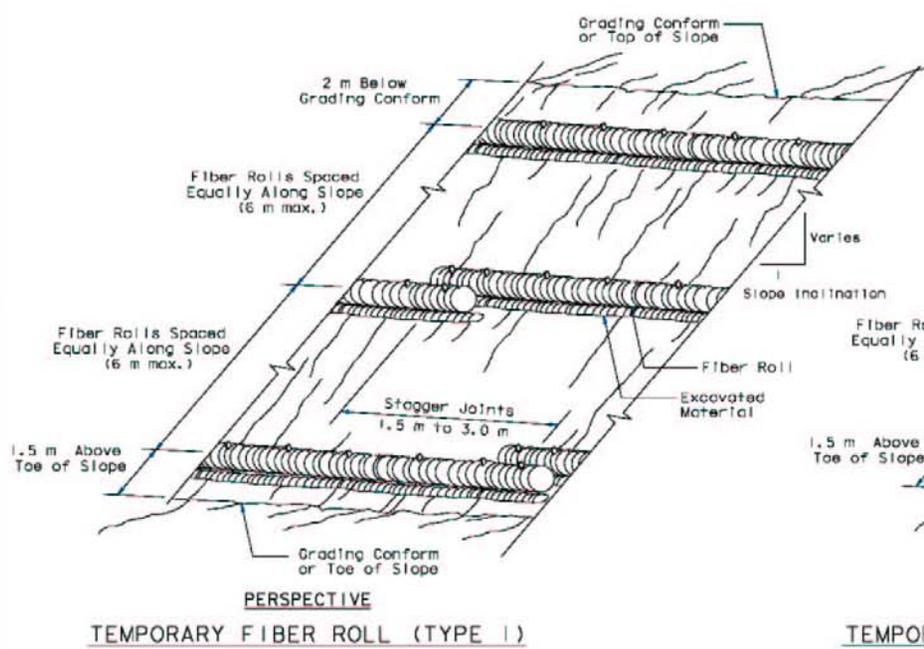
Maintenance and Inspection

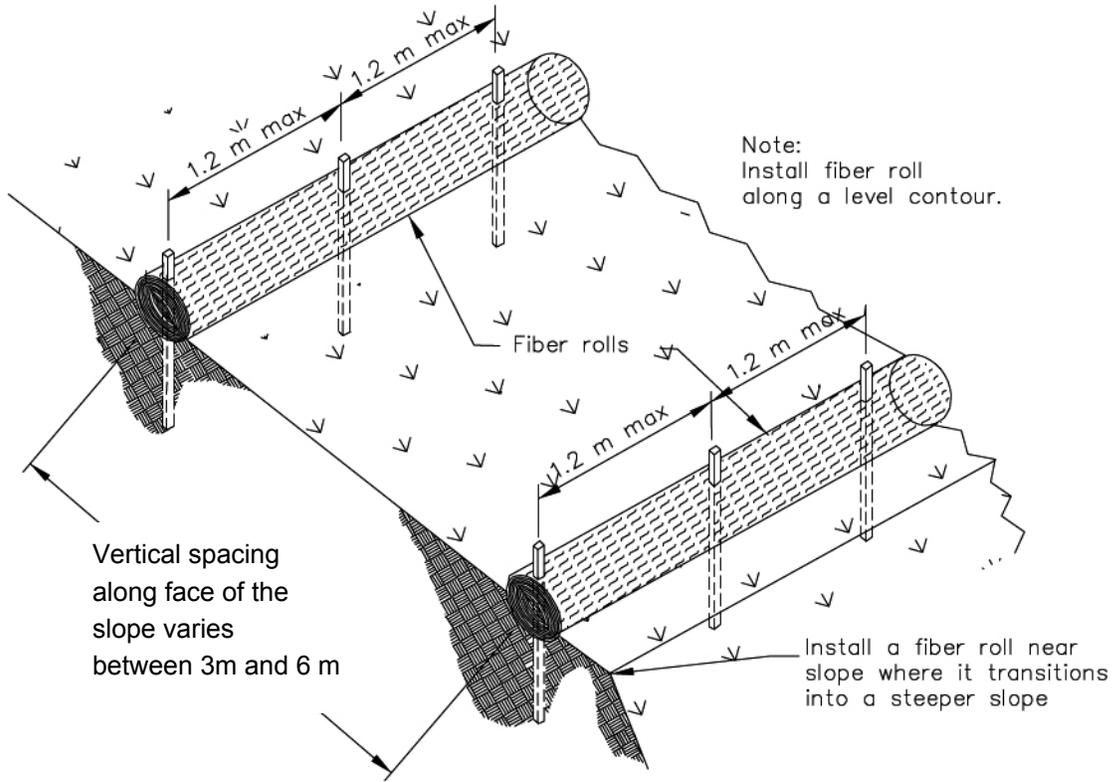
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- Inspect fiber rolls when rain is forecast. Perform maintenance as needed or as required by the RE.
- Inspect fiber rolls following rainfall events and at least daily during prolonged rainfall. Perform maintenance as needed or as required by the RE.
- Maintain fiber rolls to provide an adequate sediment holding capacity. Sediment shall be removed when the sediment accumulation reaches three quarters (3/4) of the barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.

Fiber Rolls

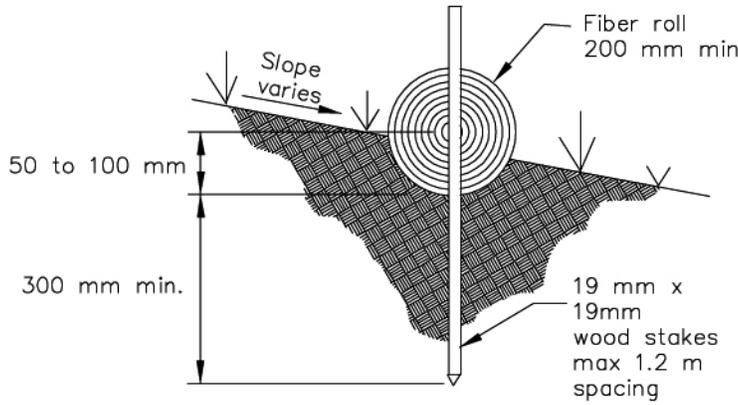


NOTE
1. Temporary fiber roll spacing varies depending upon slope inclination.

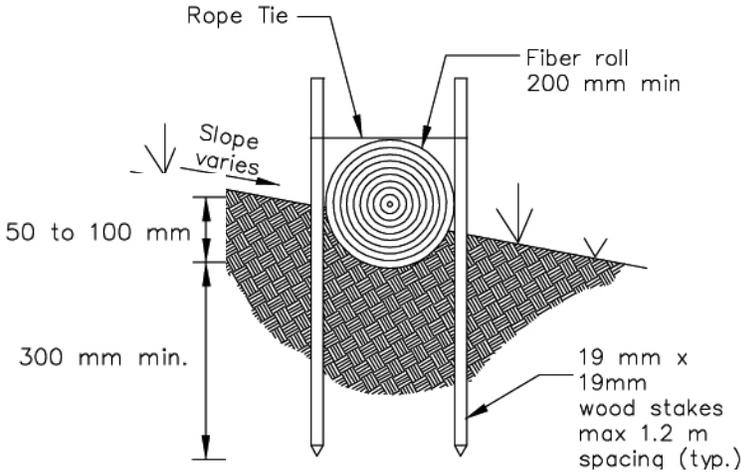
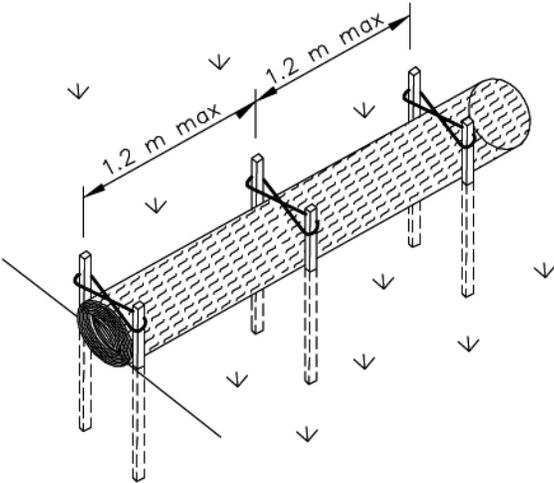




TYPICAL FIBER ROLL INSTALLATION
N.T.S.

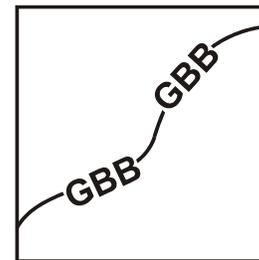
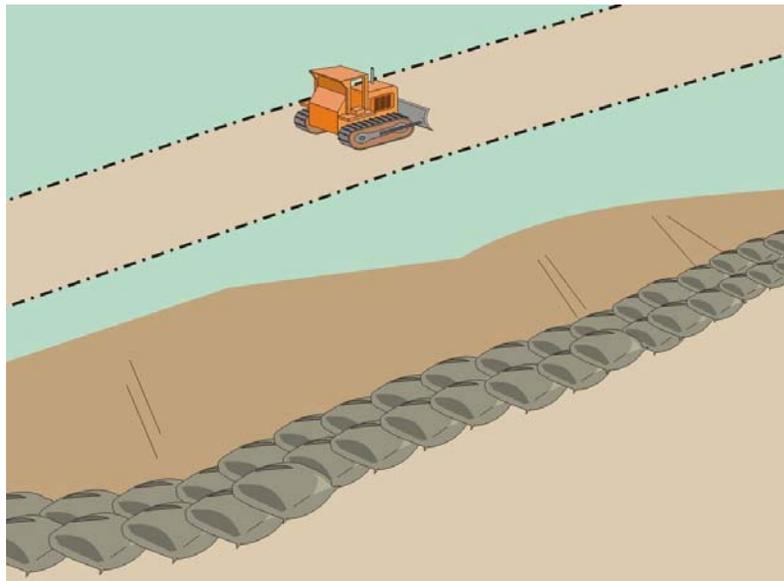


ENTRENCHMENT DETAIL
N.T.S.



OPTIONAL ENTRENCHMENT DETAIL

N.T.S.



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose A gravel bag berm consists of a single row of gravel bags that are installed end to end to form a barrier across a slope to intercept runoff, reduce its flow velocity, release the runoff as sheet flow and provide some sediment removal. Gravel bags can be used where flows are moderately concentrated, such as ditches, swales, and storm drain inlets (see BMP SC-10, Storm Drain Inlet Protection) to divert and/or detain flows.

- Appropriate Applications**
- BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the RE.
 - Along streams and channels.
 - Below the toe of exposed and erodible slopes.
 - Down slope of exposed soil areas.
 - Around stockpiles.
 - Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment, to reduce stream impacts.
 - Parallel to a roadway to keep sediment off paved areas.
 - At the top of slopes to divert roadway runoff away from disturbed slopes.
 - Along the perimeter of a site.
 - To divert or direct flow or create a temporary sediment basin.
 - During construction activities in stream beds when the contributing drainage

area is less than 2 ha (5 ac).

- When extended construction period limits the use of either silt fences or straw bale barriers.
- When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.
- At grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

Limitations

- Degraded gravel bags may rupture when removed, spilling contents.
- Installation can be labor intensive.
- Limited durability for long term projects.
- When used to detain concentrated flows, maintenance requirements increase.

Standards and Specifications

Materials

- **Bag Material:** Bags shall be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight 135 g/m² (four ounces per square yard), mullen burst strength exceeding 2,070 kPa (300 psi) in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.
- **Bag Size:** Each gravel-filled bag shall have a length of 450 mm (18 in), width of 300 mm (12 in), thickness of 75 mm (3 in), and mass of approximately 15 kg (33 lb). Bag dimensions are nominal, and may vary based on locally available materials. Alternative bag sizes shall be submitted to the RE for approval prior to deployment.
- **Fill Material:** Gravel shall be between 10 mm and 20 mm (0.4 and 0.8 inch) in diameter, and shall be clean and free from clay balls, organic matter, and other deleterious materials. The opening of gravel-filled bags shall be between 13 kg and 22 kg (28 and 48 lb) in mass. Fill material is subject to approval by the RE.

Installation

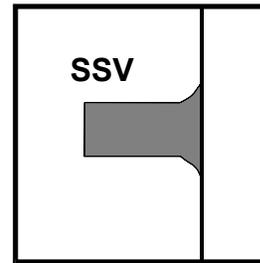
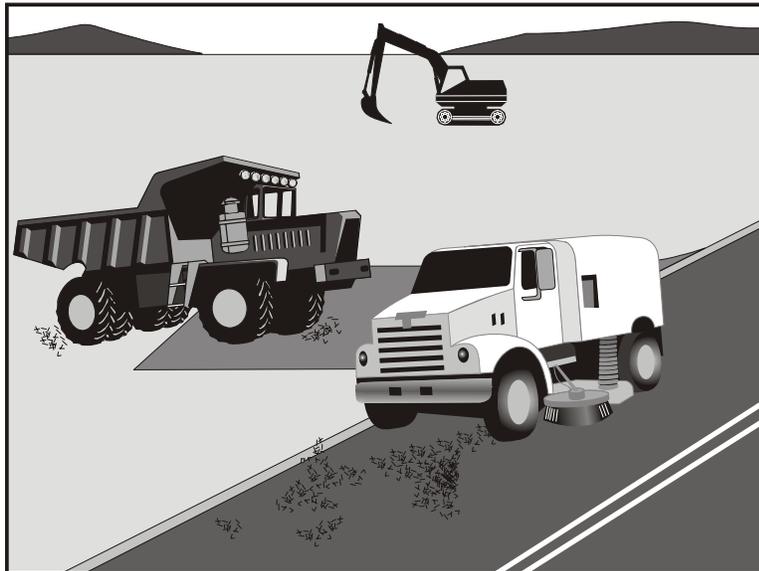
- When used as a linear control for sediment removal:
 - Install along a level contour.
 - Turn ends of gravel bag row up slope to prevent flow around the ends.
 - Generally, gravel bag barriers shall be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment

control.

- When used for concentrated flows:
 - Stack gravel bags to required height using a pyramid approach.
 - Upper rows of gravel bags shall overlap joints in lower rows.
- Construct gravel bag barriers with a set-back of at least 1m from the toe of a slope. Where it is determined to be not practicable due to specific site conditions, the gravel bag barrier may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practicable.
- Requires Certificate of Compliance per Standard Specifications 6-1.07.

Maintenance and Inspection

- Inspect gravel bag berms before and after each rainfall event, and weekly throughout the rainy season.
- Reshape or replace gravel bags as needed, or as directed by the RE.
- Repair washouts or other damages as needed, or as directed by the RE.
- Inspect gravel bag berms for sediment accumulations and remove sediments when accumulation reaches one-third of the berm height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.
- Remove gravel bag berms when no longer needed. Remove sediment accumulations and clean, re-grade, and stabilize the area.



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

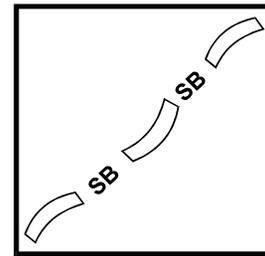
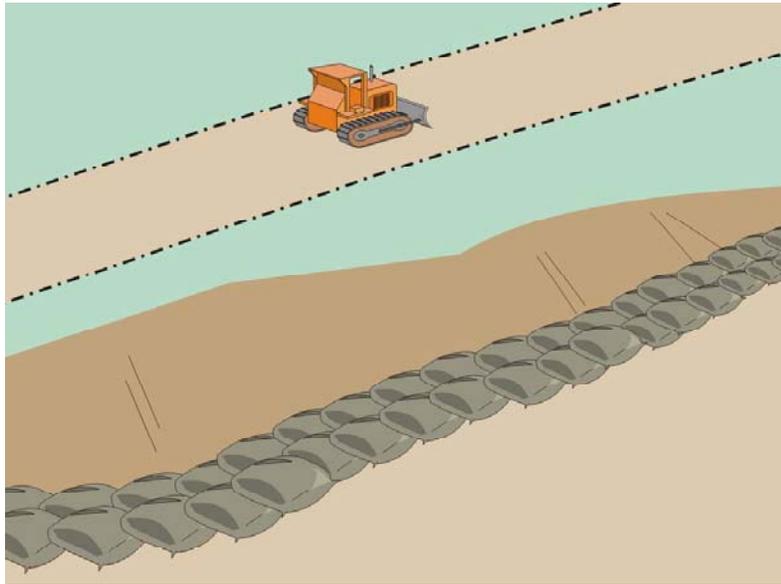
Definition and Purpose Practices to remove tracked sediment to prevent the sediment from entering a storm drain or watercourse.

Appropriate Applications These practices are implemented anywhere sediment is tracked from the project site onto public or private paved roads, typically at points of ingress/egress.

Limitations Sweeping and vacuuming may not be effective when soil is wet or muddy.

- Standards and Specifications**
- Kick brooms or sweeper attachments shall not be used.
 - Inspect potential sediment tracking locations daily.
 - Visible sediment tracking shall be swept and/or vacuumed daily.
 - If not mixed with debris or trash, consider incorporating the removed sediment back into the project.

- Maintenance and Inspection**
- Inspect ingress/egress access points daily and sweep tracked sediment as needed, or as required by the Resident Engineer (RE).
 - Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
 - Adjust brooms frequently; maximize efficiency of sweeping operations.
 - After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite in conformance with the provisions in Standard Specifications Section 7-1.13 .



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose A sandbag barrier is a temporary linear sediment barrier consisting of stacked sandbags, designed to intercept and slow the flow of sediment-laden sheet flow runoff. Sandbag barriers allow sediment to settle from runoff before water leaves the construction site.

- Appropriate Applications**
- This BMP may be implemented on a project-by-project basis in addition to other BMPs when determined necessary and feasible by the Resident Engineer (RE).
 - Along the perimeter of a site.
 - Along streams and channels.
 - Below the toe of exposed and erodible slopes.
 - Down slope of exposed soil areas.
 - Around stockpiles.
 - Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment, to reduce stream impacts.
 - Parallel to a roadway to keep sediment off paved areas.
 - At the top of slopes to divert roadway runoff away from disturbed slopes.
 - To divert or direct flow or create a temporary sediment/desilting basin.
 - During construction activities in stream beds when the contributing drainage area is less than 2 ha (5 ac).

- Appropriate Applications
- This BMP may be implemented on a project-by-project basis in addition to other BMPs when determined necessary and feasible by the Resident Engineer (RE).
 - Along the perimeter of a site.
 - Along streams and channels.
 - Below the toe of exposed and erodible slopes.
 - Down slope of exposed soil areas.
 - Around stockpiles.
 - Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment, to reduce stream impacts.
 - Parallel to a roadway to keep sediment off paved areas.
 - At the top of slopes to divert roadway runoff away from disturbed slopes.
 - To divert or direct flow or create a temporary sediment/desilting basin.
 - During construction activities in stream beds when the contributing drainage area is less than 2 ha (5 ac).
 - When extended construction period limits the use of either silt fences or straw bale barriers.
 - Along the perimeter of vehicle and equipment fueling and maintenance areas or chemical storage areas.
 - To capture and detain non-storm water flows until proper cleaning operations occur.
 - When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.
 - To temporarily close or continue broken, damaged or incomplete curbs.
- Limitations
- Limit the drainage area upstream of the barrier to 2 ha (5 ac).
 - Degraded sandbags may rupture when removed, spilling sand.
 - Installation can be labor intensive.
 - Limited durability for long-term projects.

Standards and Specifications

- When used to detain concentrated flows, maintenance requirements increase.

Materials

- **Sandbag Material:** Sandbag shall be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight 135 g/m² (four ounces per square yard), mullen burst strength exceeding 2,070 kPa (300 psi) in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355. Use of burlap is not acceptable.
- **Sandbag Size:** Each sand-filled bag shall have a length of 450 mm (18 in), width of 300 mm (12 in), thickness of 75 mm (3 in), and mass of approximately 15 kg (33 lb.). Bag dimensions are nominal, and may vary based on locally available materials. Alternative bag sizes shall be submitted to the RE for approval prior to deployment.
- **Fill Material:** All sandbag fill material shall be non-cohesive, Class 1 or Class 2 permeable material free from clay and deleterious material, conforming to the provisions in Standard Specifications Section 68-1.025 "Permeable Material". The requirements for the Durability Index and Sand Equivalent do not apply. Fill material is subject to approval by the RE.

Installation

- When used as a linear sediment control:
 - Install along a level contour.
 - Turn ends of sandbag row up slope to prevent flow around the ends.
 - Generally, sandbag barriers shall be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.
 - Install as shown in Pages 4 and 5 of this BMP.
- Construct sandbag barriers with a set-back of at least 1m (3 ft) from the toe of a slope. Where it is determined to be not practical due to specific site conditions, the sandbag barrier may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practicable.

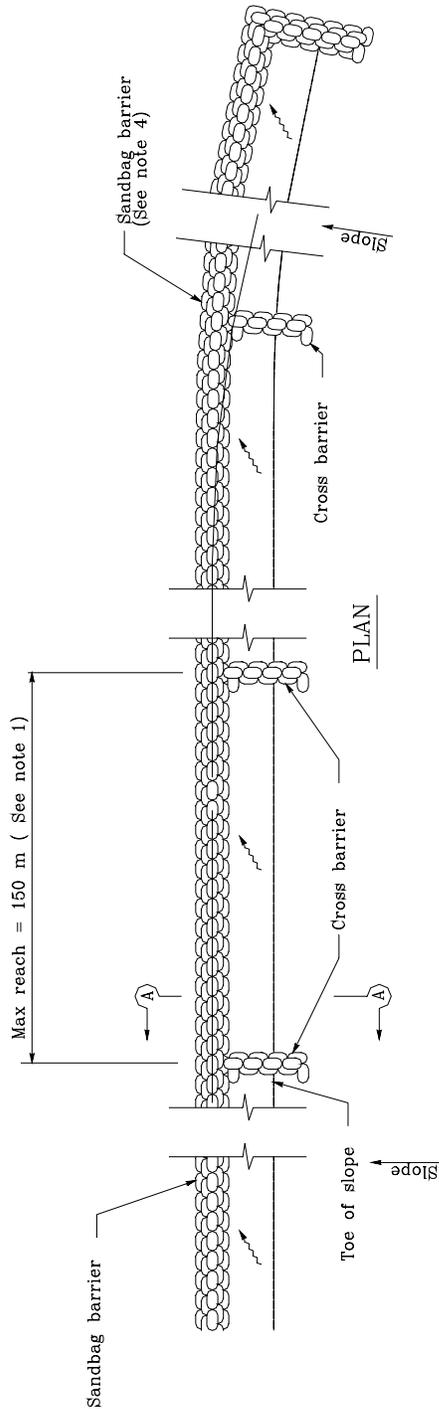
Maintenance and Inspection

- Inspect sandbag barriers before and after each rainfall event, and weekly throughout the rainy season.

- Reshape or replace sandbags as needed, or as directed by the RE.
- Repair washouts or other damages as needed, or as directed by the RE.
- Inspect sandbag barriers for sediment accumulations and remove sediments when accumulation reaches one-third the barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.
- Remove sandbags when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilized the area.

Sandbag Barrier

SC-8



TEMPORARY LINEAR SEDIMENT BARRIER (TYPE SANDBAG)



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY LINEAR SEDIMENT BARRIER (TYPE SANDBAG)

NO SCALE

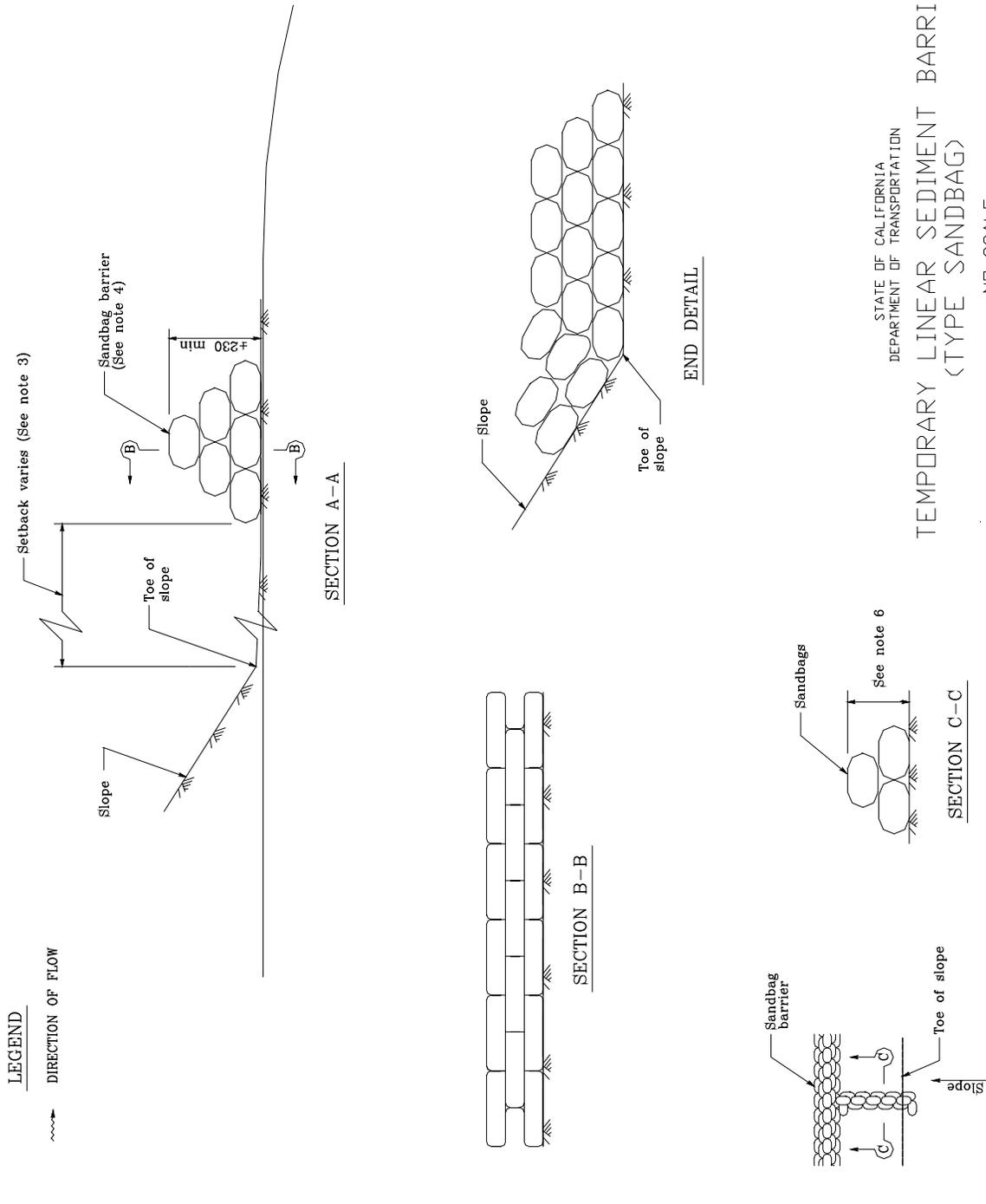
ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN

NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 150 m.
2. Place sandbags tightly.
3. Dimension may vary to fit field condition.
4. Sandbag barrier shall be a minimum of 3 bags high.
5. The end of the barrier shall be turned up slope.
6. Cross barriers shall be a min of 1/2 and a max of 2/3 the height of the linear barrier.
7. Sandbag rows and layers shall be staggered to eliminate gaps.

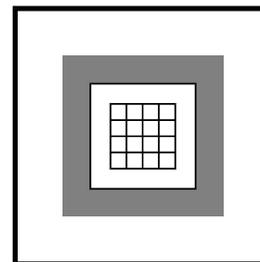
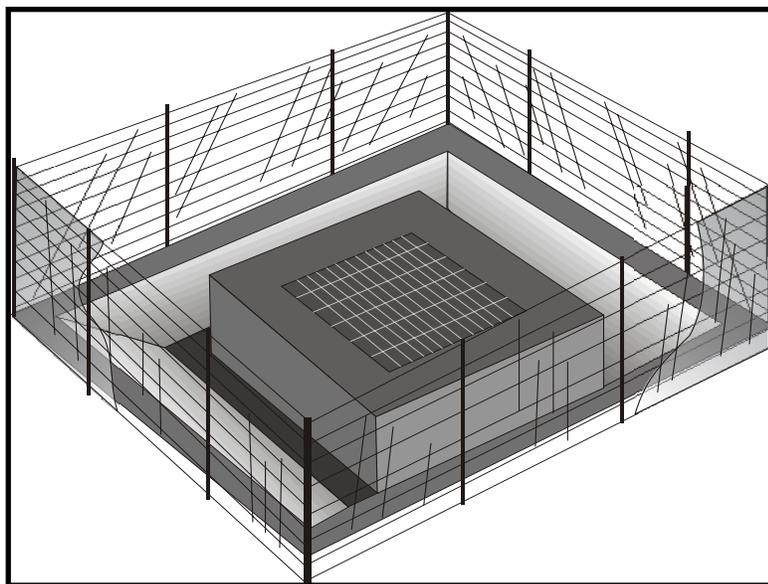
Sandbag Barrier

SC-8



STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
 TEMPORARY LINEAR SEDIMENT BARRIER
 (TYPE SANDBAG)

NO SCALE
 ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

Devices used at storm drain inlets that are subject to runoff from construction activities to detain and/or to filter sediment-laden runoff to allow sediment to settle and/or to filter sediment prior to discharge into storm drainage systems or watercourses.

Appropriate Applications

- Where ponding will not encroach into highway traffic.
- Where sediment laden surface runoff may enter an inlet.
- Where disturbed drainage areas have not yet been permanently stabilized.
- Where the drainage area is 0.4 ha (1 ac) or less.
- Appropriate during wet and snow-melt seasons.

Limitations

- Requires an adequate area for water to pond without encroaching upon traveled way and should not present itself to be an obstacle to oncoming traffic.
- May require other methods of temporary protection to prevent sediment-laden storm water and non-storm water discharges from entering the storm drain system.
- Sediment removal may be difficult in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use other on-site sediment trapping techniques (e.g. check dams) in conjunction with inlet protection.
- Frequent maintenance is required.
- For drainage areas larger than 0.4 ha (1 ac), runoff shall be routed to a sediment trapping device designed for larger flows. See BMPs SC-2, "Sediment/Desilting Basin," and SC-3 "Sediment Trap."

- Filter fabric fence inlet protection is appropriate in open areas that are subject to sheet flow and for flows not exceeding 0.014 m³/s (0.5 cfs).
- Gravel bag barriers for inlet protection are applicable when sheet flows or concentrated flows exceed 0.014 m³/s (0.5 cfs), and it is necessary to allow for overtopping to prevent flooding.
- Fiber rolls and foam barriers are not appropriate for locations where they cannot be properly anchored to the surface.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected and overflow capability is needed.

Standards and Specifications

Identify existing and/or planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed, and which method to use.

Methods and Installation

- **DI Protection Type 1 - Filter Fabric Fence** - The filter fabric fence (Type 1) protection is illustrated on Page 5. Similar to constructing a silt fence. See BMP SC-1, "Silt Fence." Do not place filter fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced.
- **DI Protection Type 2 - Excavated Drop Inlet Sediment Trap** - The excavated drop inlet sediment trap (Type 2) is illustrated in Page 6. Similar to constructing a temporary silt fence, See BMP SC-1, "Silt Fence." Size excavated trap to provide a minimum storage capacity calculated at the rate of 130 m³/ha (67 yd³/ac) of drainage area.
- **DI Protection Type 3 – Gravel bag** - The gravel bag barrier (Type 3) is illustrated in Page 7. Flow from a severe storm shall not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with BMP SC-6, "Gravel Bag Berm." Gravel bags shall be used due to their high permeability.
- **DI Protection Type 4 – Foam Barriers and Fiber Rolls** – Foam barrier or fiber roll (Type 4) is placed around the inlet and keyed and anchored to the surface. Foam barriers and fiber rolls are intended for use as inlet protection where the area around the inlet is unpaved and the foam barrier or fiber roll can be secured to the surface. RE or Construction Storm Water Coordinator approval is required.

Maintenance and Inspection

General

- Inspect all inlet protection devices before and after every rainfall event, and weekly during the rest of the rainy season. During extended rainfall events, inspect inlet protection devices at least once every 24 hours.

- Inspect the storm drain inlet after severe storms in the rainy season to check for bypassed material.
- Remove all inlet protection devices within thirty days after the site is stabilized, or when the inlet protection is no longer needed.
 - Bring the disturbed area to final grade and smooth and compact it. Appropriately stabilize all bare areas around the inlet.
 - Clean and re-grade area around the inlet and clean the inside of the storm drain inlet as it must be free of sediment and debris at the time of final inspection.

Requirements by Method

■ ***Type 1 - Filter Fabric Fence***

- This method shall be used for drain inlets requiring protection in areas where finished grade is established and erosion control seeding has been applied or is pending.
- Make sure the stakes are securely driven in the ground and are structurally sound (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes.
- Replace or clean the fabric when the fabric becomes clogged with sediment. Make sure the fabric does not have any holes or tears. Repair or replace fabric as needed or as directed by the RE.
- At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications Section 7-1.13.

■ ***Type 2 – Excavated Drop Inlet Sediment Trap***

- This method may be used for drain inlets requiring protection in areas that have been cleared and grubbed, and where exposed soil areas are subject to grading.
- Remove sediment from basin when the volume of the basin has been reduced by one-half.

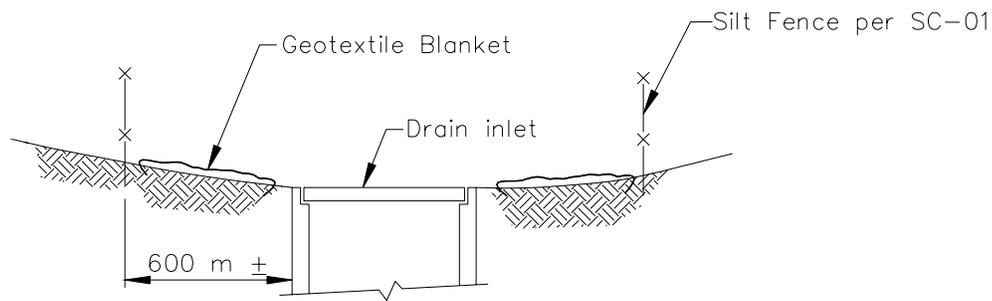
■ ***Type 3 - Gravel Bag Barrier***

- This method may be used for drain inlets surrounded by AC or paved surfaces.
- Inspect bags for holes, gashes, and snags.

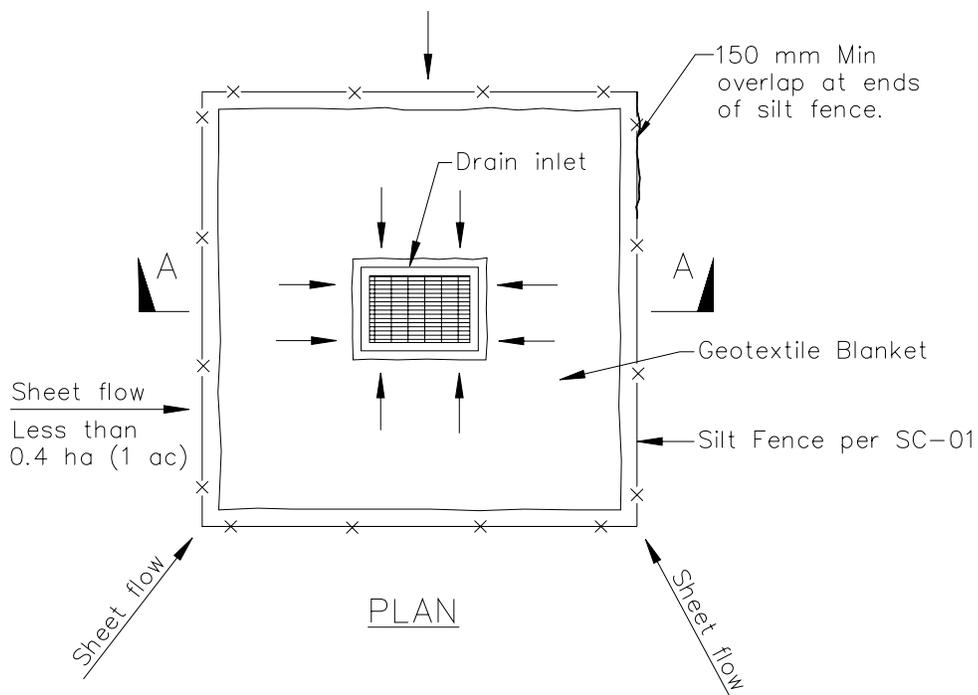
- Check gravel bags for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications Section 7-1.13.
- ***Type 4 Foam Barriers and Fiber Rolls***
 - This method may be used for drain inlets requiring protection in areas that have been cleared and grubbed, and where exposed soil areas subject to grading. RE or Construction Storm Coordinator approval is required.
 - Check foam barrier or fiber roll for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.

Storm Drain Inlet Protection

SC-10



SECTION A-A



PLAN

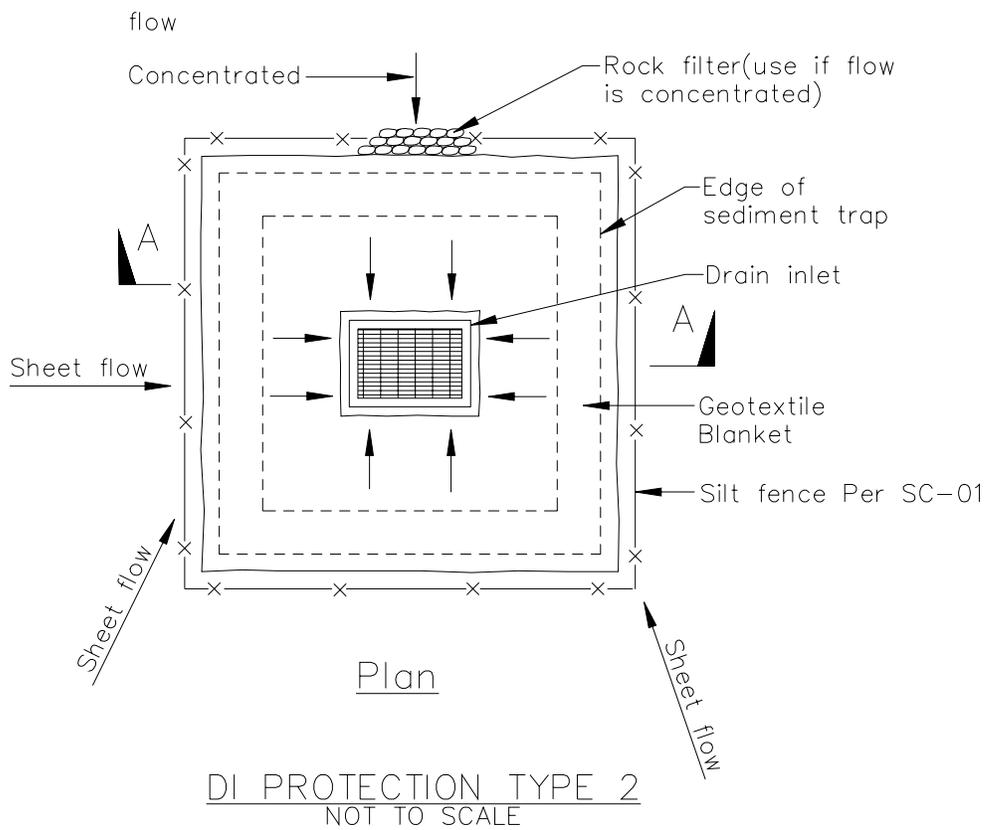
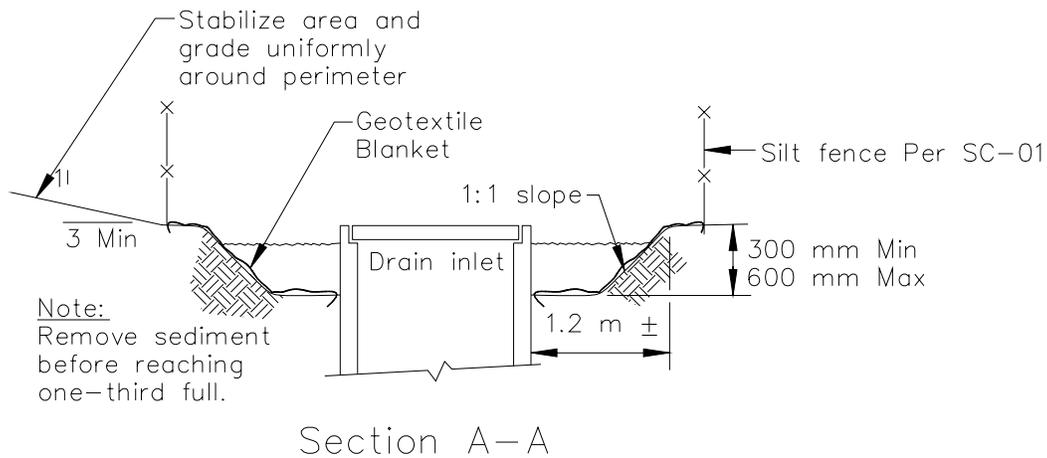
DI PROTECTION TYPE 1
NOT TO SCALE

NOTES:

1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not applicable with concentrated flows.

Storm Drain Inlet Protection

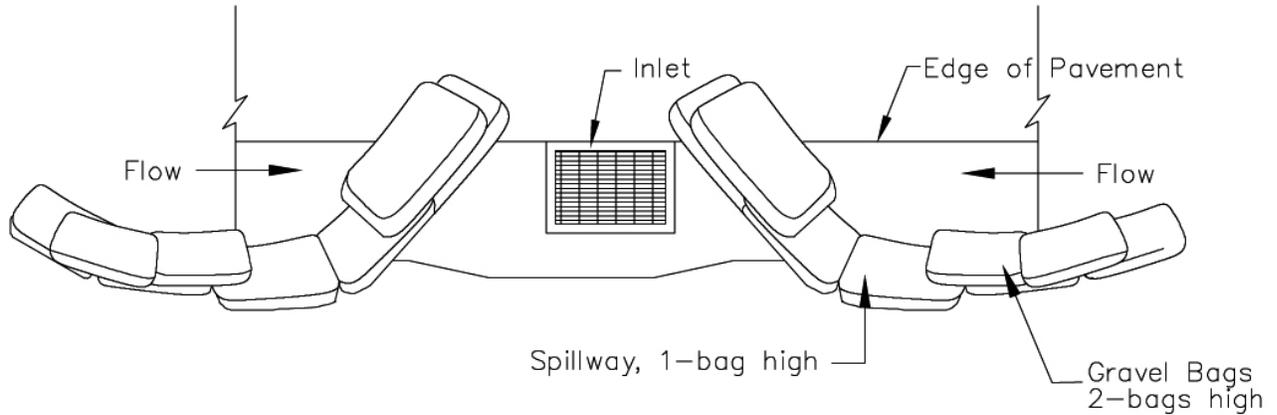
SC-10



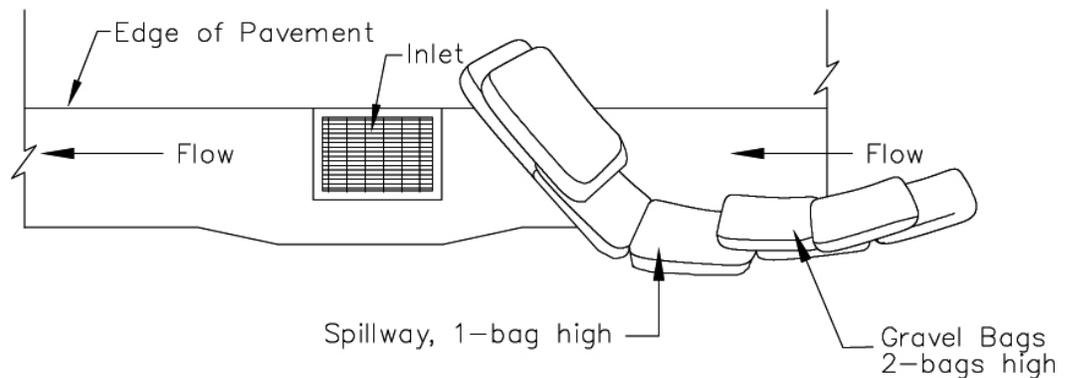
Notes

1. For use in cleared and grubbed and in graded areas.
2. Shape basin so that longest inflow area faces longest length of trap.
3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.





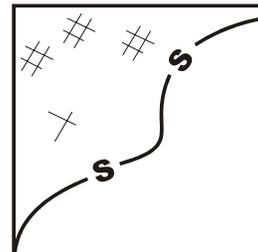
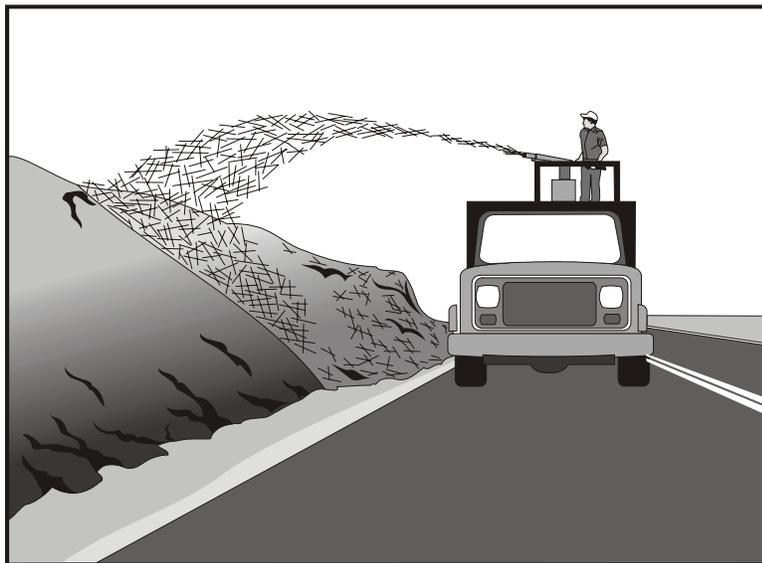
TYPICAL PROTECTION FOR INLET WITH OPPOSING FLOW DIRECTIONS



TYPICAL PROTECTION FOR INLET WITH SINGLE FLOW DIRECTION

NOTES:

1. Intended for short-term use.
2. Use to inhibit non-storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed
5. Not applicable in areas with high silts and clays without filter fabric.



Standard Symbol

- BMP Objectives**
- Soil Stabilization
 - Sediment Control
 - Tracking Control
 - Wind Erosion Control
 - Non-Storm Water Management
 - Materials and Waste Management

Definition and Purpose Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or anchoring it with a stabilizing emulsion. This is one of five temporary soil stabilization alternatives to consider.

- Appropriate Applications**
- Straw mulch is typically used for soil stabilization as a temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetation is established.
 - Also typically used in combination with temporary and/or permanent seeding strategies to enhance plant establishment.

- Limitations**
- Availability of erosion control contractors and straw may be limited prior to the rainy season due to high demand.
 - There is a potential for introduction of weed-seed and unwanted plant material.
 - When straw blowers are used to apply straw mulch, the treatment areas must be within 45 m (150 ft) of a road or surface capable of supporting trucks.
 - Straw mulch applied by hand is more time intensive and potentially costly.
 - May have to be removed prior to permanent seeding or soil stabilization.
 - “Punching” of straw does not work in sandy soils.

Standards and Specifications

- Straw shall be derived from wheat, rice, or barley.
- All materials shall conform to Standard Specifications Sections 20-2.06, 20-2.07 and 20-2.11.
- A tackifier is the preferred method for anchoring straw mulch to the soil on slopes.
- Crimping, punch roller-type rollers, or track-walking may also be used to incorporate straw mulch into the soil on slopes. Track walking shall only be used where other methods are impractical.
- Avoid placing straw onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- Straw mulch with tackifier shall not be applied during or immediately before rainfall.

Application Procedures

- Apply loose straw at a minimum rate of 3,570 kg/ha (4,000 lb/ac), or as indicated in the project's special provisions, either by machine or by hand distribution.
- If stabilizing emulsion will be used to anchor the straw mulch in lieu of incorporation, roughen embankment or fill areas by rolling with a crimping or punching-type roller or by track walking before placing the straw mulch. Track walking should only be used where rolling is impractical.
- The straw mulch must be evenly distributed on the soil surface.
- Anchor the mulch in place by using a tackifier or by "punching" it into the soil mechanically (incorporating).
- A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier shall be selected based on longevity and ability to hold the fibers in place.
- A tackifier is typically applied at a rate of 140 kg/ha (125 lb/ac). In windy conditions, the rates are typically 200 kg/ha (178 lb/ac).
- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions and longevity. If the selected method is incorporation of straw mulch into the soil, then do as follows:
 - Applying and incorporating straw shall follow the requirements in Standard Specifications Section 20-3.03.
 - On small areas, a spade or shovel can be used.

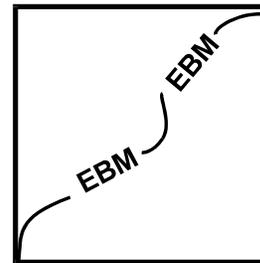
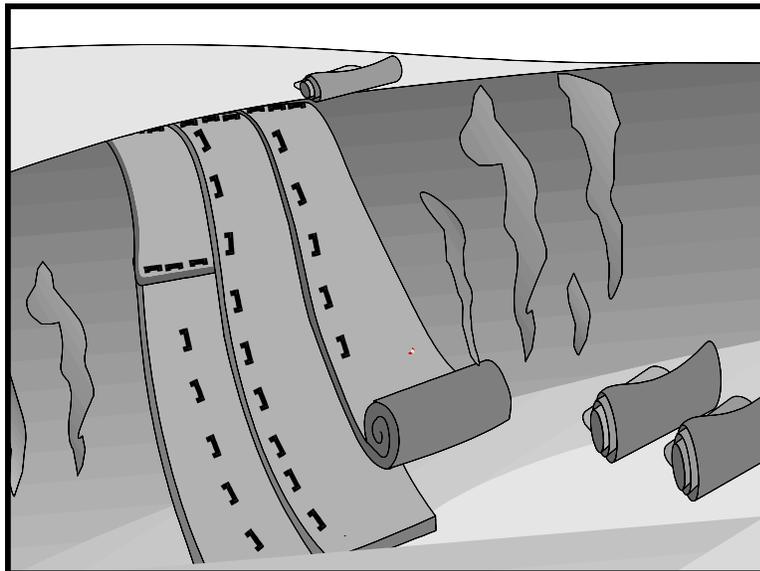
- On slopes with soils, which are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be “punched” into the ground using a knife-blade roller or a straight bladed coulter, known commercially as a “crimper.”
- On small areas and/or steep slopes, straw can also be held in place using plastic netting or jute. The netting shall be held in place using 11 gauge wire staples, geotextile pins or wooden stakes. Refer to BMP SS-7, “Geotextiles, Plastic Covers and Erosion Control Blankets/Mats.”

Maintenance and Inspections

- The key consideration in Maintenance and Inspection is that the straw needs to last long enough to achieve erosion control objectives.
- Maintain an unbroken, temporary mulched ground cover while DSAs are non-active. Repair any damaged ground cover and re-mulch exposed areas.
- Reapplication of straw mulch and tackifier may be required by the Resident Engineer (RE) to maintain effective soil stabilization over disturbed areas and slopes.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

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Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose This Best Management Practice (BMP) involves the placement of geotextiles, mats, plastic covers, or erosion control blankets to stabilize disturbed soil areas and protect soils from erosion by wind or water. This is one of five temporary soil stabilization alternatives to consider.

Appropriate Applications These measures are used when disturbed soils may be particularly difficult to stabilize, including the following situations:

- Steep slopes, generally steeper than 1:3 (V:H).
- Slopes where the erosion potential is high.
- Slopes and disturbed soils where mulch must be anchored.
- Disturbed areas where plants are slow to develop.
- Channels with flows exceeding 1.0 m/s (3.3 ft/s).
- Channels to be vegetated.
- Stockpiles.
- Slopes adjacent to water bodies of Environmentally Sensitive Areas (ESAs).

Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

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- Limitations
- Blankets and mats are more expensive than other erosion control measures, due to labor and material costs. This usually limits their application to areas inaccessible to hydraulic equipment, or where other measures are not applicable, such as channels.
 - Blankets and mats are generally not suitable for excessively rocky sites, or areas where the final vegetation will be mowed (since staples and netting can catch in mowers).
 - Blankets and mats must be removed and disposed of prior to application of permanent soil stabilization measures.
 - Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.
 - Plastic results in 100% runoff, which may cause serious erosion problems in the areas receiving the increased flow.
 - The use of plastic shall be limited to covering stockpiles, or very small graded areas for short periods of time (such as through one imminent storm event), until alternative measures, such as seeding and mulching, may be installed.
 - Geotextiles, mats, plastic covers, and erosion control covers have maximum flow rate limitations; consult the manufacturer for proper selection.

Standards and Specifications **Material Selection**

There are many types of erosion control blankets and mats, and selection of the appropriate type shall be based on the specific type of application and site conditions. Selection(s) made by the Contractor must be approved by the Resident Engineer (RE); certification of compliance shall be in accordance with Standard Specifications Section 6-1.07.

Geotextiles

- Material shall be a woven polypropylene fabric with minimum thickness of 1.5 mm (0.06 inch), minimum width of 3.7 m (12 ft) and shall have minimum tensile strength of 0.67 kN (warp) 0.36 kN (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric shall be approximately 0.07 sec⁻¹ in conformance with the requirements in ASTM Designation: D4491. The fabric shall have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets shall be secured in place with wire staples or sandbags and by keying into tops of slopes and edges to prevent infiltration of surface waters under Geotextile. Staples shall be made of 3.05-mm (0.12-inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.
- Geotextiles may be reused if, in the opinion of the RE, they are suitable for the use intended.

Plastic Covers

- Plastic sheeting shall have a minimum thickness of 6 mil, and shall be keyed in at the top of slope and firmly held in place with sandbags or other weights placed no more than 3 m (10 ft) apart. Seams are typically taped or weighted down their entire length, and there shall be at least a 300 mm to 600 mm (12 to 24 inches) overlap of all seams. Edges shall be embedded a minimum of 150 mm (6 inches) in soil.
- All sheeting shall be inspected periodically after installation and after significant rainstorms to check for erosion, undermining, and anchorage failure. Any failures shall be repaired immediately. If washout or breakages occurs, the material shall be re-installed after repairing the damage to the slope.

Erosion Control Blankets/Mats

- Biodegradable rolled erosion control products (RECPs) are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. For an RECP to be considered 100% biodegradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable.
 - **Jute** is a natural fiber that is made into a yarn, which is loosely woven into a biodegradable mesh. It is designed to be used in conjunction with vegetation and has longevity of approximately one year. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
 - **Excelsior (curled wood fiber)** blanket material shall consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 150 mm (6 inches) or longer. The excelsior blanket shall be of consistent thickness. The wood fiber shall be evenly distributed over the entire area of the blanket. The top surface of the blanket shall be covered with a photodegradable extruded plastic mesh. The blanket shall be smolder resistant without the use of chemical additives and shall be non-toxic and non-injurious to plant and animal life. Excelsior blanket shall be furnished in rolled strips, a minimum of 1220 mm (48 inches) wide, and shall have an average weight of 0.5 kg/m² (12 lb/ft²), ±10 percent, at the time of manufacture. Excelsior blankets shall be secured in place with wire staples. Staples shall be made of 3.05-mm (0.12 inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.

Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

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- **Straw blanket** shall be machine-produced mats of straw with a lightweight biodegradable netting top layer. The straw shall be attached to the netting with biodegradable thread or glue strips. The straw blanket shall be of consistent thickness. The straw shall be evenly distributed over the entire area of the blanket. Straw blanket shall be furnished in rolled strips a minimum of 2 m (6.5 ft) wide, a minimum of 25 m (80 ft) long and a minimum of 0.27 kg/m² (6.4 lb/ft²). Straw blankets shall be secured in place with wire staples. Staples shall be made of 3.05-mm (0.12 inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.
- **Wood fiber blanket** is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance revegetation. The material is furnished in rolled strips, which shall be secured to the ground with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Coconut fiber blanket** shall be machine-produced mats of 100% coconut fiber with biodegradable netting on the top and bottom. The coconut fiber shall be attached to the netting with biodegradable thread or glue strips. The coconut fiber blanket shall be of consistent thickness. The coconut fiber shall be evenly distributed over the entire area of the blanket. Coconut fiber blanket shall be furnished in rolled strips with a minimum of 2 m (6.5 ft) wide, a minimum of 25 m (80 ft) long and a minimum of 0.27-kg/m² (6.4 lb/ft²). Coconut fiber blankets shall be secured in place with wire staples. Staples shall be made of 3.05-mm (0.12 inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.
- **Coconut fiber mesh** is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a biodegradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Straw coconut fiber blanket** shall be machine-produced mats of 70% straw and 30% coconut fiber with a biodegradable netting top layer and a biodegradable bottom net. The straw and coconut fiber shall be attached to the netting with biodegradable thread or glue strips. The straw coconut fiber blanket shall be of consistent thickness. The straw and coconut fiber shall be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket shall be furnished in rolled strips a minimum of 2 m (6.5 ft) wide, a minimum of 25 m (80 ft) long and a minimum of 0.27 kg/m² (6.4 lb/ft²). Straw coconut fiber blankets shall be secured in place with wire staples. Staples shall be made of 3.05-mm (0.12-inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.

Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

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- Non-biodegradable RECPs are typically composed of polypropylene, polyethylene, nylon or other synthetic fibers. In some cases, a combination of biodegradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-biodegradable as well.
 - **Plastic netting** is a lightweight biaxially-oriented netting designed for securing loose mulches like straw to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
 - **Plastic mesh** is an open-weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than 0.5 cm (0.2 inch). It is used with revegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
 - **Synthetic fiber with netting** is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three-dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be revegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
 - **Bonded synthetic fibers** consist of a three-dimensional geomatrix nylon (or other synthetic) matting. Typically it has more than 90% open area, which facilitates root growth. Its tough root-reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
 - **Combination synthetic and biodegradable RECPs** consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top and a high-strength continuous-filament geomatrix or net stitched to the bottom. The material is designed to enhance revegetation. The material is furnished in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Site Preparation

- Proper site preparation is essential to ensure complete contact of the blanket or matting with the soil.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 50 mm (2 in) to 75 mm (3 in) of topsoil.

Seeding

Seed the area before blanket installation for erosion control and revegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all check slots and other areas disturbed during installation must be re-seeded. Where soil filling is specified, seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Anchoring

- U-shaped wire staples, metal geotextile stake pins or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Staples shall be made of 3.05 mm (0.12 inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.
- Metal stake pins shall be 5 mm (0.188 in) diameter steel with a 40 mm (1.5 in) steel washer at the head of the pin.
- Wire staples and metal stakes shall be driven flush to the soil surface.
- All anchors shall be 150 mm (6 in) to 450 mm (18 in) long and have sufficient ground penetration to resist pullout. Longer anchors may be required for loose soils.

Installation on Slopes

Installation shall be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 150 mm (6 in) deep by 150 mm (6 in) wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket downslope in the direction of water flow.

Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

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- Overlap the edges of adjacent parallel rolls 50 mm (2 in) to 75 mm (3 in) and staple every 1 m (3 ft).
- When blankets must be spliced, place blankets end over end (shingle style) with 150 mm (6 in) overlap. Staple through overlapped area, approximately 300 mm (12 in) apart.
- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
- Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples shall be placed down the center and staggered with the staples placed along the edges. Steep slopes, 1:1 (V:H) to 1:2 (V:H), require a minimum of 2 staples/m² (2 staples/yd²). Moderate slopes, 1:2 (V:H) to 1:3 (V:H), require a minimum of 1½ staples/m² (1½ staples/yd²), placing 1 staple/m (1 staple/yd) on centers. Gentle slopes require a minimum of 1 staple/m² (1 staple/yd²).

Installation in Channels

Installation shall be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Dig initial anchor trench 300 mm (12 in) deep and 150 mm (6 in) wide across the channel at the lower end of the project area.
- Excavate intermittent check slots, 150 mm (6 in) deep and 150 mm (6 in) wide across the channel at 8 m to 10 m (25 ft to 30 ft) intervals along the channels.
- Cut longitudinal channel anchor slots 100 mm (4 in) deep and 100 mm (4 in) wide along each side of the installation to bury edges of matting, whenever possible extend matting 50 mm (2 in) to 75 mm (3 in) above the crest of the channel side slopes.
- Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 300 mm (12 in) intervals. Note: matting will initially be upside down in anchor trench.
- In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 75 mm (3 in).
- Secure these initial ends of mats with anchors at 300 mm (12 in) intervals, backfill and compact soil.
- Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 75 mm (3 in) overlap.

Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

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- Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 300 mm (12 in) intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.
- Alternate method for non-critical installations: Place two rows of anchors on 150 mm (6 in) centers at 8 m (25 ft) to 10 m (30 ft) intervals in lieu of excavated check slots.
- Shingle-lap spliced ends by a minimum of 300 mm (12 in) apart on 300 mm (12 in) intervals.
- Place edges of outside mats in previously excavated longitudinal slots, anchor using prescribed staple pattern, backfill and compact soil.
- Anchor, fill and compact upstream end of mat in a 300 mm (12 in) by 150 mm (6 in) terminal trench.
- Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
- Seed and fill turf reinforcement matting with soil, if specified.

Soil Filling (if specified for turf reinforcement)

- Always consult the manufacturer's recommendations for installation.
- Do not drive tracked or heavy equipment over mat.
- Avoid any traffic over matting if loose or wet soil conditions exist.
- Use shovels, rakes or brooms for fine grading and touch up.
- Smooth out soil filling, just exposing top netting of mat.

Temporary Soil Stabilization Removal

- When no longer required for the work, temporary soil stabilization shall become the property of the Contractor. Temporary soil stabilization removed from the site of the work shall be disposed of outside the highway right-of-way in conformance with the provisions in Standard Specifications Section 7-1.13. If approved by the RE, the contractor may leave the temporary soil stabilizer in place.

Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

SS-7

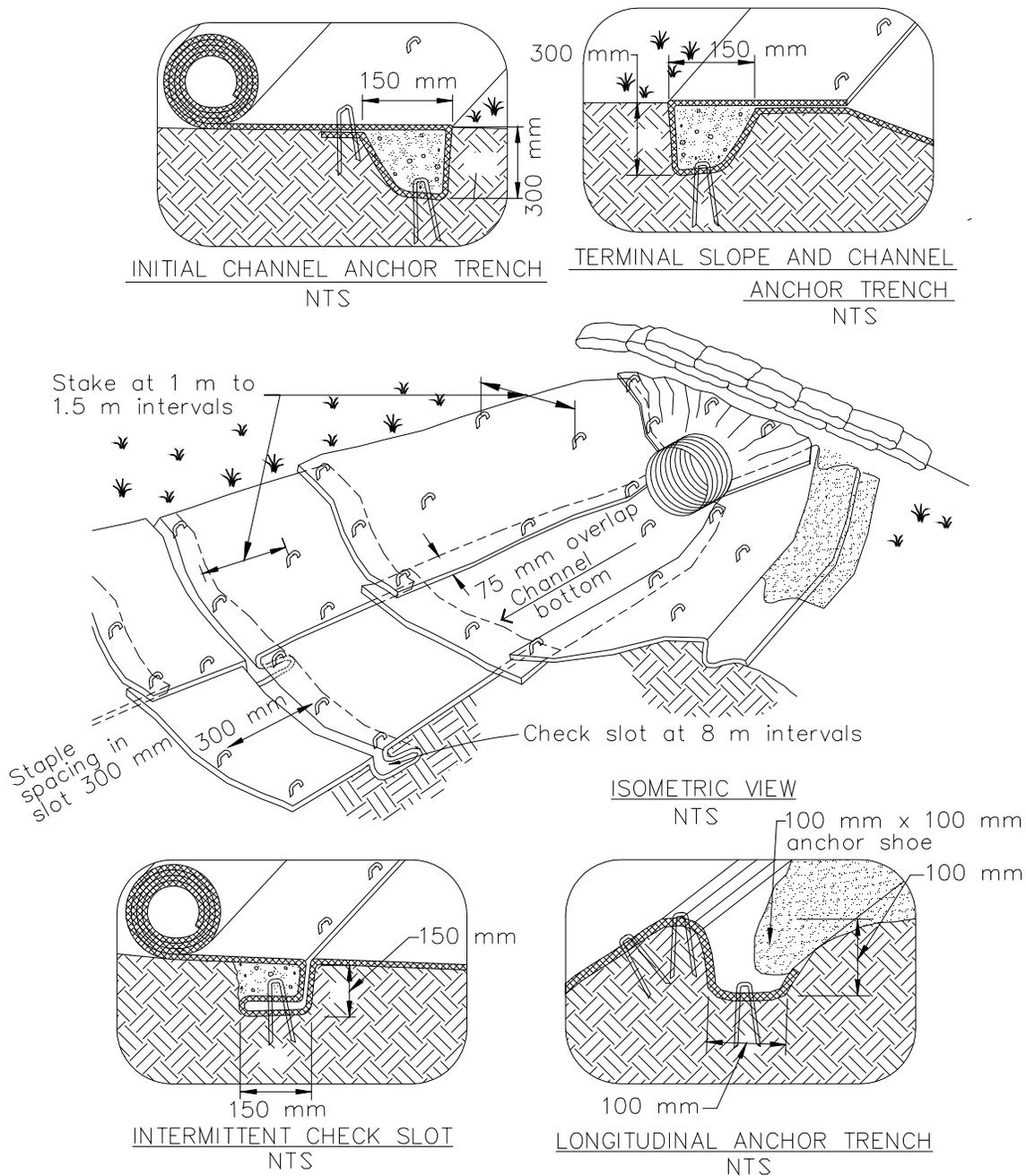
Maintenance and Inspection Areas treated with temporary soil stabilization shall be inspected as specified in the special provisions. Areas treated with temporary soil stabilization shall be maintained to provide adequate erosion control. Temporary soil stabilization shall be reapplied or replaced on exposed soils when area becomes exposed or exhibits visible erosion.

- All blankets and mats shall be inspected periodically after installation.
- Installation shall be inspected after significant rain storms to check for erosion and undermining. Any failures shall be repaired immediately.
- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.

Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

SS-7

Typical Installation Detail



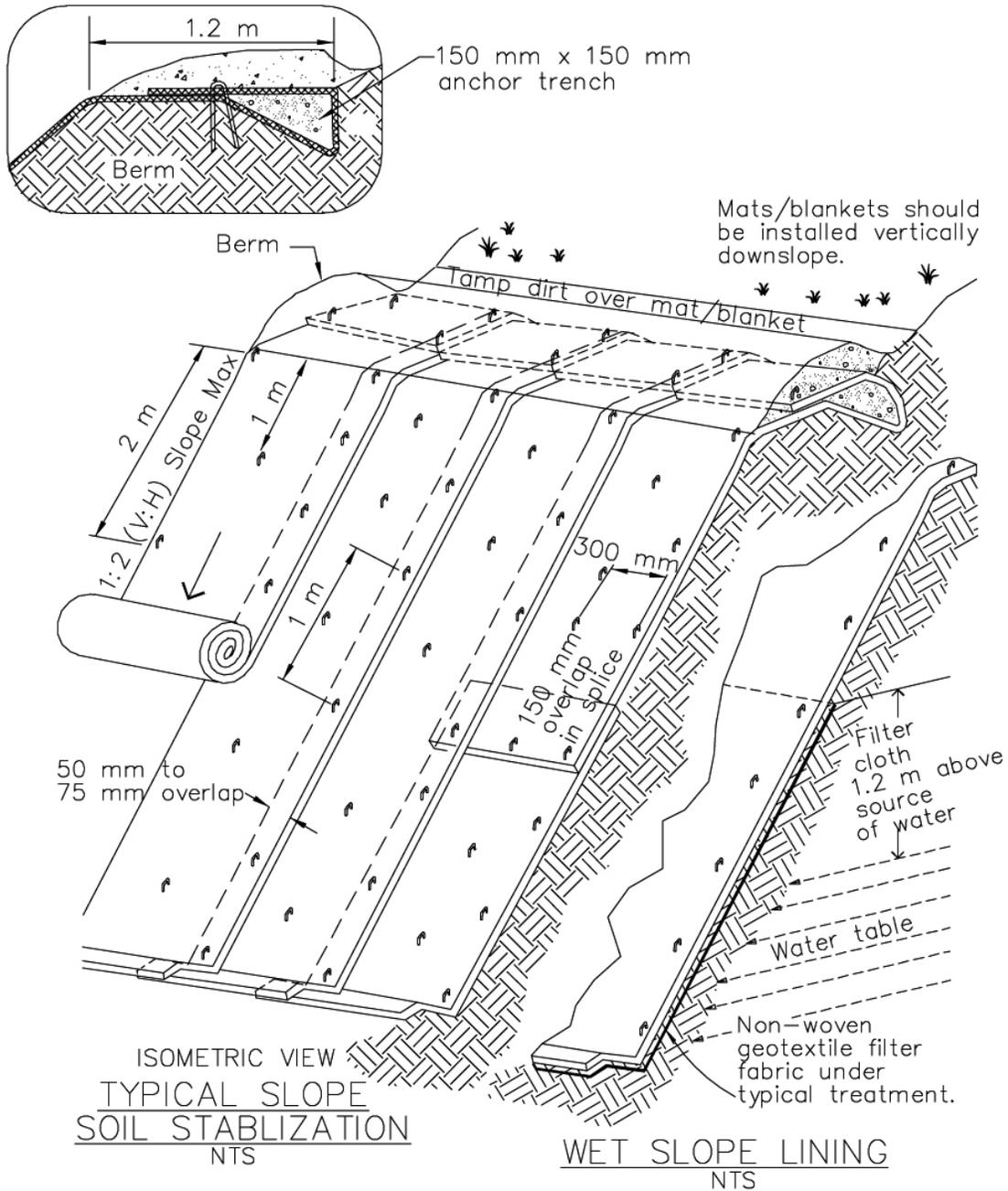
NOTES:

1. Check slots to be constructed per manufacturers specifications.
2. Staking or stapling layout per manufacturers specifications.
3. Install per manufacturer's recommendations

Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

SS-7

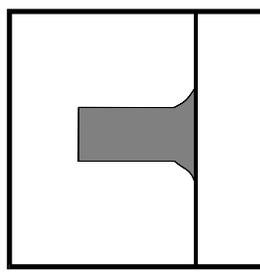
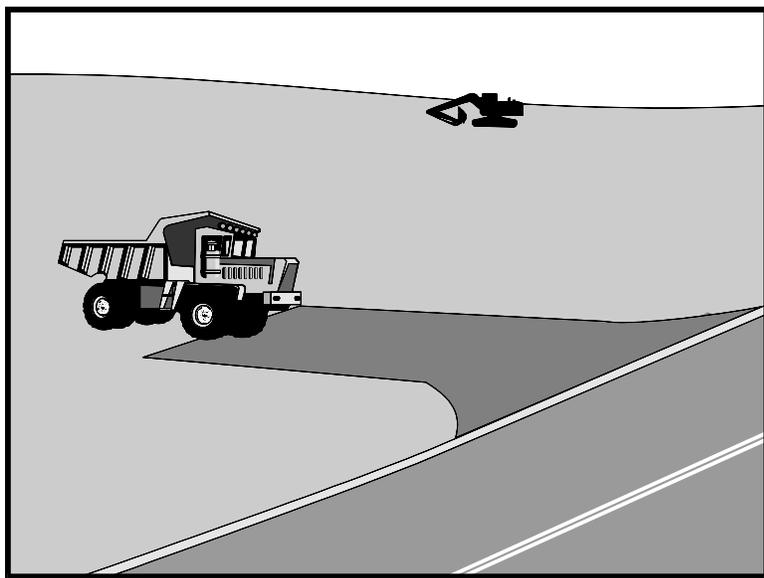
Typical Installation Detail



NOTES:

1. Slope surface shall be free of rocks, clods, sticks and grass. Mats/blankets shall have good soil contact.
2. Lay blankets loosely and stake or staple to maintain direct contact with the soil. Do not stretch.
3. Install per manufacturer's recommendations





Standard Symbol

- BMP Objectives**
- Soil Stabilization
 - Sediment Control
 - Tracking Control
 - Wind Erosion Control
 - Non-Storm Water Management
 - Materials and Waste Management

Definition and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Appropriate Applications

- Use at construction sites:
 - Where dirt or mud can be tracked onto public roads.
 - Adjacent to water bodies.
 - Where poor soils are encountered.
 - Where dust is a problem during dry weather conditions.
- This BMP may be implemented on a project-by-project basis in addition to other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Limitations

- Site conditions will dictate design and need.

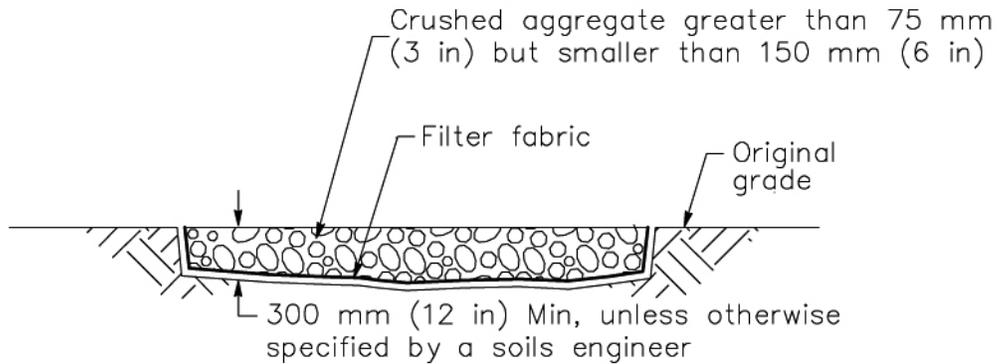
Standards and Specifications

- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment-trapping device before discharge.
- Design stabilized entrance/exit to support the heaviest vehicles and equipment that will use it.

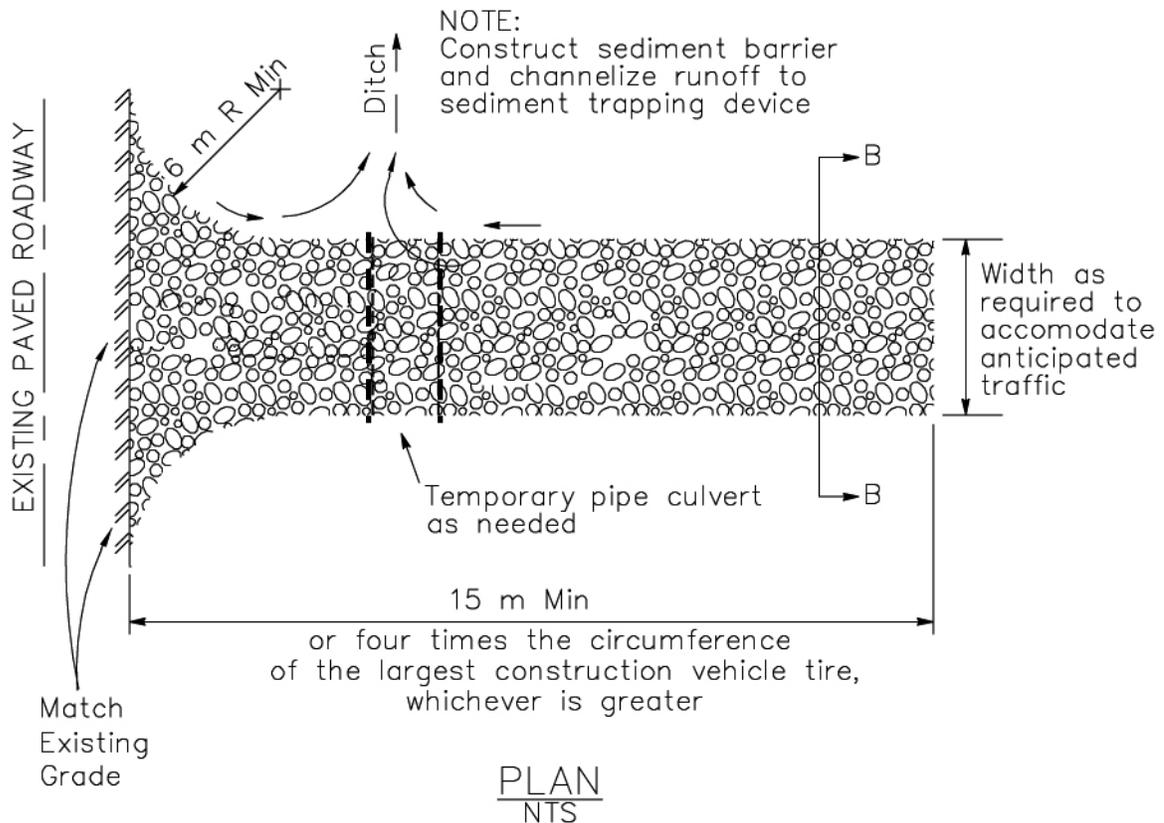
- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. The use of asphalt concrete (AC) grindings for stabilized construction access/roadway is not allowed.
 - Use of constructed/manufactured steel plates with ribs for entrance/exit access is allowed with written approval from the RE.
 - If aggregate is selected, place crushed aggregate over geotextile fabric to at least 300 mm (12 in) depth, or place aggregate to a depth recommended by the RE. Crushed aggregate greater than 75 mm (3 inches) and smaller than 150 mm (6 inches) shall be used.
 - Designate combination or single purpose entrances and exits to the construction site.
 - Implement BMP SC-7, “Street Sweeping and Vacuuming” as needed and as required.
 - Require all employees, subcontractors, and suppliers to utilize the stabilized construction access.
 - All exit locations intended to be used continuously and for a period of time shall have stabilized construction entrance/exit BMPs (TC-1 “Stabilized Construction Entrance/Exit” or TC-3 “Entrance/Outlet Tire Wash”).
- Maintenance and Inspection
- Inspect routinely for damage and assess effectiveness of the BMP. Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment or as directed by the RE.
 - Keep all temporary roadway ditches clear.
 - Inspect for damage and repair as needed.

Stabilized Construction Entrance/Exit

TC-1



SECTION B-B
NTS

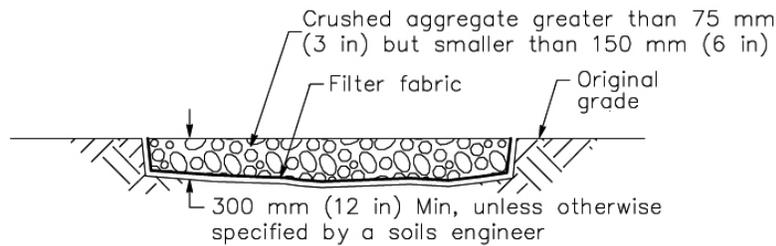


Stabilized Construction Entrance/Exit (Type 1)

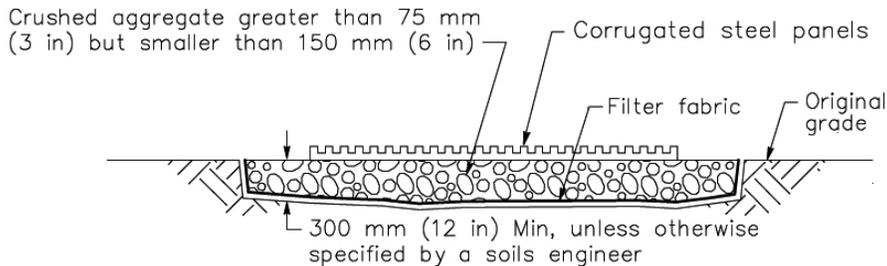


Stabilized Construction Entrance/Exit

TC-1

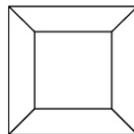


SECTION B-B
NTS

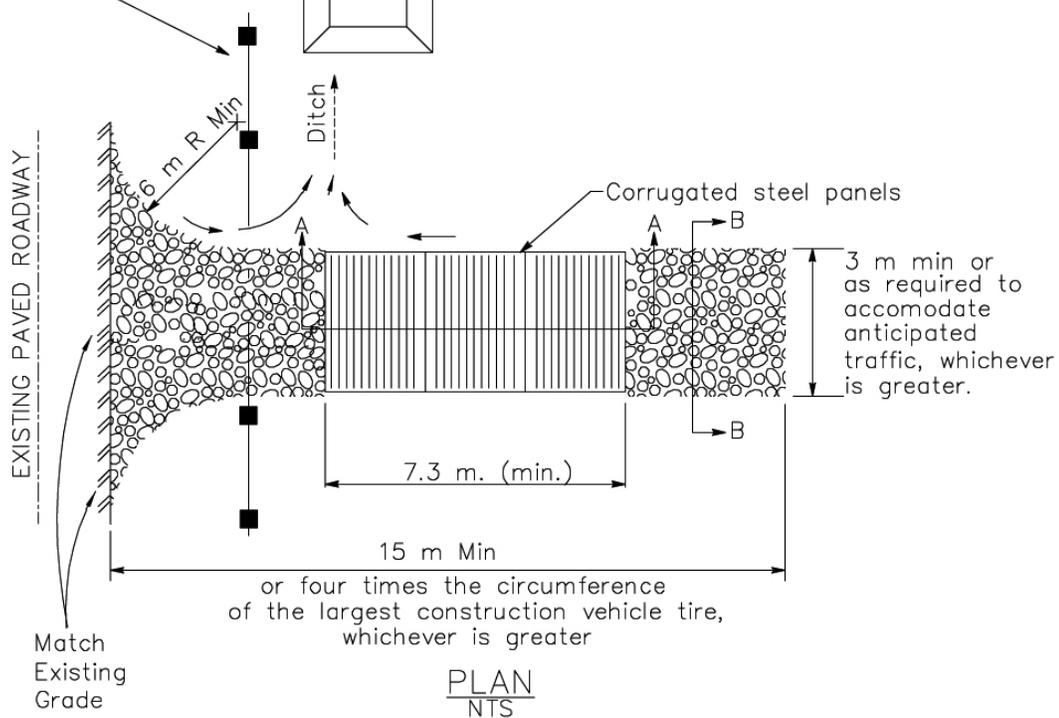


SECTION A-A
NOT TO SCALE

NOTE:
Construct sediment barrier
and channelize runoff to
sediment trapping device



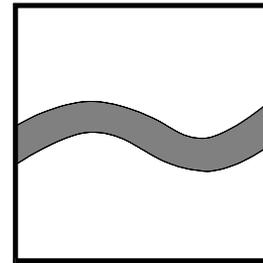
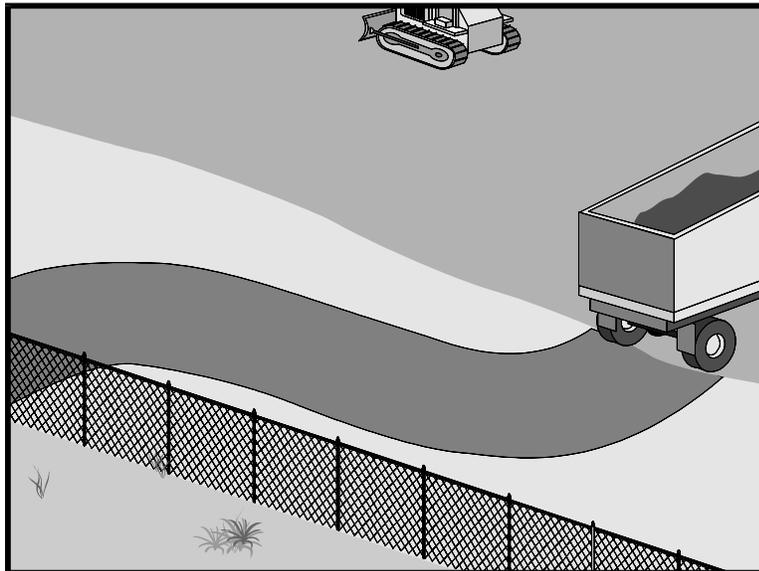
Sediment trapping
device



PLAN
NTS

Stabilized Construction Entrance/Exit (Type 2)





Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose A stabilized construction roadway is a temporary access road. It is designed for the control of dust and erosion created by vehicular tracking.

Appropriate Applications

- Construction roadways and short-term detour roads:
 - Where mud tracking is a problem during wet weather.
 - Where dust is a problem during dry weather.
 - Adjacent to water bodies.
 - Where poor soils are encountered.
 - Where there are steep grades and additional traction is needed.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Limitations

- Materials will likely need to be removed prior to final project grading and stabilization.
- Site conditions will dictate design and need.
- May not be applicable to very short duration projects.
- Limit speed of vehicles to control dust.

Standards and Specifications

- Properly grade roadway to prevent runoff from leaving the construction site.
- Design stabilized access to support the heaviest vehicles and equipment that will use it.
- Stabilize roadway using aggregate, asphalt concrete, or concrete based on longevity, required performance, and site conditions. The use of cold mix asphalt or asphalt concrete (AC) grindings for stabilized construction roadway is not allowed.
- Coordinate materials with those used for stabilized construction entrance/exit points.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 300 mm (12 in) depth, or place aggregate to a depth recommended by the RE or Construction Storm Water Coordinator. Crushed aggregate greater than 75 mm (3 inches) and smaller than 150 mm (6 inches) shall be used.

Maintenance and Inspection

- Inspect routinely for damage and repair as needed, or as directed by the RE.
- Keep all temporary roadway ditches clear.
- When no longer required, remove stabilized construction roadway and re-grade and repair slopes.



Maintenance Concerns, Objectives, and Goals

- Accumulation of Metals
- Clogged Soil Outlet Structures
- Vegetation/Landscape Maintenance

General Description

An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. Runoff is stored in the void space between the stones and infiltrates through the bottom and into the soil matrix. Infiltration trenches perform well for removal of fine sediment and associated pollutants. Pretreatment using buffer strips, swales, or detention basins is important for limiting amounts of coarse sediment entering the trench which can clog and render the trench ineffective.

Inspection/Maintenance Considerations

Frequency of clogging is dependant on effectiveness of pretreatment, such as vegetated buffer strips, at removing sediments. See appropriate maintenance factsheets for associated pretreatment. If the trench clogs, it may be necessary to remove and replace all or part of the filter fabric and possibly the coarse aggregate. Clogged infiltration trenches with surface standing water can become a nuisance due to mosquito breeding. Maintenance efforts associated with infiltration trenches should include frequent inspections to ensure that water infiltrates into the subsurface completely at a recommended infiltration rate of 72 hours or less to prevent creating mosquito and other vector habitats. Most of the maintenance should be concentrated on the pretreatment practices, such as buffer strips and swales upstream of the trench to ensure that sediment does not reach the infiltration trench. Regular inspection should determine if the sediment removal structures require routine maintenance. Infiltration trenches should not be put into operation until the upstream tributary area is stabilized.

Targeted Constituents

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

Legend (Removal Effectiveness)

- Low
- ▲ Medium
- High



Inspection Activities	Suggested Frequency
<ul style="list-style-type: none"> ■ Inspect after every major storm for the first few months to ensure proper functioning. Drain times should be observed to confirm that designed drain times has been achieved. 	After construction
<ul style="list-style-type: none"> ■ Inspect facility for signs of wetness or damage to structures, signs of petroleum hydrocarbon contamination, standing water, trash and debris, sediment accumulation, slope stability, standing water, and material buildup. ■ Check for standing water or, if available, check observation wells following 3 days of dry weather to ensure proper drain time. ■ Inspect pretreatment devices and diversion structures for damage, sediment buildup, and structural damage. 	Semi-annual and after extreme events
<ul style="list-style-type: none"> ■ Trenches with filter fabric should be inspected for sediment deposits by removing a small section of the top layer. If inspection indicates that the trench is partially or completely clogged, it should be restored to its design condition. 	Annual
Maintenance Activities	Suggested Frequency
<ul style="list-style-type: none"> ■ Repair undercut and eroded areas at inflow and outflow structures. ■ Remove sediment, debris, and oil/grease from pretreatment devices and overflow structures. 	Standard maintenance (as needed)
<ul style="list-style-type: none"> ■ Remove trash, debris, grass clippings, trees, and other large vegetation from the trench perimeter and dispose of properly. ■ Mow and trim vegetation to prevent establishment of woody vegetation, and for aesthetic and vector reasons. 	Semi-annual, more often as needed
<ul style="list-style-type: none"> ■ Clean out sediment traps, forebays, inlet/outlet structures, overflow spillway, and trenches if necessary. ■ Remove grass clippings, leaves, and accumulated sediment from the surface of the trench. Replace first layer of aggregate and filter fabric if clogging appears only to be at the surface. ■ Clean trench when loss of infiltrative capacity is observed. If drawdown time is observed to have increased significantly over the design drawdown time, removal of sediment may be necessary. This is an expensive maintenance activity and the need for it can be minimized through prevention of upstream erosion. 	Annual
<ul style="list-style-type: none"> ■ If bypass capability is available, it may be possible to regain the infiltration rate in the short term by providing an extended dry period. ■ Seed or sod to restore ground cover. 	5-year maintenance
<ul style="list-style-type: none"> ■ Total rehabilitation of the trench should be conducted to maintain storage capacity within 2/3 of the design treatment volume and 72-hour exfiltration rate limit. ■ Trench walls should be excavated to expose clean soil. ■ All of the stone aggregate and filter fabric or media must be removed. Accumulated sediment should be stripped from the trench bottom. At this point the bottom may be scarified or tilled to help induce infiltration. New fabric and clean stone aggregate should be refilled. 	Upon failure

Additional Information

Infiltration practices have historically had a high rate of failure compared to other stormwater management practices. One study conducted in Prince George's County, Maryland (Galli, 1992), revealed that less than half of the infiltration trenches investigated (of about 50) were still functioning properly, and less than one-third still functioned properly after 5 years. Many of these practices, however, did not incorporate advanced pretreatment. By carefully selecting the location and improving the design features of infiltration practices, their performance should improve.

It is absolutely critical that settleable particles and floatable organic materials be removed from runoff water before it enters the infiltration trench. The trench will clog and become nonfunctional if excessive particulate matter is allowed to enter the trench.

Cold climate considerations – see <http://www.cwp.org/cold-climates.htm>

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Design Considerations

- Soil for Infiltration
- Slope
- Aesthetics

Description

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

California Experience

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

Advantages

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

Targeted Constituents

<input checked="" type="checkbox"/>	Sediment	■
<input checked="" type="checkbox"/>	Nutrients	■
<input checked="" type="checkbox"/>	Trash	■
<input checked="" type="checkbox"/>	Metals	■
<input checked="" type="checkbox"/>	Bacteria	■
<input checked="" type="checkbox"/>	Oil and Grease	■
<input checked="" type="checkbox"/>	Organics	■

Legend (Removal Effectiveness)

- Low
- High
- ▲ Medium



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

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

Limitations

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

Design and Sizing Guidelines

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

Construction/Inspection Considerations

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

Performance

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

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

Siting Criteria

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

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

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

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

Secondary Screening Based on Site Geotechnical Investigation

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

Additional Design Guidelines

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

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

where A = Basin invert area (m²)

WQV = water quality volume (m³)

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

t = drawdown time (48 hr)

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

Maintenance

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

- Inspections and maintenance to ensure that water infiltrates into the subsurface completely (recommended infiltration rate of 72 hours or less) and that vegetation is carefully managed to prevent creating mosquito and other vector habitats.
- Observe drain time for the design storm after completion or modification of the facility to confirm that the desired drain time has been obtained.
- Schedule semiannual inspections for beginning and end of the wet season to identify potential problems such as erosion of the basin side slopes and invert, standing water, trash and debris, and sediment accumulation.
- Remove accumulated trash and debris in the basin at the start and end of the wet season.
- Inspect for standing water at the end of the wet season.
- Trim vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector reasons.
- Remove accumulated sediment and regrade when the accumulated sediment volume exceeds 10% of the basin.
- If erosion is occurring within the basin, revegetate immediately and stabilize with an erosion control mulch or mat until vegetation cover is established.
- To avoid reversing soil development, scarification or other disturbance should only be performed when there are actual signs of clogging, rather than on a routine basis. Always remove deposited sediments before scarification, and use a hand-guided rotary tiller, if possible, or a disc harrow pulled by a very light tractor.

Cost

Infiltration basins are relatively cost-effective practices because little infrastructure is needed when constructing them. One study estimated the total construction cost at about \$2 per ft (adjusted for inflation) of storage for a 0.25-acre basin (SWRPC, 1991). As with other BMPs, these published cost estimates may deviate greatly from what might be incurred at a specific site. For instance, Caltrans spent about \$18/ft³ for the two infiltration basins constructed in southern California, each of which had a water quality volume of about 0.34 ac.-ft. Much of the higher cost can be attributed to changes in the storm drain system necessary to route the runoff to the basin locations.

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

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

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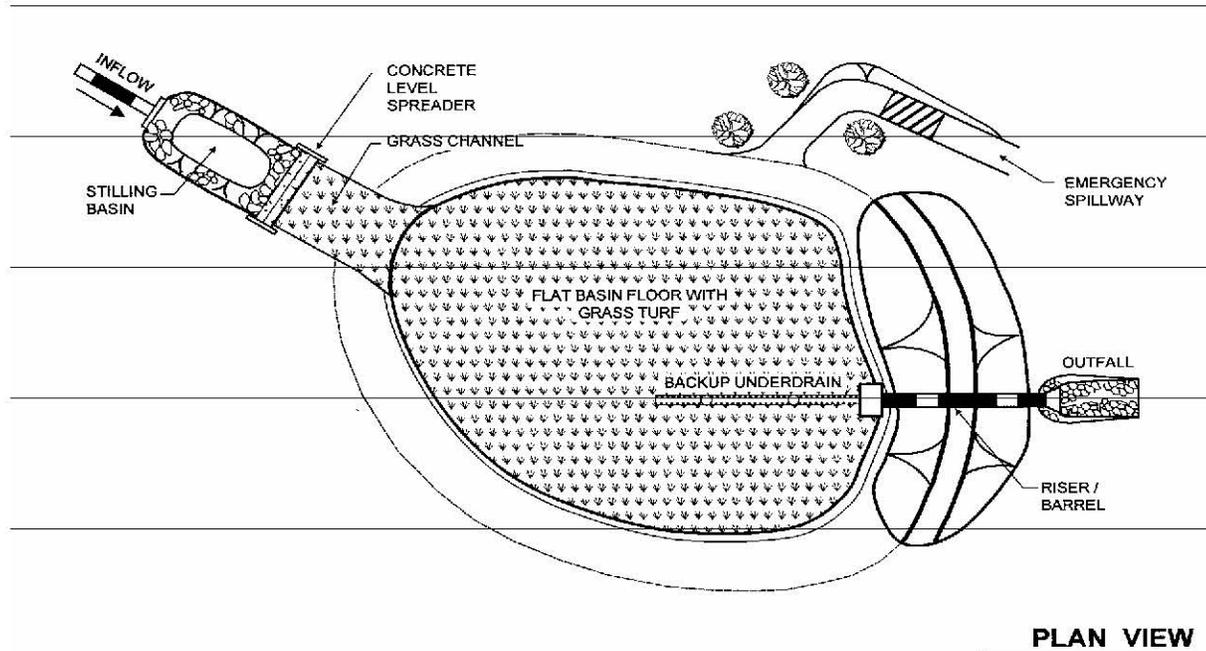
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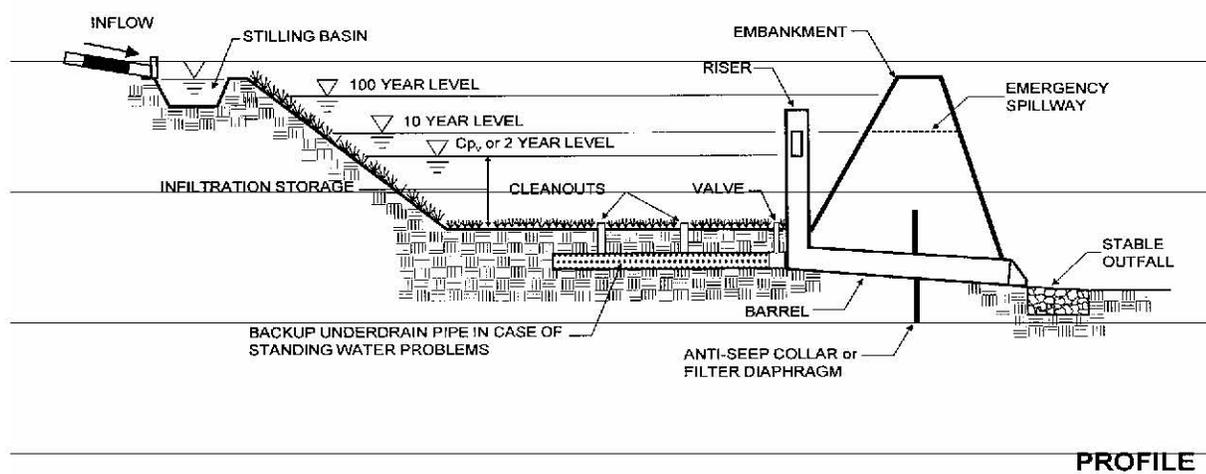
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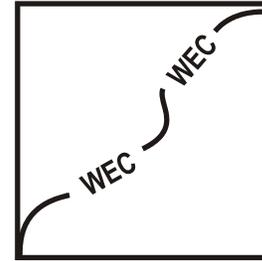
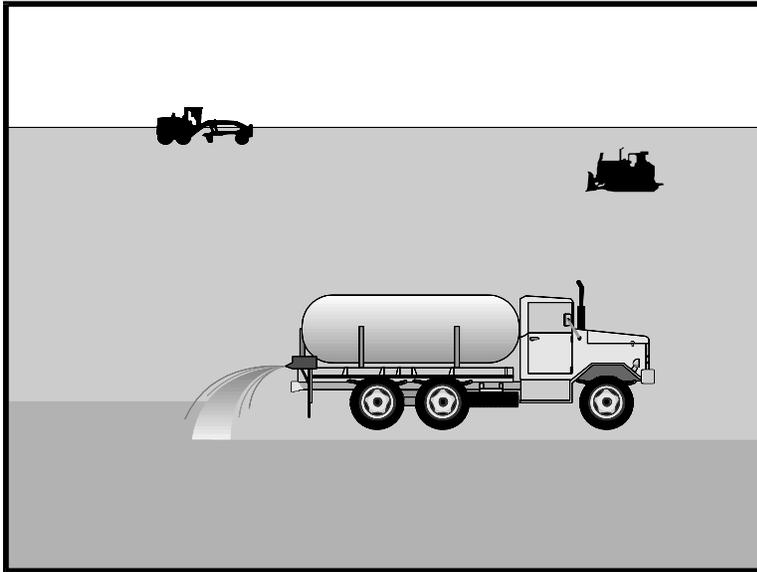
USEPA. 1993. *Guidance to Specify Management Measures for Sources of Nonpoint Pollution in Coastal Waters*. EPA-840-B-92-002. U.S. Environmental Protection Agency, Office of Water, Washington, DC.



PLAN VIEW



PROFILE



Standard Symbol

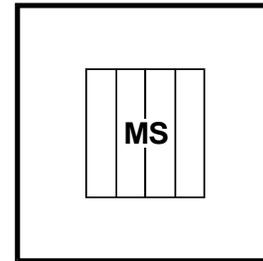
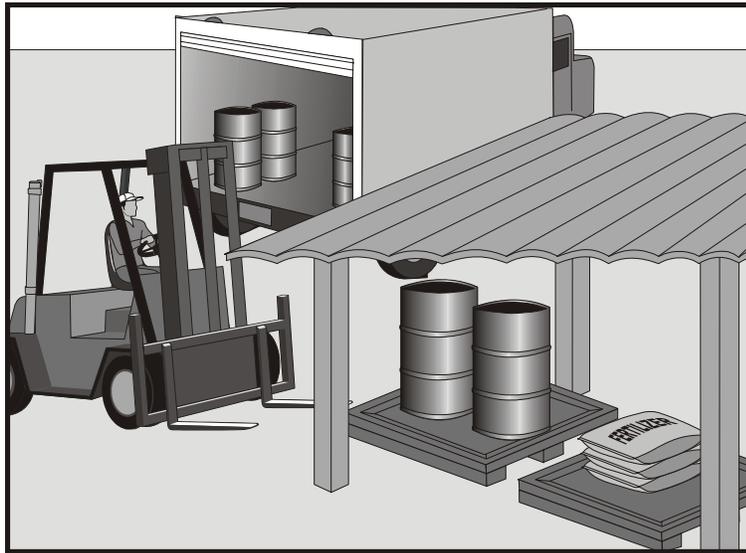
- BMP Objectives**
- Soil Stabilization
 - Sediment Control
 - Tracking Control
 - Wind Erosion Control
 - Non-Storm Water Management
 - Materials and Waste Management

Definition and Purpose Wind erosion control consists of applying water and/or other dust palliatives as necessary to prevent or alleviate erosion by the forces of wind. Dust control shall be applied in accordance with Caltrans standard practices. Covering of small stockpiles or areas is an alternative to applying water or other dust palliatives.

- Appropriate Applications**
- This practice is implemented on all exposed soils subject to wind erosion.
- Limitations**
- Effectiveness depends on soil, temperature, humidity and wind velocity.

- Standards and Specifications**
- Water shall be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
 - All distribution equipment shall be equipped with a positive means of shutoff.
 - Unless water is applied by means of pipelines, at least one mobile unit shall be available at all times to apply water or dust palliative to the project.
 - If reclaimed water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality Control Board requirements. Non-potable water shall not be conveyed in tanks or drain pipes that will be used to convey potable water and there shall be no connection between potable and non-potable supplies. Non-potable tanks, pipes and other conveyances shall be marked “NON-POTABLE WATER - DO NOT DRINK.”
 - Materials applied as temporary soil stabilizers and soil binders will also provide wind erosion control benefits.

- Maintenance and Inspection**
- Check areas that have been protected to ensure coverage.



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose Procedures and practices for the proper handling and storage of materials in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to watercourses.

Appropriate Applications These procedures are implemented at all construction sites with delivery and storage of the following:

- Hazardous chemicals such as:
 - Acids,
 - lime,
 - glues,
 - adhesives,
 - paints,
 - solvents, and
 - curing compounds.
- Soil stabilizers and binders.
- Fertilizers.
- Detergents.
- Plaster.
- Petroleum products such as fuel, oil, and grease.
- Asphalt and concrete components.
- Pesticides and herbicides.

- Other materials that may be detrimental if released to the environment.
- Limitations
- Space limitation may preclude indoor storage.
 - Storage sheds must meet building & fire code requirements.

Standards and Specifications

General

- Train employees and subcontractors on the proper material delivery and storage practices.
- Temporary storage area shall be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) shall be supplied to the Resident Engineer (RE) for all materials stored.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall be placed in temporary containment facilities for storage.
- Throughout the rainy season, each temporary containment facility shall have a permanent cover and side wind protection or be covered during non-working days and prior to and during rain events.
- A temporary containment facility shall provide for a spill containment volume able to contain precipitation from a 24-hour, 25-year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids shall be sent to an approved disposal site.
- Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.
- Materials shall be stored in their original containers and the original product labels shall be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced immediately.

-
- Bagged and boxed materials shall be stored on pallets and shall not be allowed to accumulate on the ground. To provide protection from wind and rain, throughout the rainy season, bagged and boxed materials shall be covered during non-working days and prior to rain events.
- Stockpiles shall be protected in accordance with BMP WM-3, “Stockpile Management.”
- Minimize the material inventory stored on-site (e.g., only a few days supply).
- Have proper storage instructions posted at all times in an open and conspicuous location.
- Do not store hazardous chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and when possible, under cover in secondary containment.
- Keep hazardous chemicals well labeled and in their original containers.
- Keep ample supply of appropriate spill clean up material near storage areas.
- Also see BMP WM-6, “Hazardous Waste Management”, for storing of hazardous materials.

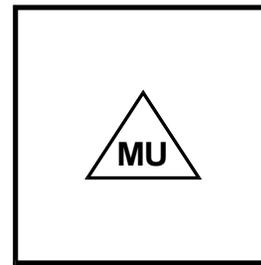
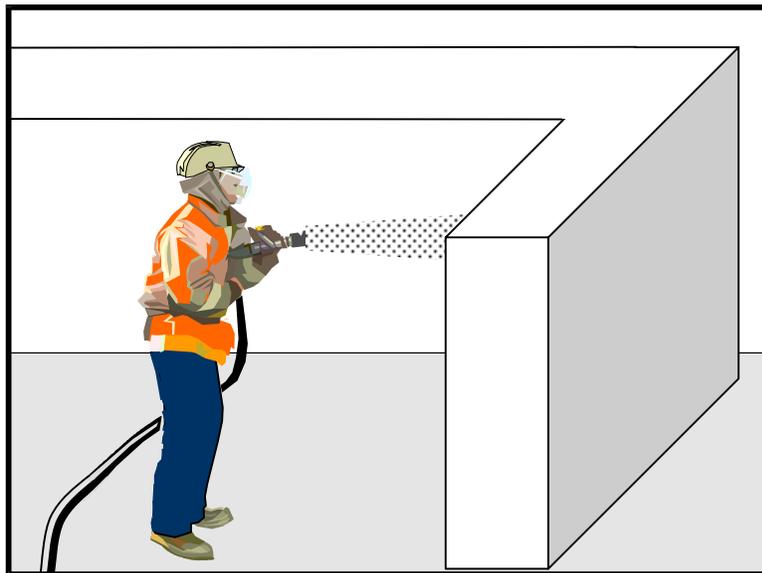
Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored on-site.
- Employees trained in emergency spill clean-up procedures shall be present when dangerous materials or liquid chemicals are unloaded.

Spill Clean-up

- Contain and clean up any spill immediately.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose any hazardous materials or contaminated soil.
- See BMP WM-4, “Spill Prevention and Control”, for spills of chemicals and/or hazardous materials.

- Maintenance and Inspection
- Storage areas shall be kept clean, well organized, and equipped with ample clean-up supplies as appropriate for the materials being stored.
 - Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.
 - Inspect storage areas before and after rainfall events, and at least weekly during other times. Collect and place into drums any spills or accumulated rainwater.



Standard Symbol

BMP Objectives

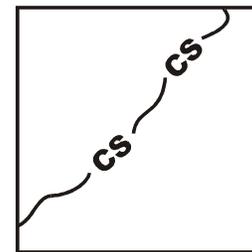
- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose These are procedures and practices for use of construction material in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to watercourses.

Appropriate Applications This BMP applies to all construction projects. These procedures apply when the following materials are used or prepared on site:

- Hazardous chemicals such as:
 - Acids,
 - lime,
 - glues,
 - adhesives,
 - paints,
 - solvents, and
 - curing compounds.
- Soil stabilizers and binders.
- Fertilizers.
- Detergents.
- Plaster.
- Petroleum products such as fuel, oil, and grease.
- Asphalt and concrete components.
- Pesticides and herbicides.
- Other materials that may be detrimental if released to the environment.

- Limitations** ■ Safer alternative building and construction products may not be available or suitable in every instance.
- Standards and Specifications** ■ Material Safety Data Sheets (MSDS) shall be supplied to the Resident Engineer (RE) for all materials.
- Latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, may be disposed of with other construction debris.
 - Do not remove the original product label, it contains important safety and disposal information. Use the entire product before disposing of the container.
 - Mix paint indoors, or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain or watercourse. Dispose of any paint thinners, residue and sludge(s), that cannot be recycled, as hazardous waste.
 - For water-based paint, clean brushes to the extent practical, and rinse to a drain leading to a sanitary sewer where permitted, or into a concrete washout pit. For oil-based paints, clean brushes to the extent practical and filter and reuse thinners and solvents.
 - Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
 - Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials on-site when practical.
 - Do not over-apply fertilizers and pesticides. Prepare only the amount needed. Strictly follow the recommended usage instructions. Apply surface dressings in smaller applications, as opposed to large applications, to allow time for it to work in and to avoid excess materials being carried off-site by runoff.
 - Application of herbicides and pesticides shall be performed by a licensed applicator.
 - Contractors are required to complete the “Report of Chemical Spray Forms” when spraying herbicides and pesticides.
 - Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
 - Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
- Maintenance and Inspections** ■ Spot check employees and subcontractors monthly throughout the job to ensure appropriate practices are being employed.



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose	Stockpile management procedures and practices are designed to reduce or eliminate air and storm water pollution from stockpiles of soil, and paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate subbase or pre-mixed aggregate, asphalt binder (so called “cold mix” asphalt) and pressure treated wood.
Appropriate Applications	Implemented in all projects that stockpile soil and other materials.
Limitations	<ul style="list-style-type: none"> ■ None identified
Standards and Specifications	<ul style="list-style-type: none"> ■ Protection of stockpiles is a year-round requirement. ■ Locate stockpiles a minimum of 15 m (50 ft) away from concentrated flows of storm water, drainage courses, and inlets. ■ Implement wind erosion control practices as appropriate on all stockpiled material. For specific information see BMP WE-1, “Wind Erosion Control.” ■ Stockpiles of contaminated soil shall be managed in accordance with BMP WM-7, “Contaminated Soil Management.” ■ Bagged materials should be placed on pallets and under cover.

Protection of Non-Active Stockpiles

Non-active stockpiles of the identified materials shall be protected further as follows:

- ***Soil stockpiles:***

- During the rainy seasons, soil stockpiles shall be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- During the non-rainy season, soil stockpiles shall be covered and protected with a temporary perimeter sediment barrier prior to the onset of precipitation.

- ***Stockpiles of portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate subbase:***

- During the rainy season, the stockpiles shall be covered or protected with a temporary perimeter sediment barrier at all times.
- During the non-rainy season, the stockpiles shall be covered or protected with a temporary perimeter sediment barrier prior to the onset of precipitation.

- ***Stockpiles of “cold mix”:***

- During the rainy season, cold mix stockpiles shall be placed on and covered with plastic or comparable material at all times.
- During the non-rainy season, cold mix stockpiles shall be placed on and covered with plastic or comparable material prior to the onset of precipitation.

- ***Stockpiles/Storage of pressure treated wood with copper, chromium, and arsenic or ammonical, copper, zinc, and arsenate:***

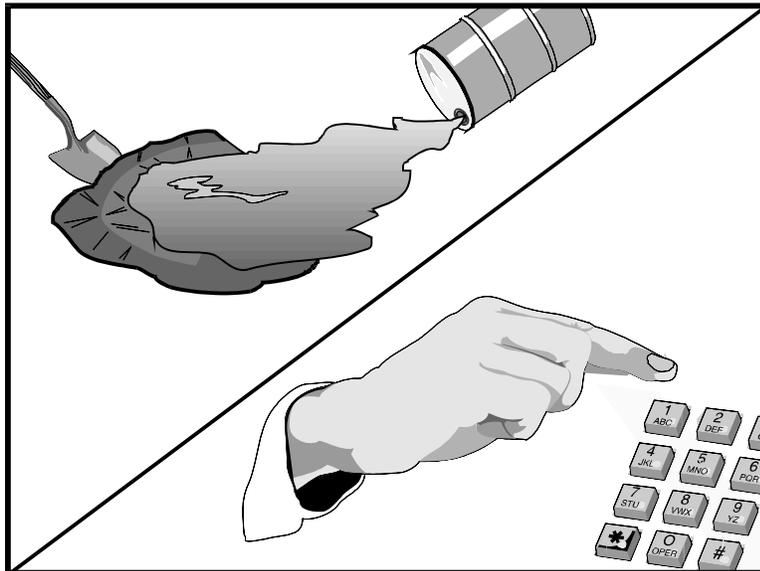
- During the rainy season, treated wood shall be covered with plastic or comparable material at all times.
- During the non-rainy season, treated wood shall be covered with plastic or comparable material and shall be placed on pallets prior to the onset of precipitation.

Protection of Active Stockpiles

Active stockpiles of the identified materials shall be protected further as follows:

- All stockpiles shall be covered, stabilized, or protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of “cold mix” shall be placed on and covered with plastic or comparable material prior to the onset of precipitation.

- Maintenance and Inspections
- Repair and/or replace perimeter controls and covers as needed, or as directed by the RE, to keep them functioning properly. Sediment shall be removed when sediment accumulation reaches one-third (1/3) of the barrier height.



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose These procedures and practices are implemented to prevent and control spills in a manner that minimizes or prevents the discharge of spilled material to the drainage system or watercourses.

Appropriate Application This best management practice (BMP) applies to all construction projects. Spill control procedures are implemented anytime chemicals and/or hazardous substances are stored. Substances may include, but are not limited to:

- Soil stabilizers/binders.
- Dust Palliatives.
- Herbicides.
- Growth inhibitors.
- Fertilizers.
- Deicing/anti-icing chemicals.
- Fuels.
- Lubricants.
- Other petroleum distillates.

To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110, 117, and 302, and sanitary and septic wastes shall be contained and cleaned up immediately.

Limitations ■ This BMP only applies to spills caused by the contractor.

■ Procedures and practices presented in this BMP are general. Contractor shall identify appropriate practices for the specific materials used or stored on-site.

Standards and Specifications ■ To the extent that it doesn't compromise clean up activities, spills shall be covered and protected from storm water run-on during rainfall.

■ Spills shall not be buried or washed with water.

■ Used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose shall be stored and disposed of in conformance with the special provisions.

■ Water used for cleaning and decontamination shall not be allowed to enter storm drains or watercourses and shall be collected and disposed of in accordance with BMP WM-10, "Liquid Waste Management."

■ Water overflow or minor water spillage shall be contained and shall not be allowed to discharge into drainage facilities or watercourses.

■ Proper storage, clean-up and spill reporting instruction for hazardous materials stored or used on the project site shall be posted at all times in an open, conspicuous and accessible location.

■ Waste storage areas shall be kept clean, well organized and equipped with ample clean-up supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers and liners shall be repaired or replaced as needed to maintain proper function.

Education

■ Educate employees and subcontractors on what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.

■ Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.

■ Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).

■ Establish a continuing education program to indoctrinate new employees.

■ The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper spill prevention and control measures.

Cleanup and Storage Procedures

- Minor Spills
 - Minor spills typically involve small quantities of oil, gasoline, paint, etc., which can be controlled by the first responder at the discovery of the spill.
 - Use absorbent materials on small spills rather than hosing down or burying the spill.
 - Remove the absorbent materials promptly and dispose of properly.
 - The practice commonly followed for a minor spill is:
 - Contain the spread of the spill.
 - Recover spilled materials.
 - Clean the contaminated area and/or properly dispose of contaminated materials.

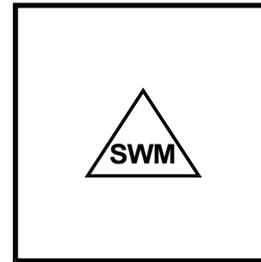
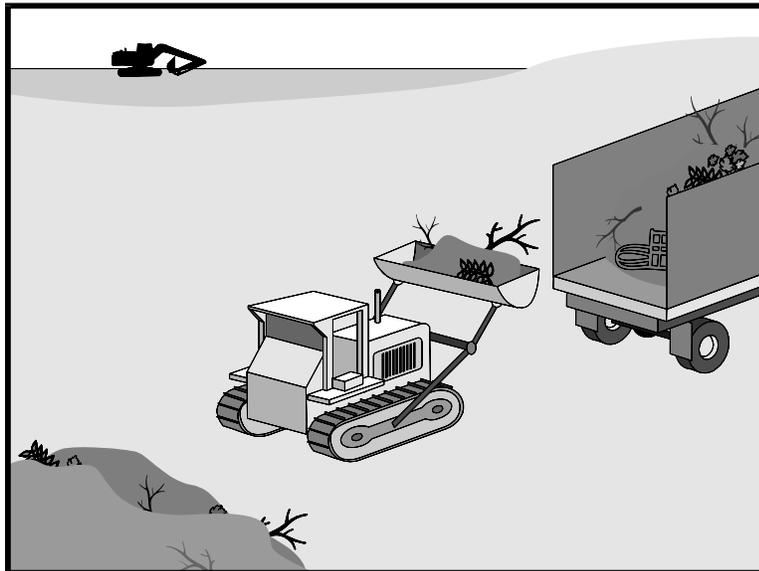
- Semi-Significant Spills
 - Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.
 - Clean up spills immediately:
 - Notify the project foreman immediately. The foreman shall notify the Resident Engineer (RE).
 - Contain spread of the spill.
 - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
 - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
 - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

■ Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps shall be taken:
 - Notify the RE immediately and follow up with a written report.
 - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
 - Notify the Governor's Office of Emergency Services Warning Center, (805) 852-7550.
 - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor shall notify the National Response Center at (800) 424-8802.
 - Notification shall first be made by telephone and followed up with a written report.
 - The services of a spills contractor or a Haz-Mat team shall be obtained immediately. Construction personnel shall not attempt to clean up the spill until the appropriate and qualified staff have arrived at the job site.
 - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, RWQCB, etc.

Maintenance and Inspection

- Verify weekly that spill control clean up materials are located near material storage, unloading, and use areas.
- Update spill prevention and control plans and stock appropriate clean-up materials whenever changes occur in the types of chemicals used or stored onsite.



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

Solid waste management procedures and practices are designed to minimize or eliminate the discharge of pollutants to the drainage system or to watercourses as a result of the creation, stockpiling, or removal of construction site wastes.

Appropriate Applications

Solid waste management procedures and practices are implemented on all construction projects that generate solid wastes.

Solid wastes include but are not limited to:

- Construction wastes including brick, mortar, timber, steel and metal scraps, sawdust, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials.
- Highway planting wastes, including vegetative material, plant containers, and packaging materials.
- Litter, including food containers, beverage cans, coffee cups, paper bags, plastic wrappers, and smoking materials, including litter generated by the public.

Limitations

- Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Standards and Specifications *Education*

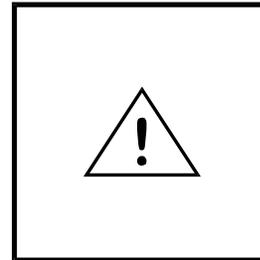
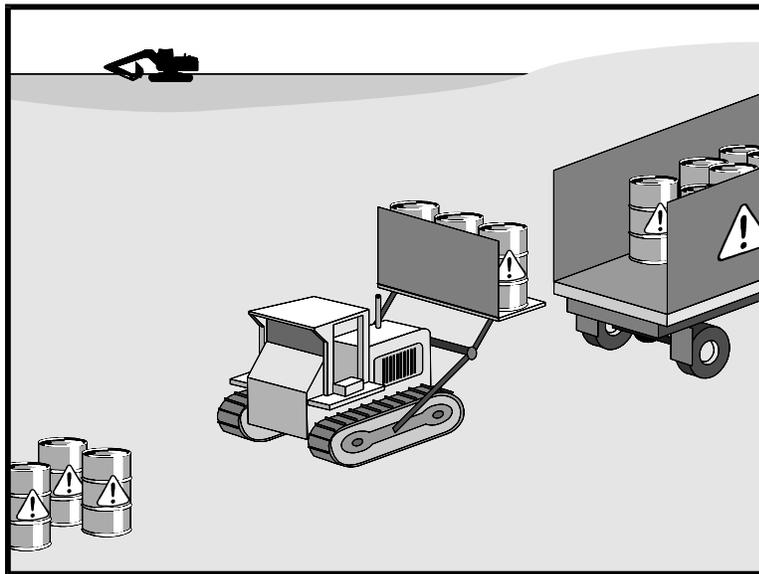
- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper solid waste procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Wherever possible, minimize production of solid waste materials.

Collection, Storage, and Disposal

- Dumpsters of sufficient size and number shall be provided to contain the solid waste generated by the project and properly serviced.
- Littering on the project site shall be prohibited.
- To prevent clogging of the storm drainage system litter and debris removal from drainage grates, trash racks, and ditch lines shall be a priority.
- Trash receptacles shall be provided in the Contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Construction debris and litter from work areas within the construction limits of the project site shall be collected and placed in watertight dumpsters at least weekly regardless of whether the litter was generated by the Contractor, the public, or others. Collected litter and debris shall not be placed in or next to drain inlets, storm water drainage systems or watercourses.
- Full dumpsters shall be removed from the project site and the contents shall be disposed of outside the highway right-of-way in conformance with the provisions in the Standard Specifications Section 7-1.13.
- Litter stored in collection areas and containers shall be handled and disposed of by trash hauling contractors.
- Construction debris and waste shall be removed from the site every two weeks or as directed by the RE.

- Construction material visible to the public shall be stored or stacked in an orderly manner to the satisfaction of the RE.
- Storm water run-on shall be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas shall be located at least 15 m (50 ft) from drainage facilities and watercourses and shall not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters shall be securely covered from wind and rain by covering the waste with tarps or plastic sheeting or protected in conformance with the applicable Disturbed Soil Area protection section.
- Dumpster washout on the project site is not allowed.
- Notify trash hauling contractors that only watertight dumpsters are acceptable for use on-site.
- Plan for additional containers during the demolition phase of construction.
- Plan for more frequent pickup during the demolition phase of construction.
- Construction waste shall be stored in a designated area approved by the RE.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Keep the site clean of litter debris.
- Make sure that toxic liquid wastes (e.g., used oils, solvents, and paints) and chemicals (e.g., acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Dispose of non-hazardous waste in accordance with Standard Specification 7-1.13, Disposal of Material Outside the Highway Right of Way.
- For disposal of hazardous waste, see BMP WM-6, “Hazardous Waste Management.” Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- Salvage or recycle useful vegetation debris, packaging and/or surplus building materials when practical. For example, trees and shrubs from land clearing can be converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

- Maintenance and Inspection
- The WPCM shall monitor onsite solid waste storage and disposal procedures.
 - Police site for litter and debris.



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose These are procedures and practices to minimize or eliminate the discharge of pollutants from construction site hazardous waste to the storm drain systems or to watercourses.

- Appropriate Applications**
- This best management practice (BMP) applies to all construction projects.
 - Hazardous waste management practices are implemented on construction projects that generate waste from the use of:
 - Petroleum Products,
 - Asphalt Products,
 - Concrete Curing Compounds,
 - Pesticides,
 - Acids,
 - Paints,
 - Stains,
 - Solvents,
 - Wood Preservatives,
 - Roofing Tar, or
 - Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302.

- Limitations**
- Nothing in this BMP relieves the Contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
 - This BMP does not cover aerially deposited lead (ADL) soils. For ADL soils refer to BMP WM-7, “Contaminated Soil Management,” and the project special provisions.

Standards and Specifications

Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- The Contractor’s Water Pollution Control Manager (WPCM) shall oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.

Storage Procedures

- Wastes shall be stored in sealed containers constructed of a suitable material and shall be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172,173, 178, and 179.
- All hazardous waste shall be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers shall be stored in temporary containment facilities that shall comply with the following requirements:
 - Temporary containment facility shall provide for a spill containment volume able to contain precipitation from a 24-hour, 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.

- Temporary containment facility shall be impervious to the materials stored there for a minimum contact time of 72 hours.
 - Temporary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks accumulated rainwater and spills shall be placed into drums after each rainfall. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids shall be sent to an approved disposal site.
 - Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
 - Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.
 - Throughout the rainy season, temporary containment facilities shall be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs. A storage facility having a solid cover and sides is preferred to a temporary tarp. Storage facilities shall be equipped with adequate ventilation.
- Drums shall not be overfilled and wastes shall not be mixed.
 - Unless watertight, containers of dry waste shall be stored on pallets.
 - Paint brushes and equipment for water and oil based paints shall be cleaned within a contained area and shall not be allowed to contaminate site soils, watercourses or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused shall be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths shall be disposed of as solid waste.
 - Ensure that adequate hazardous waste storage volume is available.
 - Ensure that hazardous waste collection containers are conveniently located.
 - Designate hazardous waste storage areas on site away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.
 - Minimize production or generation of hazardous materials and hazardous waste on the job site.
 - Use containment berms in fueling and maintenance areas and where the potential for spills is high.

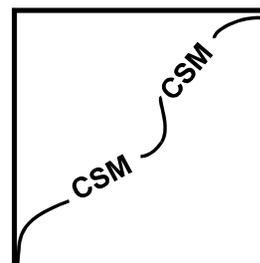
- Segregate potentially hazardous waste from non-hazardous construction site debris.
- Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.
- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Place hazardous waste containers in secondary containment.
- Do not allow potentially hazardous waste materials to accumulate on the ground.
- Do not mix wastes.

Disposal Procedures

- Waste shall be disposed of outside the highway right-of-way within 90 days of being generated, or as directed by the Resident Engineer (RE). In no case shall hazardous waste storage exceed requirements in Title 22 CCR, Section 66262.34.
- Waste shall be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.
- A Department of Health Services (DHS) certified laboratory shall sample waste and classify it to determine the appropriate disposal facility.
- Make sure that toxic liquid wastes (e.g., used oils, solvents, and paints) and chemicals (e.g., acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for solid waste construction debris.
- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
- Recycle any useful material such as used oil or water-based paint when practical.
- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

Maintenance and Inspection

- A foreman and/or construction supervisor shall monitor on-site hazardous waste storage and disposal procedures.
- Waste storage areas shall be kept clean, well organized, and equipped with ample clean-up supplies as appropriate for the materials being stored.
- Storage areas shall be inspected in conformance with the provisions in the contract documents.
- Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.
- Hazardous spills shall be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.
- The National Response Center, at (800) 424-8802, shall be notified of spills of Federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302.
- Copy of the hazardous waste manifests shall be provided to the RE.



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose These are procedures and practices to minimize or eliminate the discharges of pollutants to the drainage system or to watercourses from contaminated soil.

- Appropriate Applications**
- Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, and leaks from underground storage tanks.
 - It may also apply to highway widening projects in older areas where median and shoulder soils may have been contaminated by aerially deposited lead (ADL).

Limitations

- The procedures and practices presented in this best management practice (BMP) are general. The contractor shall identify appropriate practices and procedures for the specific contaminants known to exist or discovered on site.

Standards and Specifications ***Identifying Contaminated Areas***

- Contaminated soils are often identified during project planning and development with known locations identified in the plans and specifications. The contractor shall review applicable reports and investigate appropriate call-outs in the plans and specifications.
- The contractor may further identify contaminated soils by investigating:
 - Past site uses and activities.
 - Detected or undetected spills and leaks.
 - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements.

- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris. Test suspected soils at a certified laboratory.

Education

- Prior to performing any excavation work at the locations containing material classified as hazardous, employees and subcontractors shall complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified.
- Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

Handling Procedures for Material with Aerially Deposited Lead (ADL)

- Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.
- Excavation, transportation, and placement operations shall result in no visible dust.
- Use caution to prevent spillage of lead containing material during transport.
- Monitor the air quality during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

- To minimize on-site storage, contaminated soil shall be disposed of properly in accordance with all applicable regulations. All hazardous waste storage will comply with the requirements in Title 22, CCR, Sections 6626.250 to 66265.260.
- Test suspected soils at a DHS approved certified laboratory.
- If the soil is contaminated, work with the local regulatory agencies to develop options for treatment and/or disposal.
- Avoid temporary stockpiling of contaminated soils or hazardous material.
- If temporary stockpiling is necessary:
 - (1) Cover the stockpile with plastic sheeting or tarps.
 - (2) Install a berm around the stockpile to prevent runoff from leaving the area.
 - (3) Do not stockpile in or near storm drains or watercourses.

- Contaminated material and hazardous material on exteriors of transport vehicles shall be removed and placed either into the current transport vehicle or the excavation prior to the vehicle leaving the exclusion zone.
- Monitor the air quality continuously during excavation operations at all locations containing hazardous material.
- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
- Collect water from decontamination procedures and treat and/or dispose of it at an appropriate disposal site.
- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.
- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
- Excavation, transport, and disposal of contaminated material and hazardous material shall be in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
 - United States Department of Transportation (USDOT).
 - United States Environmental Protection Agency (USEPA).
 - California Environmental Protection Agency (CAL-EPA).
 - California Division of Occupation Safety and Health Administration (CAL-OSHA).
 - Local regulatory agencies.

Procedures for Underground Storage Tank Removals

- Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies, which have jurisdiction over such work.
- Arrange to have tested, as directed by the Resident Engineer (RE), any liquid or sludge found in the underground tank prior to its removal to determine if it contains hazardous substances.
- Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).

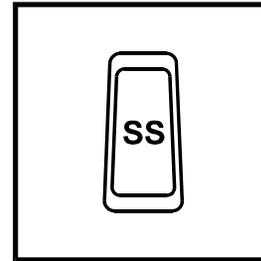
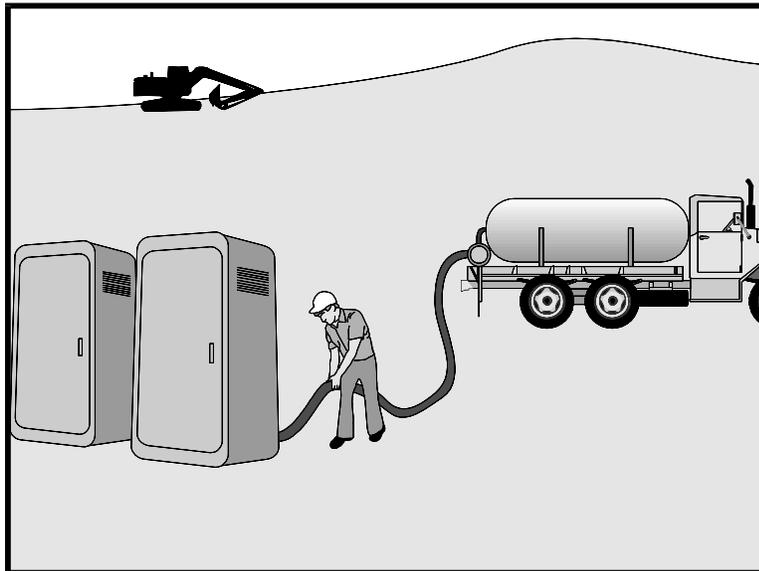
- The underground storage tank, any liquid and/or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal shall be transported to disposal facilities permitted to accept such waste.

Water Control

- Take all necessary precautions and preventive measures to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to: berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, shall be dewatered consistent with BMP NS-2, "Dewatering Operations."

Maintenance and Inspection

- The Contractor's Water Pollution Control Manager, foreman, and/or construction supervisor shall monitor on-site contaminated soil storage and disposal procedures.
- Monitor air quality continuously during excavation operations at all locations containing hazardous material.
- Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.
- Inspect hazardous waste receptacles and areas regularly.



Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose Procedures and practices to minimize or eliminate the discharge of construction site sanitary/septic waste materials to the storm drain system or to watercourses.

Appropriate Applications Sanitary/septic waste management practices are implemented on all construction sites that use temporary or portable sanitary/septic waste systems.

Limitations ■ None identified.

Standards and Specifications *Education*

- Educate employees, subcontractors, and suppliers on sanitary/septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary/septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary/septic waste.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Storage and Disposal Procedures

- Temporary sanitary facilities shall be located away from drainage facilities, watercourses, and from traffic circulation. When subjected to high winds or risk.

- Wastewater shall not be discharged or buried within the highway right-of-way.
 - Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, shall comply with the local health agency, city, county, and sewer district requirements.
 - If using an on site disposal system, such as a septic system, comply with local health agency requirements.
 - Properly connect temporary sanitary facilities that discharge to the sanitary sewer system to avoid illicit discharges.
 - Ensure that sanitary/septic facilities are maintained in good working order by a licensed service.
 - Use only reputable, licensed sanitary/septic waste haulers.
- Maintenance and Inspection
- The Contractor's Water Pollution Control Manager (WPCM) shall monitor onsite sanitary/septic waste storage and disposal procedures at least weekly.

APPENDIX 7

WPCDs and Surface Condition Calculations

STORM WATER POLLUTION PREVENTION

GENERAL SITE MANAGEMENT REQUIREMENTS

THE FOLLOWING GENERAL SITE MANAGEMENT REQUIREMENTS SHALL BE ADHERED TO THROUGHOUT THE DURATION OF THE CONSTRUCTION WORK (YEAR ROUND):

1. IN CASE EMERGENCY WORK IS REQUIRED, CONTACT _____ FROM _____ AT _____.
2. DEVICES SHOWN ON CITY APPROVED PLANS SHALL NOT BE MOVED OR MODIFIED WITHOUT THE APPROVAL OF THE ENGINEERING INSPECTOR.
3. THE CONTRACTOR SHALL RESTORE ALL EROSION CONTROL DEVICES TO WORKING ORDER TO THE SATISFACTION OF THE CITY ENGINEER AFTER EACH RUN-OFF PRODUCING RAINFALL.
4. THE CONTRACTOR SHALL INSTALL ADDITIONAL EROSION CONTROL MEASURES AS MAY BE REQUIRED BY THE CITY ENGINEER DUE TO UNCOMPLETED GRADING OPERATIONS OR UNFORESEEN CIRCUMSTANCES WHICH MAY ARISE.
5. THE CONTRACTOR SHALL BE RESPONSIBLE AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT PUBLIC TRESPASS ONTO AREAS WHERE IMPOUNDED WATERS CREATE A HAZARDOUS CONDITION.
6. GRADED AREAS AROUND THE PROJECT PERIMETER MUST DRAIN AWAY FROM THE FACE OF SLOPE AT THE CONCLUSION OF EACH WORKING DAY.
7. ALL REMOVABLE PROTECTIVE DEVICES SHALL BE IN PLACE AT THE END OF EACH WORKING DAY WHEN THE FIVE (5) DAY RAIN PROBABILITY FORECAST EXCEEDS FORTY PERCENT (40%). SILT AND OTHER DEBRIS SHALL BE REMOVED AFTER EACH RAINFALL.
8. ALL GRAVEL BAGS SHALL BE BURLAP TYPE WITH 3/4 INCH MINIMUM AGGREGATE.
9. ALL GRADED AREAS MUST HAVE EROSION CONTROL PROTECTION BEST MANAGEMENT PRACTICE MEASURES PROPERLY INSTALLED.
10. ADEQUATE PERIMETER PROTECTION BEST MANAGEMENT PRACTICE MEASURES MUST BE INSTALLED AND MAINTAINED.
11. ADEQUATE SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MEASURES MUST BE INSTALLED AND MAINTAINED.
12. ADEQUATE MEASURES TO CONTROL OFFSITE SEDIMENT TRACKING MUST BE INSTALLED AND MAINTAINED.
13. A MINIMUM OF 125% OF THE MATERIAL NEEDED TO INSTALL STANDBY BEST MANAGEMENT PRACTICE MEASURES TO PROTECT THE EXPOSED AREAS FROM EROSION AND PREVENT SEDIMENT DISCHARGES, MUST BE STORED ONSITE. AREAS ALREADY PROTECTED FROM EROSION USING PHYSICAL STABILIZATION OR ESTABLISHED VEGETATION STABILIZATION MEASURES ARE NOT CONSIDERED TO BE "EXPOSED" FOR PURPOSES OF THIS REQUIREMENT.

14. THE OWNER/DEVELOPER/CONTRACTOR MUST HAVE AN APPROVED "WEATHER TRIGGERED" ACTION PLAN AND BE ABLE TO DEPLOY STANDBY BEST MANAGEMENT PRACTICE MEASURES TO COMPLETELY PROTECT THE EXPOSED PORTIONS OF THE SITE WITHIN 48 HOURS OF A PREDICTED STORM EVENT (A PREDICTED STORM EVENT IS DEFINED AS A FORECASTED, 40% CHANCE OF RAIN BY THE NATIONAL WEATHER SERVICE). ON REQUEST, THE OWNER/CONTRACTOR MUST PROVIDE PROOF OF THIS CAPABILITY THAT IS ACCEPTABLE TO THE CITY.
15. DEPLOYMENT OF PHYSICAL OR VEGETATION EROSION CONTROL MEASURES MUST COMMENCE AS SOON AS SLOPES ARE COMPLETED. THE OWNER/CONTRACTOR MAY NOT CONTINUE TO RELY ON THE ABILITY TO DEPLOY STANDBY BEST MANAGEMENT PRACTICE MATERIALS TO PREVENT EROSION OF SLOPES THAT HAVE BEEN COMPLETED.
16. UNLESS OTHERWISE SPECIFIED ON THE GRADING PLANS OR THE CONSTRUCTION STORM WATER POLLUTION PREVENTION PLAN DOCUMENTS, THE AREA THAT CAN BE CLEARED, GRADED, AND LEFT EXPOSED AT ONE TIME IS LIMITED TO THE AMOUNT OF ACREAGE THAT THE CONTRACTOR CAN ADEQUATELY PROTECT PRIOR TO A PREDICTED RAINSTORM. IT MAY BE NECESSARY TO DEPLOY EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MEASURES IN AREAS THAT ARE NOT COMPLETED AND ARE NOT ACTIVELY BEING WORKED BEFORE ADDITIONAL GRADING IS ALLOWED TO PROCEED, AT THE DISCRETION OF THE PUBLIC WORKS INSPECTOR.

RAINY SEASON SITE MANAGEMENT REQUIREMENTS (OCTOBER 1 – APRIL 30)

THE FOLLOWING RAINY SEASON SITE MANAGEMENT REQUIREMENTS SHALL BE ADHERED TO THROUGHOUT THE RAINY SEASON DEFINED AS BEGINNING ON OCTOBER 1 OF ANY YEAR AND EXTENDING THROUGH APRIL 30TH OF THE FOLLOWING YEAR:

1. EROSION CONTROL, PERIMETER PROTECTION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MEASURES MUST BE UPGRADED IF NECESSARY TO PROVIDE SUFFICIENT PROTECTION FOR STORMS LIKELY TO OCCUR DURING THE RAINY SEASON.
2. EQUIPMENT AND WORKERS FOR EMERGENCY WORK SHALL BE MADE AVAILABLE AT ALL TIMES DURING THE RAINY SEASON. ALL NECESSARY MATERIALS SHALL BE STOCKPILED ON SITE AT CONVENIENT LOCATIONS TO FACILITATE RAPID CONSTRUCTION OF TEMPORARY DEVICES WHEN RAIN IS EMINENT.
3. ADEQUATE PHYSICAL OR VEGETATION EROSION CONTROL BEST MANAGEMENT PRACTICE MEASURES MUST BE INSTALLED AND ESTABLISHED FOR ALL COMPLETED SLOPES PRIOR TO THE START OF THE RAINY SEASON. THESE BEST MANAGEMENT PRACTICE MEASURES MUST BE MAINTAINED THROUGHOUT THE RAINY SEASON. IF A SELECTED BEST MANAGEMENT PRACTICE MEASURE FAILS, IT MUST BE REPAIRED AND IMPROVED, OR REPLACED WITH AN ACCEPTABLE ALTERNATE AS SOON AS IT IS SAFE TO DO SO. THE FAILURE OF A BEST MANAGEMENT PRACTICE MEASURE INDICATES IT WAS NOT ADEQUATE FOR THE CIRCUMSTANCES IN WHICH IT WAS USED. REPAIRS OR REPLACEMENTS MUST THEREFORE PUT A MORE ROBUST BEST MANAGEMENT PRACTICE MEASURE IN PLACE.

4. ALL VEGETATION EROSION CONTROL MUST BE ESTABLISHED PRIOR TO THE RAINY SEASON TO BE CONSIDERED AS A BEST MANAGEMENT PRACTICE MEASURE.
5. THE AMOUNT OF EXPOSED SOIL ALLOWED AT ONE TIME SHALL NOT EXCEED THAT WHICH CAN BE ADEQUATELY PROTECTED BY DEPLOYING STANDBY EROSION CONTROL AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MEASURES PRIOR TO A PREDICTED RAINSTORM.
6. A DISTURBED AREA THAT IS NOT COMPLETED BUT THAT IS NOT BEING ACTIVELY GRADED MUST BE FULLY PROTECTED FROM EROSION IF LEFT FOR 10 OR MORE DAYS. THE ABILITY TO DEPLOY STANDBY BEST MANAGEMENT PRACTICE MEASURE MATERIALS IS NOT SUFFICIENT FOR THESE AREAS. BEST MANAGEMENT PRACTICE MEASURES MUST ACTUALLY BE DEPLOYED.

EROSION CONTROL HYDROSEEDING, PLANTING AND IRRIGATION

1. ALL PERMANENT AND TEMPORARY EROSION CONTROL PLANTING AND IRRIGATION SHALL BE INSTALLED AND MAINTAINED AS REQUIRED IN SECTION 212 OF THE STANDARD SPECIFICATIONS AND THE FOLLOWING:

A HYDROSEEDING SHALL BE APPLIED TO:

- 1 ALL SLOPES THAT ARE GRADED 6:1 (HORIZONTAL TO VERTICAL) OR STEEPER WHEN THEY ARE:
 - a. THREE FEET OR MORE IN HEIGHT AND ADJACENT TO A PUBLIC WALL OR STREET.
 - b. ALL SLOPES 4 FEET OR MORE IN HEIGHT.
- 2 AREAS GRADED FLATTER THAN 6:1 WHEN ANY OF THE FOLLOWING CONDITIONS EXIST:
 - a. NOT SCHEDULED FOR IMPROVEMENTS (CONSTRUCTION OR GENERAL LANDSCAPING) WITHIN 60 DAYS OF ROUGH GRADING.
 - b. IDENTIFIED BY THE PARKS AND RECREATION DIRECTOR AS HIGHLY VISIBLE TO THE PUBLIC.
 - c. HAVE ANY SPECIAL CONDITION IDENTIFIED BY THE CITY ENGINEER THAT WARRANTS IMMEDIATE TREATMENT.

B HYDROSEEDING AREAS SHALL BE IRRIGATED IN ACCORDANCE WITH THE FOLLOWING CRITERIA:

- 1 ALL SLOPES THAT ARE GRADED 6:1 OR STEEPER AND THAT ARE:
 - a. THREE TO EIGHT FEET IN HEIGHT SHALL BE IRRIGATED BY HAND WATERING FROM QUICK COUPLERS/HOSE BIBS OR A CONVENTIONAL SYSTEM OF LOW PRECIPITATION SPRINKLER HEADS PROVIDING 100% COVERAGE.
 - b. GREATER THAN 8 FEET IN HEIGHT SHALL BE WATERED BY A CONVENTIONAL SYSTEM OF LOW PRECIPITATION SPRINKLER HEADS PROVIDING 100% COVERAGE.
- 2 AREAS SLOPED LESS THAN 6:1 SHALL BE IRRIGATED AS APPROVED BY THE CITY ENGINEER, PRIOR TO HYDROSEEDING. THE DEVELOPER SHALL SUBMIT A PROPOSED SCHEME TO PROVIDE IRRIGATION TO THE CITY ENGINEER. THE PROPOSAL SHALL BE SPECIFIC REGARDING THE NUMBERS, TYPES, AND COSTS OF THE ELEMENTS OF THE PROPOSED SYSTEM.
- 3 IRRIGATION SHALL MAINTAIN THE MOISTURE LEVEL OF THE SOIL AT THE OPTIMUM LEVEL FOR THE GROWTH OF THE HYDROSEEDING GROWTH.

C HYDROSEEDING MIX SHALL CONSIST OF ALL OF THE FOLLOWING:

- 1 SEED MIX SHALL CONSIST OF NO LESS THAN:
 - a. 20 lbs. PER ACRE OF ROSE CLOVER
 - b. 20 lbs. PER ACRE OF ZORRO FESCUE
 - c. 3 lbs. PER ACRE OF E SCHOOL CIA CALIFORNICA
 - d. 4 lbs. PER ACRE OF ACHILLEA MILLEFOLIA
 - e. 3 lbs. PER ACRE OF ALYSSUM (CARPET OF SNOW)
 - f. 1/2 lb. PER ACRE OF DIMORPHOLECA
 - g. ITEMS c,d,e, AND f OF THIS SUBSECTION MAY BE OMITTED ON LOCATIONS WHERE THE AREA BEING HYDROSEEDED IS NOT VISIBLE FROM EITHER A PUBLIC STREET OR RESIDENTIAL STRUCTURES.
 - h. ITEM a OF THIS SUBSECTION MUST BE INOCULATED WITH A NITROGEN FIXING BACTERIA AND APPLIED DRY EITHER BY DRILLING OR BROADCASTING BEFORE HYDROSEEDING.
 - i. ALL SEED MATERIALS SHALL BE TRANSPORTED TO THE JOBSITE IN UNOPENED CONTAINERS WITH THE CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE CERTIFICATION TAG ATTACHED TO, OR PRINTED ON SAID CONTAINERS.
 - j. NON-PHYTO-TOXIC WETTING AGENTS MAY BE ADDED TO THE HYDROSEED SLURRY AT THE DISCRETION OF THE CONTRACTOR.
- 2 TYPE 1 MULCH APPLIED AT THE RATE OF NO LESS THAN 2000 lbs PER ACRE. TYPE 6 MULCH (STRAW) MAY BE SUBSTITUTED, ALL OR PART, FOR HYDRAULICALLY APPLIED FIBER MATERIAL. WHEN STRAW IS USED, IT MUST BE ANCHORED TO THE SLOPE BY MECHANICALLY PUNCHING NO LESS THAN 50% OF THE STRAW INTO THE SOIL.
- 3 FERTILIZER CONSISTING OF AMMONIUM PHOSPHATE SULFATE, 16-20-0, WITH 15% SULPHUR APPLIED AT THE RATE OF 500 lbs. PER ACRE.

D AREAS TO BE HYDROSEEDED SHALL BE PREPARED PRIOR TO HYDROSEEDING BY:

- 1 ROUGHENING THE SURFACE TO BE PLANTED BY ANY OR A COMBINATION OF:
 - a. TRACK WALKING SLOPES STEEPER THAN 6:1
 - b. HARROWING AREAS 6:1 OR FLATTER THAT ARE SUFFICIENTLY FRIABLE.
 - c. RIPPING AREAS THAT WILL NOT BREAK UP USING ITEMS a OR b ABOVE.
- 2 CONDITIONING THE SOILS SO THAT IT IS SUITABLE FOR PLANTING BY:
 - a. ADJUSTING THE SURFACE SOIL MOISTURE TO PROVIDE A DAMP BUT NOT SATURATED SEED BED.
 - b. THE ADDITION OF SOIL AMENDMENTS, PH ADJUSTMENT, LEACHING COVERING SALINE SOILS TO PROVIDED VIABLE CONDITIONS FOR GROWTH.

E HYDROSEEDED AREAS SHALL BE MAINTAINED TO PROVIDE A VIGOROUS GROWTH UNTIL THE PROJECT IS PERMANENTLY LANDSCAPED OR, FOR AREAS WHERE HYDROSEEDING IS THE PERMANENT LANDSCAPING, UNTIL THE PROJECT IS COMPLETED AND ALL BONDS RELEASED.

Attachment C

Computation Sheet for Determining Runoff Coefficients

$$\text{Total Site Area} = \underline{\hspace{2cm} 23 \text{ Acres} \hspace{2cm}} \quad (\text{A})$$

Existing Site Conditions

$$\text{Impervious Site Area}^1 = \underline{\hspace{2cm} 9 \text{ Acres} \hspace{2cm}} \quad (\text{B})$$

$$\text{Impervious Site Area Runoff Coefficient}^{2,4} = \underline{\hspace{2cm} 0.87 \hspace{2cm}} \quad (\text{C})$$

$$\text{Pervious Site Area}^3 = \underline{\hspace{2cm} 14 \text{ Acres} \hspace{2cm}} \quad (\text{D})$$

$$\text{Pervious Site Area Runoff Coefficient}^4 = \underline{\hspace{2cm} 0.25 \hspace{2cm}} \quad (\text{E})$$

$$\text{Existing Site Area Runoff Coefficient} \quad \frac{(\text{B} \times \text{C}) + (\text{D} \times \text{E})}{(\text{A})} = \underline{\hspace{2cm} 0.49 \hspace{2cm}} \quad (\text{F})$$

Proposed Site Conditions (after construction)

$$\text{Impervious Site Area}^1 = \underline{\hspace{2cm} 8 \text{ Acres} \hspace{2cm}} \quad (\text{G})$$

$$\text{Impervious Site Area Runoff Coefficient}^{2,4} = \underline{\hspace{2cm} 0.87 \hspace{2cm}} \quad (\text{H})$$

$$\text{Pervious Site Area}^3 = \underline{\hspace{2cm} 15 \text{ Acres} \hspace{2cm}} \quad (\text{I})$$

$$\text{Pervious Site Area Runoff Coefficient}^4 = \underline{\hspace{2cm} .25 \hspace{2cm}} \quad (\text{J})$$

$$\text{Proposed Site Area Runoff Coefficient} \quad \frac{(\text{G} \times \text{H}) + (\text{I} \times \text{J})}{(\text{A})} = \underline{\hspace{2cm} 0.466 \hspace{2cm}} \quad (\text{K})$$

1. Includes paved areas, areas covered by buildings, and other impervious surfaces.
2. Use 0.95 unless lower or higher runoff coefficient can be verified.
3. Includes areas of vegetation, most unpaved or uncovered soil surfaces, and other pervious areas.
4. Refer to local Hydrology Manual for typical C values.

Attachment C

Computational Sheet for Determining Run-on Discharges

Existing Site Conditions

Area Runoff Coefficient	=	<u>0.49</u>	(A)
Area Rainfall Intensity	=	<u>3.1 in/hr</u>	(B)
Drainage Area	=	<u>23 Acres</u>	(C)
Site Area Run-on Discharge (A) x (B) x (C)	=	<u>7.66 ft³/sec</u>	(D)

Carlsbad- CECP Drainage/SUSMP BMP Calculations:

Table I shows the volume of stormwater that will be generated w/in the CECP basin during the listed rainfall intensities, assuming the size of the CECP plant basin is 522,000 Sq. Ft or 12.7 Acres:

Table 1: CECP Basin Capacity Bt Storm Event				
Rain Event Intensity 24 hour storm	Rain Inches	CECP Basin Stormwater Volume		
		Acre-Ft	Meter ²	Gallons
100	4	4.2	5200	1,380,000
10	3	3.2	4000	1,040,000
2	1.8	1.9	2400	620,000

Assuming no infiltration the size of the stormwater storage basin for each size storm, at the listed ponding depths, is show in Table 2:

Table 2: Size of Stormwater Storage Basin at various depths, Acres				
Rain Event Intensity 24 hour storm	Storage Depth			
	6"	12"	18"	24"
100	8.4	4.2	2.8	2.1
10	6.4	3.2	2.1	1.6
2	3.8	1.9	1.3	.95

Assuming an infiltration rate of .72-inch/hr for sandy loam-type soil (minimum required for infiltration is .52-inch/hr), the minimum basin invert area is determined by the equation:

$$A = WQV / kt$$

Where A = Basin invert area

WQV = water quality volume

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

t = drawdown time (hr)

Assuming a 24 hour drawdown time (allowed 72 hours), the size of the infiltration basin's invert area for each of the following storm events is:

- 100 yr/24 hr storm event: A= 5.4 acre
- 10 yr/24 hr storm event: A= 4.2 acre
- 2 yr/24 hr storm event: A= 2.5 acre

APPENDIX 8

2002 Construction General Stormwater Permit

STATE WATER RESOURCES CONTROL BOARD (SWRCB)
ORDER NO. 99 - 08 - DWQ
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT NO. CAS000002

WASTE DISCHARGE REQUIREMENTS (WDRS)
FOR
DISCHARGES OF STORM WATER RUNOFF ASSOCIATED WITH
CONSTRUCTION ACTIVITY

The State Water Resources Control Board finds that:

1. Federal regulations for controlling pollutants in storm water runoff discharges were promulgated by the U.S. Environmental Protection Agency (USEPA) on November 16, 1990 (40 Code of Federal Regulations (CFR) Parts 122, 123, and 124). The regulations require discharges of storm water to surface waters associated with construction activity including clearing, grading, and excavation activities (except operations that result in disturbance of less than five acres of total land area and which are not part of a larger common plan of development or sale) to obtain an NPDES permit and to implement Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to reduce or eliminate storm water pollution.

On December 8, 1999 federal regulations promulgated by USEPA (40CFR Parts 9, 122, 123, and 124) expanded the NPDES storm water program to include storm water discharges from municipal separate storm sewer systems (MS4s) and construction sites that were smaller than those previously included in the program. Federal regulation 40 CFR § 122.26(b)(15) defines small construction activity as including clearing, grading, and excavating that result in land disturbance of equal to or greater than one acre or less than five acres or is part of a larger common plan of development or sale. Permit applications for small construction activities are due by March 10, 2003.

2. This General Permit regulates pollutants in discharges of storm water associated with construction activity (storm water discharges) to surface waters, except from those areas on Tribal Lands; Lake Tahoe Hydrologic Unit; construction projects which disturb less than one acre, unless part of a larger common plan of development or sale; and storm water discharges which are determined ineligible for coverage under this General Permit by the California Regional Water Quality Control Boards (RWQCBs). Attachment 1 contains addresses and telephone numbers of each RWQCB office.
3. This General Permit does not preempt or supersede the authority of local storm water management agencies to prohibit, restrict, or control storm water discharges to separate storm sewer systems or other watercourses within their jurisdiction, as allowed by State and Federal law.

4. To obtain authorization for proposed storm water discharges to surface waters, pursuant to this General Permit, the landowner (discharger) must submit a Notice of Intent (NOI) with a vicinity map and the appropriate fee to the SWRCB prior to commencement of construction activities. In addition, coverage under this General Permit shall not occur until the applicant develops a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the requirements of Section A of this permit for the project. For proposed construction activity conducted on easements or on nearby property by agreement or permission, or by an owner or lessee of a mineral estate (oil, gas, geothermal, aggregate, precious metals, and/or industrial minerals) entitled to conduct the activities, the entity responsible for the construction activity must submit the NOI and filing fee and shall be responsible for development of the SWPPP.
5. If an individual NPDES Permit is issued to a discharger otherwise subject to this General Permit or if an alternative General Permit is subsequently adopted which covers storm water discharges regulated by this General Permit, the applicability of this General Permit to such discharges is automatically terminated on the effective date of the individual permit or the date of approval for coverage under the subsequent General Permit.
6. This action to adopt an NPDES permit is exempt from the provisions of the California Environmental Quality Act (Public Resources Code Section 21100, et seq.) in accordance with section 13389 of the California Water Code.
7. The SWRCB adopted the California Ocean Plan, and the RWQCBs have adopted and the SWRCB has approved Water Quality Control Plans (Basin Plans). Dischargers regulated by this General Permit must comply with the water quality standards in these Basin Plans and subsequent amendments thereto.
8. The SWRCB finds storm water discharges associated with construction activity to be a potential significant sources of pollutants. Furthermore, the SWRCB finds that storm water discharges associated with construction activities have the reasonable potential to cause or contribute to an excursion above water quality standards for sediment in the water bodies listed in Attachment 3 to this permit.
9. It is not feasible at this time to establish numeric effluent limitations for pollutants in storm water discharges from construction activities. Instead, the provisions of this General Permit require implementation of Best Management Practices (BMPs) to control and abate the discharge of pollutants in storm water discharges.
10. Discharges of non-storm water may be necessary for the completion of certain construction projects. Such discharges include, but are not limited to: irrigation of vegetative erosion control measures, pipe flushing and testing, street cleaning, and dewatering. Such discharges are authorized by this General Permit as long as they (a) do comply with Section A.9 of this General Permit, (b) do not cause or contribute to violation of any water quality standard, (c) do not violate any other provision of this

General Permit, (d) do not require a non-storm water permit as issued by some RWQCBs, and (e) are not prohibited by a Basin Plan. If a non-storm water discharge is subject to a separate permit adopted by a RWQCB, the discharge must additionally be authorized by the RWQCB permit.

11. Following adoption of this General Permit, the RWQCBs shall enforce the provisions herein including the monitoring and reporting requirements.
12. Following public notice in accordance with State and Federal laws and regulations, the SWRCB in a public meeting on June 8, 1998, heard and considered all comments. The SWRCB has prepared written responses to all significant comments.
13. This Order is an NPDES permit in compliance with section 402 of the Clean Water Act (CWA) and shall take effect upon adoption by the SWRCB provided the Regional Administrator of the USEPA has no objection. If the USEPA Regional Administrator objects to its issuance, the General Permit shall not become effective until such objection is withdrawn.
14. This General Permit does not authorize discharges of fill or dredged material regulated by the U.S. Army Corps of Engineers under CWA section 404 and does not constitute a waiver of water quality certification under CWA section 401.
15. The Monitoring Program and Reporting Requirements are modified in compliance with a judgment in the case of San Francisco BayKeeper, et al. v. State Water Resources Control Board. The modifications include sampling and analysis requirements for direct discharges of sediment to waters impaired due to sediment and for pollutants that are not visually detectable in runoff that may cause or contribute to an exceedance of water quality objectives.
16. Storm water discharges associated with industrial activity that are owned or operated by municipalities serving populations less than 100,000 people are no longer exempt from the need to apply for or obtain a storm water discharge permit. A temporary exemption, which was later extended by USEPA, was provided under section 1068(c) of the Intermodal Surface Transportation and Efficiency Act (ISTEA) of 1991. Federal regulation 40 CFR § 122.26(e)(1)(ii) requires the above municipalities to submit permit application by March 10, 2003.
17. This permit may be reopened and modified to include different monitoring requirements for small construction activity than for construction activity over five (5) acres.

IT IS HEREBY ORDERED that all dischargers who file an NOI indicating their intention to be regulated under the provisions of this General Permit shall comply with the following:

A. DISCHARGE PROHIBITIONS:

1. Authorization pursuant to this General Permit does not constitute an exemption to applicable discharge prohibitions prescribed in Basin Plans, as implemented by the nine RWQCBs.
2. Discharges of material other than storm water which are not otherwise authorized by an NPDES permit to a separate storm sewer system (MS4) or waters of the nation are prohibited, except as allowed in Special Provisions for Construction Activity, C.3.
3. Storm water discharges shall not cause or threaten to cause pollution, contamination, or nuisance.
4. Storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of a reportable quantity listed in 40 CFR Part 117 and/or 40 CFR Part 302.

B. RECEIVING WATER LIMITATIONS:

1. Storm water discharges and authorized nonstorm water discharges to any surface or ground water shall not adversely impact human health or the environment.
2. The SWPPP developed for the construction activity covered by this General Permit shall be designed and implemented such that storm water discharges and authorized nonstorm water discharges shall not cause or contribute to an exceedance of any applicable water quality standards contained in a Statewide Water Quality Control Plan and/or the applicable RWQCB's Basin Plan.
3. Should it be determined by the discharger, SWRCB, or RWQCB that storm water discharges and/or authorized nonstorm water discharges are causing or contributing to an exceedance of an applicable water quality standard, the discharger shall:
 - a. Implement corrective measures immediately following discovery that water quality standards were exceeded, followed by notification to the RWQCB by telephone as soon as possible but no later than 48 hours after the discharge has been discovered. This notification shall be followed by a report within 14-calendar days to the appropriate RWQCB, unless otherwise directed by the RWQCB, describing (1) the nature and cause of the water quality standard exceedance; (2) the BMPs currently being implemented; (3) any additional BMPs which will be implemented to

prevent or reduce pollutants that are causing or contributing to the exceedance of water quality standards; and (4) any maintenance or repair of BMPs. This report shall include an implementation schedule for corrective actions and shall describe the actions taken to reduce the pollutants causing or contributing to the exceedance.

- b. The discharger shall revise its SWPPP and monitoring program immediately after the report to the RWQCB to incorporate the additional BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring needed.
- c. Nothing in this section shall prevent the appropriate RWQCB from enforcing any provisions of this General Permit while the discharger prepares and implements the above report.

C. SPECIAL PROVISIONS FOR CONSTRUCTION ACTIVITY:

- 1. All dischargers shall file an NOI and pay the appropriate fee for construction activities conducted at each site as required by Attachment 2: Notice of Intent--General Instructions.
- 2. All dischargers shall develop and implement a SWPPP in accordance with Section A: Storm Water Pollution Prevention Plan. The discharger shall implement controls to reduce pollutants in storm water discharges from their construction sites to the BAT/BCT performance standard.
- 3. Discharges of non-storm water are authorized only where they do not cause or contribute to a violation of any water quality standard and are controlled through implementation of appropriate BMPs for elimination or reduction of pollutants. Implementation of appropriate BMPs is a condition for authorization of non-storm water discharges. Non-storm water discharges and the BMPs appropriate for their control must be described in the SWPPP. Wherever feasible, alternatives which do not result in discharge of nonstorm water shall be implemented in accordance with Section A.9. of the SWPPP requirements.
- 4. All dischargers shall develop and implement a monitoring program and reporting plan in accordance with Section B: Monitoring Program and Reporting Requirements.
- 5. All dischargers shall comply with the lawful requirements of municipalities, counties, drainage districts, and other local agencies regarding discharges of storm water to separate storm sewer systems or other watercourses under their jurisdiction, including applicable requirements in municipal storm water management programs developed to comply with NPDES permits issued by the RWQCBs to local agencies.

6. All dischargers shall comply with the standard provisions and reporting requirements contained in Section C: Standard Provisions.
7. The discharger may terminate coverage for a portion of the project under this General Permit when ownership of a portion of this project has been transferred or when a phase within this multi-phase project has been completed. When ownership has transferred, the discharger must submit to its RWQCB a Change of Information Form (COI) Attachment 4 with revised site map and the name, address and telephone number of the new owner(s). Upon transfer of title, the discharger should notify the new owner(s) of the need to obtain coverage under this General Permit. The new owner must comply with provisions of Sections A. 2. (c) and B. 2. (b) of this General Permit. To terminate coverage for a portion of the project when a phase has been completed, the discharger must submit to its RWQCB a COI with a revised map that identifies the newly delineated site.
8. The discharger may terminate coverage under this General Permit for a complete project by submitting to its RWQCB a Notice of Termination Form (NOT), and the post-construction BMPs plan according to Section A.10 of this General Permit. Note that a construction project is considered complete only when all portions of the site have been transferred to a new owner; or the following conditions have been met:
 - a. There is no potential for construction related storm water pollution,
 - b. All elements of the SWPPP have been completed,
 - c. Construction materials and waste have been disposed of properly,
 - d. The site is in compliance with all local storm water management requirements, and
 - e. A post-construction storm water management plan is in place as described in the site's SWPPP.
9. This General Permit expires five years from the date of adoption.

D. REGIONAL WATER QUALITY CONTROL BOARD (RWQCB) AUTHORITIES:

1. RWQCBs shall:
 - a. Implement the provisions of this General Permit. Implementation of this General Permit may include, but is not limited to requesting the submittal of SWPPPS, reviewing SWPPPs, reviewing monitoring reports, conducting compliance inspections, and taking enforcement actions.
 - b. Issue permits as they deem appropriate to individual dischargers, categories of dischargers, or dischargers in a geographic area. Upon issuance of such permits by a RWQCB, the affected dischargers shall no longer be regulated by this General Permit.
2. RWQCBs may require, on a case-by-case basis, the inclusion of an analysis of potential downstream impacts on receiving waterways due to the permitted construction.
3. RWQCBs may provide information to dischargers on the development and implementation of SWPPPs and monitoring programs and may require revisions to SWPPPs and monitoring programs.
4. RWQCBs may require dischargers to retain records for more than three years.
5. RWQCBs may require additional monitoring and reporting program requirements including sampling and analysis of discharges to water bodies listed in Attachment 3 to this permit. Additional requirements imposed by the RWQCB should be consistent with the overall monitoring effort in the receiving waters.
6. RWQCBs may issue individual NPDES permits for those construction activities found to be ineligible for coverage under this permit.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on August 19, 1999.

AYE: James M. Stubchaer
Mary Jane Forster
John W. Brown
Arthur G. Baggett, Jr.

NO: None

ABSENT: None

ABSTAIN: None

/s/
Maureen Marché
Administrative Assistant to the Board

SECTION A: STORM WATER POLLUTION PREVENTION PLAN

1. Objectives

A Storm Water Pollution Prevention Plan (SWPPP) shall be developed and implemented to address the specific circumstances for each construction site covered by this General Permit. The SWPPP shall be certified in accordance with the signatory requirements of section C, Standard Provision for Construction Activities (9). The SWPPP shall be developed and amended or revised, when necessary, to meet the following objectives:

- a. Identify all pollutant sources including sources of sediment that may affect the quality of storm water discharges associated with construction activity (storm water discharges) from the construction site, and
- b. Identify non-storm water discharges, and
- c. Identify, construct, implement in accordance with a time schedule, and maintain Best Management Practices (BMPs) to reduce or eliminate pollutants in storm water discharges and authorized nonstorm water discharges from the construction site during construction, and
- d. Develop a maintenance schedule for BMPs installed during construction designed to reduce or eliminate pollutants after construction is completed (post-construction BMPs).
- e. Identify a sampling and analysis strategy and sampling schedule for discharges from construction activity which discharge directly into water bodies listed on Attachment 3. (Clean Water Act Section 303(d) [303(d)] Water Bodies listed for Sedimentation).
- f. For all construction activity, identify a sampling and analysis strategy and sampling schedule for discharges that have been discovered through visual monitoring to be potentially contaminated by pollutants not visually detectable in the runoff.

2. Implementation Schedule

- a. For construction activity commencing on or after adoption of this General Permit, the SWPPP shall be developed prior to the start of soil-disturbing activity in accordance with this Section and shall be implemented concurrently with commencement of soil-disturbing activities.
- b. Existing permittees engaging in construction activities covered under the terms of the previous General Construction Permit SWPPP (WQ Order No.92-08-DWQ) shall continue to implement their existing SWPPP and shall implement any

necessary revisions to their SWPPP in accordance with this Section of the General Permit in a timely manner, but in no case more than 90-calender days from the date of adoption of this General Permit.

- c. For ongoing construction activity involving a change of ownership of property, the new owner shall review the existing SWPPP and amend if necessary, or develop a new SWPPP within 45-calender days.
- d. Existing permittees shall revise their SWPPP in accordance with the sampling and analysis modifications prior to August 1, 2001. For ongoing construction activity involving a change of ownership the new owner shall review the existing SWPPP and amend the sampling and analysis strategy, if required, within 45 days. For construction activity commencing after the date of adoption, the SWPPP shall be developed in accordance with the modification language adopted.

3. Availability

The SWPPP shall remain on the construction site while the site is under construction during working hours, commencing with the initial construction activity and ending with termination of coverage under the General Permit.

4. Required Changes

- a. The discharger shall amend the SWPPP whenever there is a change in construction or operations which may affect the discharge of pollutants to surface waters, ground waters, or a municipal separate storm sewer system (MS4). The SWPPP shall also be amended if the discharger violates any condition of this General Permit or has not achieved the general objective of reducing or eliminating pollutants in storm water discharges. If the RWQCB determines that the discharger is in violation of this General Permit, the SWPPP shall be amended and implemented in a timely manner, but in no case more than 14-calendar days after notification by the RWQCB. All amendments should be dated and directly attached to the SWPPP.
- b. The RWQCB or local agency with the concurrence of the RWQCB may require the discharger to amend the SWPPP.

5. Source Identification

The SWPPP shall include: (a) project information and (b) pollutant source identification combined with an itemization of those BMPs specifically chosen to control the pollutants listed.

- a. Project Information

- (1) The SWPPP shall include a vicinity map locating the project site with respect to easily identifiable major roadways, geographic features, or landmarks. At a minimum, the map must show the construction site perimeter, the geographic features surrounding the site, and the general topography.
- (2) The SWPPP shall include a site map(s) which shows the construction project in detail, including the existing and planned paved areas and buildings.
 - (a) At a minimum, the map must show the construction site perimeter; existing and proposed buildings, lots, roadways, storm water collection and discharge points; general topography both before and after construction; and the anticipated discharge location(s) where the storm water from the construction site discharges to a municipal storm sewer system or other water body.
 - (b) The drainage patterns across the project area must clearly be shown on the map, and the map must extend as far outside the site perimeter as necessary to illustrate the relevant drainage areas. Where relevant drainage areas are too large to depict on the map, map notes or inserts illustrating the upstream drainage areas are sufficient.
 - (c) Temporary on-site drainages to carry concentrated flow shall be selected to comply with local ordinances, to control erosion, to return flows to their natural drainage courses, and to prevent damage to downstream properties.
3. Information presented in the SWPPP may be represented either by narrative or by graphics. Where possible, narrative descriptions should be plan notes. Narrative descriptions which do not lend themselves to plan notes can be contained in a separate document which must be referenced on the plan.

b. Pollutant Source and BMP Identification

The SWPPP shall include a description of potential sources which are likely to add pollutants to storm water discharges or which may result in nonstorm water discharges from the construction site. Discharges originating from off-site which flow across or through areas disturbed by construction that may contain pollutants should be reported to the RWQCB.

The SWPPP shall:

- (1) Show drainage patterns and slopes anticipated after major grading activities are completed. Runoff from off-site areas should be prevented from flowing through areas that have been disturbed by construction unless appropriate conveyance systems are in place. The amount of anticipated storm water run-on must be considered to determine the appropriateness of the BMPs chosen. Show all calculations for anticipated storm water run-on, and describe all BMPs implemented to divert off-site drainage described in section A. 5 a. (2) (c) around or through the construction project.
- (2) Show the drainage patterns into each on-site storm water inlet point or receiving water. Show or describe the BMPs that will protect operational storm water inlets or receiving waters from contaminated discharges other than sediment discharges, such as, but not limited to: storm water with elevated pH levels from contact with soil amendments such as lime or gypsum; slurry from sawcutting of concrete or asphalt ;washing of exposed aggregate concrete; concrete rinse water; building washing operations; equipment washing operations; minor street washing associated with street delineation; and/or sealing and paving activities occurring during rains.
- (3) Show existing site features that, as a result of known past usage, may contribute pollutants to storm water, (e.g., toxic materials that are known to have been treated, stored, disposed, spilled, or leaked onto the construction site). Show or describe the BMPs implemented to minimize the exposure of storm water to contaminated soil or toxic materials.
- (4) Show areas designated for the (a) storage of soil or waste, (b) vehicle storage and service areas, (c) construction material loading, unloading, and access areas, (d) equipment storage, cleaning, and maintenance areas.
- (5) Describe the BMPs for control of discharges from waste handling and disposal areas and methods of on-site storage and disposal of construction materials and construction waste. Describe the BMPs designed to minimize or eliminate the exposure of storm water to construction materials, equipment, vehicles, waste storage areas, or service areas. The BMPs described shall be in compliance with Federal, State, and local laws, regulations, and ordinances.
- (6) Describe all post-construction BMPs for the project, and show the location of each BMP on the map. (Post-construction BMPs consist of permanent features designed to minimize pollutant discharges, including sediment, from the site after construction has been completed.) Also, describe the agency or parties to be the responsible party for long-term maintenance of these BMPs.

- (7) Show the locations of direct discharge from the construction site into a Section 303(d) list water body. Show the designated sampling locations in the receiving waters, which represent the prevailing conditions of the water bodies upstream of the construction site discharge and immediately downstream from the last point of discharge.
- (8) Show the locations designated for sampling the discharge from areas identified in Section A. 5. b. (2), (3), and (4) and Section A. 5. c. (1) and (2). Samples shall be taken should visual monitoring indicate that there has been a breach, malfunction, leakage, or spill from a BMP which could result in the discharge in storm water of pollutants that would not be visually detectable, or if storm water comes into contact with soil amendments or other exposed materials or contamination and is allowed to be discharged. Describe the sampling procedure, location, and rationale for obtaining the uncontaminated sample of storm water.

c. Additional Information

- (1) The SWPPP shall include a narrative description of pollutant sources and BMPs that cannot be adequately communicated or identified on the site map. In addition, a narrative description of preconstruction control practices (if any) to reduce sediment and other pollutants in storm water discharges shall be included.
- (2) The SWPPP shall include an inventory of all materials used and activities performed during construction that have the potential to contribute to the discharge of pollutants other than sediment in storm water. Describe the BMPs selected and the basis for their selection to eliminate or reduce these pollutants in the storm water discharges.
- (3) The SWPPP shall include the following information regarding the construction site surface area: the size (in acres or square feet), the runoff coefficient before and after construction, and the percentage that is impervious (e.g., paved, roofed, etc.) before and after construction.
- (4) The SWPPP shall include a copy of the NOI, and the Waste Discharge Identification (WDID) number. Should a WDID number not be received from the SWRCB at the time construction commences, the discharger shall include proof of mailing of the NOI, e.g., certified mail receipt, copy of check, express mail receipt, etc.
- (5) The SWPPP shall include a construction activity schedule which describes all major activities such as mass grading, paving, lot or parcel

improvements at the site and the proposed time frame to conduct those activities.

- (6) The SWPPP shall list the name and telephone number of the qualified person(s) who have been assigned responsibility for prestorm, poststorm, and storm event BMP inspections; and the qualified person(s) assigned responsibility to ensure full compliance with the permit and implementation of all elements of the SWPPP, including the preparation of the annual compliance evaluation and the elimination of all unauthorized discharges.

6. Erosion Control

Erosion control, also referred to as “soil stabilization” is the most effective way to retain soil and sediment on the construction site. The most efficient way to address erosion control is to preserve existing vegetation where feasible, to limit disturbance, and to stabilize and revegetate disturbed areas as soon as possible after grading or construction. Particular attention must be paid to large mass-graded sites where the potential for soil exposure to the erosive effects of rainfall and wind is great. Mass graded construction sites may be exposed for several years while the project is being built out. Thus, there is potential for significant sediment discharge from the site to surface waters.

At a minimum, the discharger/operator must implement an effective combination of erosion and sediment control on all disturbed areas during the rainy season. These disturbed areas include rough graded roadways, slopes, and building pads. Until permanent vegetation is established, soil cover is the most cost-effective and expeditious method to protect soil particles from detachment and transport by rainfall. Temporary soil stabilization can be the single-most important factor in reducing erosion at construction sites. The discharger shall consider measures such as: covering with mulch, temporary seeding, soil stabilizers, binders, fiber rolls or blankets, temporary vegetation, permanent seeding, and a variety of other measures.

The SWPPP shall include a description of the erosion control practices, including a time schedule, to be implemented during construction to minimize erosion on disturbed areas of a construction site. The discharger must consider the full range of erosion control BMPs. The discharger must consider any additional site-specific and seasonal conditions when selecting and implementing appropriate BMPs. The above listed erosion control measures are examples of what should be considered and are not exclusive of new or innovative approaches currently available or being developed.

- a. The SWPPP shall include:

- (1) An outline of the areas of vegetative soil cover or native vegetation onsite which will remain undisturbed during the construction project.
 - (2) An outline of all areas of soil disturbance including cut or fill areas which will be stabilized during the rainy season by temporary or permanent erosion control measures, such as seeding, mulch, or blankets, etc.
 - (3) An outline of the areas of soil disturbance, cut, or fill which will be left exposed during any part of the rainy season, representing areas of potential soil erosion where sediment control BMPs are required to be used during construction.
 - (4) A proposed schedule for the implementation of erosion control measures.
- b. The SWPPP shall include a description of the BMPs and control practices to be used for both temporary and permanent erosion control measures.
 - c. The SWPPP shall include a description of the BMPs to reduce wind erosion at all times, with particular attention paid to stock-piled materials.

7. Stabilization

- (1) All disturbed areas of the construction site must be stabilized. Final stabilization for the purposes of submitting a NOT is satisfied when:
 - All soil disturbing activities are completed AND EITHER OF THE TWO FOLLOWING CRITERIA ARE MET:
 - A uniform vegetative cover with 70 percent coverage has been established OR:
 - equivalent stabilization measures have been employed. These measures include the use of such BMPs as blankets, reinforced channel liners, soil cement, fiber matrices, geotextiles, or other erosion resistant soil coverings or treatments.
- (2) Where background native vegetation covers less than 100 percent of the surface, such as in arid areas, the 70 percent coverage criteria is adjusted as follows: If the native vegetation covers 50 percent of the ground surface, 70 percent of 50 percent ($.70 \times .50 = .35$) would require 35 percent total uniform surface coverage.

8. Sediment Control

The SWPPP shall include a description or illustration of BMPs which will be implemented to prevent a net increase of sediment load in storm water discharge relative to preconstruction levels. Sediment control BMPs are required at appropriate locations along the site perimeter and at all operational internal inlets to the storm drain system at all times during the rainy season. Sediment control practices may include filtration devices and barriers (such as fiber rolls, silt fence, straw bale barriers, and gravel inlet filters) and/or settling devices (such as sediment traps or basins). Effective filtration devices, barriers, and settling devices shall be selected, installed and maintained properly. A proposed schedule for deployment of sediment control BMPs shall be included in the SWPPP. These are the most basic measures to prevent sediment from leaving the project site and moving into receiving waters. Limited exemptions may be authorized by the RWQCB when work on active areas precludes the use of sediment control BMPs temporarily. Under these conditions, the SWPPP must describe a plan to establish perimeter controls prior to the onset of rain.

During the nonrainy season, the discharger is responsible for ensuring that adequate sediment control materials are available to control sediment discharges at the downgrade perimeter and operational inlets in the event of a predicted storm. The discharger shall consider a full range of sediment controls, in addition to the controls listed above, such as straw bale dikes, earth dikes, brush barriers, drainage swales, check dams, subsurface drain, sandbag dikes, fiber rolls, or other controls. At a minimum, the discharger/operator must implement an effective combination of erosion and sediment control on all disturbed areas during the rainy season.

If the discharger chooses to rely on sediment basins for treatment purposes, sediment basins shall, at a minimum, be designed and maintained as follows:

Option 1: Pursuant to local ordinance for sediment basin design and maintenance, provided that the design efficiency is as protective or more protective of water quality than Option 3.

OR

Option 2: Sediment basin(s), as measured from the bottom of the basin to the principal outlet, shall have at least a capacity equivalent to 3,600 cubic feet of storage per acre draining into the sediment basin. The length of the basin shall be more than twice the width of the basin. The length is determined by measuring the distance between the inlet and the outlet; and the depth must not be less than three feet nor greater than five feet for safety reasons and for maximum efficiency.

OR

Option 3: Sediment basin(s) shall be designed using the standard equation:

$$A_s = 1.2Q/V_s$$

Where: A_s is the minimum surface area for trapping soil particles of a certain size; V_s is the settling velocity of the design particle size chosen; and $Q = C \times I \times A$ where Q is the discharge rate measured in cubic feet per second; C is the runoff coefficient; I is the precipitation intensity for the 10-year, 6-hour rain event and A is the area draining into the sediment basin in acres. The design particle size shall be the smallest soil grain size determined by wet sieve analysis, or the fine silt sized (0.01mm) particle, and the V_s used shall be 100 percent of the calculated settling velocity.

The length is determined by measuring the distance between the inlet and the outlet; the length shall be more than twice the dimension as the width; the depth shall not be less than three feet nor greater than five feet for safety reasons and for maximum efficiency (two feet of storage, two feet of capacity). The basin(s) shall be located on the site where it can be maintained on a year-round basis and shall be maintained on a schedule to retain the two feet of capacity;

OR

- Option 4: The use of an equivalent surface area design or equation, provided that the design efficiency is as protective or more protective of water quality than Option 3.

A sediment basin shall have a means for dewatering within 7-calendar days following a storm event. Sediment basins may be fenced if safety (worker or public) is a concern.

The outflow from a sediment basin that discharges into a natural drainage shall be provided with outlet protection to prevent erosion and scour of the embankment and channel.

The discharger must consider any additional site-specific and seasonal conditions when selecting and designing sediment control BMPs. The above listed sediment control measures are examples of what should be considered and are not exclusive of new or innovative approaches currently available or being developed.

The SWPPP shall include a description of the BMPs to reduce the tracking of sediment onto public or private roads at all times. These public and private roads shall be inspected and cleaned as necessary. Road cleaning BMPs shall be discussed in the SWPPP and will not rely on the washing of accumulated sediment or silt into the storm drain system.

9. Non-Storm Water Management

Describe all non-storm water discharges to receiving waters that are proposed for the construction project. Non-storm water discharges should be eliminated or reduced to the extent feasible. Include the locations of such discharges and descriptions of all BMPs designed for the control of pollutants in such discharges. Onetime discharges shall be monitored during the time that such discharges are occurring. A qualified person should be assigned the responsibility for ensuring that no materials other than storm water are discharged in quantities which will have an adverse effect on receiving waters or storm drain systems (consistent with BAT/BCT), and the name and contact number of that person should be included in the SWPPP document.

Discharging sediment-laden water which will cause or contribute to an exceedance of the applicable RWQCB's Basin Plan from a dewatering site or sediment basin into any receiving water or storm drain without filtration or equivalent treatment is prohibited.

10. Post-Construction Storm Water Management

The SWPPP shall include descriptions of the BMPs to reduce pollutants in storm water discharges after all construction phases have been completed at the site (Post-Construction BMPs). Post-Construction BMPs include the minimization of land disturbance, the minimization of impervious surfaces, treatment of storm water runoff using infiltration, detention/retention, biofilter BMPs, use of efficient irrigation systems, ensuring that interior drains are not connected to a storm sewer system, and appropriately designed and constructed energy dissipation devices. These must be consistent with all local post-construction storm water management requirements, policies, and guidelines. The discharger must consider site-specific and seasonal conditions when designing the control practices. Operation and maintenance of control practices after construction is completed shall be addressed, including short-and long-term funding sources and the responsible party.

11. Maintenance, Inspection, and Repair

The SWPPP shall include a discussion of the program to inspect and maintain all BMPs as identified in the site plan or other narrative documents throughout the entire duration of the project. A qualified person will be assigned the responsibility to conduct inspections. The name and telephone number of that person shall be listed in the SWPPP document. Inspections will be performed before and after storm events and once each 24-hour period during extended storm events to identify BMP effectiveness and implement repairs or design changes as soon as feasible depending upon field conditions. Equipment, materials, and workers must be available for rapid response to failures and emergencies. All corrective maintenance to BMPs shall be performed as soon as possible after the conclusion of each storm depending upon worker safety.

For each inspection required above, the discharger shall complete an inspection checklist. At a minimum, an inspection checklist shall include:

- a. Inspection date.

- b. Weather information: best estimate of beginning of storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall (inches).
- c. A description of any inadequate BMPs.
- d. If it is possible to safely access during inclement weather, list observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list result of visual inspection at relevant outfall, discharge point, or downstream location and projected required maintenance activities.
- e. Corrective actions required, including any changes to SWPPP necessary and implementation dates.
- f. Inspectors name, title, and signature.

The dischargers shall prepare their inspection checklists using the inspection checklist form provided by the SWRCB or RWQCB or on forms that contain the equivalent information.

12. Training

Individuals responsible for SWPPP preparation, implementation, and permit compliance shall be appropriately trained, and the SWPPP shall document all training. This includes those personnel responsible for installation, inspection, maintenance, and repair of BMPs. Those responsible for overseeing, revising, and amending the SWPPP shall also document their training. Training should be both formal and informal, occur on an ongoing basis when it is appropriate and convenient, and should include training/workshops offered by the SWRCB, RWQCB, or other locally recognized agencies or professional organizations.

13. List of Contractors/Subcontractors

The SWPPP shall include a list of names of all contractors, (or subcontractors) and individuals responsible for implementation of the SWPPP. This list should include telephone numbers and addresses. Specific areas of responsibility of each subcontractor and emergency contact numbers should also be included.

14. Other Plans

This SWPPP may incorporate by reference the appropriate elements of other plans required by local, State, or Federal agencies. A copy of any requirements incorporated by reference shall be kept at the construction site.

15. Public Access

The SWPPP shall be provided, upon request, to the RWQCB. The SWPPP is considered a report that shall be available to the public by the RWQCB under section 308(b) of the Clean Water Act.

16. Preparer Certification

The SWPPP and each amendment shall be signed by the landowner (discharger) or his representative and include the date of initial preparation and the date of each amendment.

SECTION B: MONITORING PROGRAM AND REPORTING REQUIREMENTS

1. Required Changes

The RWQCB may require the discharger to conduct additional site inspections, to submit reports and certifications, or perform sampling and analysis.

2. Implementation

- a. The requirements of this Section shall be implemented at the time of commencement of construction activity (see also Section A. 2. Implementation Schedule). The discharger is responsible for implementing these requirements until construction activity is complete and the site is stabilized.
- b. For ongoing construction activity involving a change in ownership of property covered by this General Permit, the new owner must complete a NOI and implement the requirements of this Section concurrent with the change of ownership. For changes of information, the owner must follow instructions in C. 7. Special Provisions for Construction Activity of the General Permit.

3. Site Inspections

Qualified personnel shall conduct inspections of the construction site prior to anticipated storm events, during extended storm events, and after actual storm events to identify areas contributing to a discharge of storm water associated with construction activity. The name(s) and contact number(s) of the assigned inspection personnel shall be listed in the SWPPP. Pre-storm inspections are to ensure that BMPs are properly installed and maintained; post-storm inspections are to assure that the BMPs have functioned adequately. During extended storm events, inspections shall be required each 24-hour period. Best Management Practices (BMPs) shall be evaluated for adequacy and proper implementation and whether additional BMPs are required in accordance with the terms of the General Permit (see language in Section A. 11. Maintenance, Inspection, and Repair). Implementation of nonstorm water discharge BMPs shall be verified and their

effectiveness evaluated. One time discharges of non-storm water shall be inspected when such discharges occur.

4. Compliance Certification

Each discharger or qualified assigned personnel listed by name and contact number in the SWPPP must certify annually that construction activities are in compliance with the requirements of this General Permit and the SWPPP. This Certification shall be based upon the site inspections required in Item 3 of this Section. The certification must be completed by July 1 of each year.

5. Noncompliance Reporting

Dischargers who cannot certify compliance, in accordance with Item 4 of this Section and/or who have had other instances of noncompliance excluding exceedances of water quality standards as defined in section B. 3. Receiving Water Limitations Language, shall notify the appropriate RWQCB within 30 days. Corrective measures should be implemented immediately following discovery that water quality standards were exceeded. The notifications shall identify the noncompliance event, including an initial assessment of any impact caused by the event; describe the actions necessary to achieve compliance; and include a time schedule subject to the modifications by the RWQCB indicating when compliance will be achieved. Noncompliance notifications must be submitted within 30-calendar days of identification of noncompliance.

6. Monitoring Records

Records of all inspections, compliance certifications, and noncompliance reporting must be retained for a period of at least three years from the date generated. With the exception of noncompliance reporting, dischargers are not required to submit these records.

7. Monitoring Program for Sedimentation/Siltation

Dischargers of storm water associated with construction activity that directly enters a water body listed in Attachment 3 shall conduct a sampling and analysis program for the pollutants (sedimentation/siltation or turbidity) causing the impairment. The discharger shall monitor for the applicable parameter. If the water body is listed for sedimentation or siltation, samples should be analyzed for Settleable Solids (ml/l) and Total Suspended Solids (mg/l). Alternatively or in addition, samples may be analyzed for suspended sediment concentration according to ASTM D3977-97. If the water body is listed for turbidity, samples should be analyzed for turbidity (NTU). Discharges that flow through tributaries that are not listed in Attachment 3 or that flow into Municipal Separate Storm Sewer Systems (MS4) are not subject to these sampling and analysis requirements. The sampling and analysis parameters and procedures must be designed to determine whether the BMPs installed and maintained prevent discharges of sediment from contributing to impairment in receiving waters.

Samples shall be collected during the first two hours of discharge from rain events which result in a direct discharge to any water body listed in Attachment 3. Samples shall be collected during daylight hours (sunrise to sunset). Dischargers need not collect more than four (4) samples per month. All samples shall be taken in the receiving waters and shall be representative of the prevailing conditions of the water bodies. Samples shall be collected from safely accessible locations upstream of the construction site discharge and immediately downstream from the last point of discharge.

For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed. Portable meters shall be calibrated according to manufacturer's specification. All field and/or laboratory analytical data shall be kept in the SWPPP document, which is to remain at the construction site at all times until a Notice of Termination has been submitted and approved.

8. Monitoring Program for Pollutants Not Visually Detectable in Storm Water

A sampling and analysis program shall be developed and conducted for pollutants which are not visually detectable in storm water discharges, which are or should be known to occur on the construction site, and which could cause or contribute to an exceedance of water quality objectives in the receiving water. Pollutants that should be considered for inclusion in this sampling and analysis program are those identified in Sections A.5.b. and A.5.c.

Construction materials and compounds that are not stored in water-tight containers under a water-tight roof or inside a building are examples of materials for which the discharger may have to implement sampling and analysis procedures. The goal of the sampling and analysis is to determine whether the BMPs employed and maintained on site are effective in preventing the potential pollutants from coming in contact with storm water and causing or contributing to an exceedance of water quality objectives in the receiving waters. Examples of construction sites that may require sampling and analysis include: sites that are known to have contaminants spilled or spread on the ground; sites where construction practices include the application of soil amendments, such as gypsum, which can increase the pH of the runoff; or sites having uncovered stockpiles of material exposed to storm water. Visual observations before, during, and after storm events may trigger the requirement to collect samples. Any breach, malfunction, leakage, or spill observed which could result in the discharge of pollutants to surface waters that *would* not be visually detectable in storm water shall trigger the collection of a sample of discharge. Samples shall be collected at all discharge locations which drain the areas identified by the visual observations and which can be safely accessed. For sites where sampling and analysis is required, personnel trained in water quality sampling procedures shall collect storm water samples. A sufficiently large sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site

(uncontaminated sample) shall be collected for comparison with the discharge sample. Samples shall be collected during the first two hours of discharge from rain events that occur during daylight hours and which generate runoff.

The uncontaminated sample shall be compared to the samples of discharge using field analysis or through laboratory analysis. Analyses may include, but are not limited to, indicator parameters such as: pH, specific conductance, dissolved oxygen, conductivity, salinity, and TDS.

For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed. Portable meters shall be calibrated according to manufacturer's specification. All field and/or analytical data shall be kept in the SWPPP document, which is to remain at the construction site at all times until a *Notice of Termination* has been submitted and approved.

SECTION C: STANDARD PROVISIONS FOR CONSTRUCTION ACTIVITY

1. Duty to Comply

The discharger must comply with all of the conditions of this General Permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and the Porter-Cologne Water Quality Control Act and is grounds for enforcement action and/or removal from General Permit coverage.

The discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this General Permit has not yet been modified to incorporate the requirement.

2. General Permit Actions

This General Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the discharger for a General Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not annul any General Permit condition.

If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this General Permit, this General Permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the dischargers so notified.

3. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this General Permit.

4. Duty to Mitigate

The discharger shall take all responsible steps to minimize or prevent any discharge in violation of this General Permit, which has a reasonable likelihood of adversely affecting human health or the environment.

5. Proper Operation and Maintenance

The discharger shall at all times properly operate and maintain any facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this General Permit and with the requirements of Storm Water Pollution Prevention Plans (SWPPP). Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance may require the operation of backup or auxiliary facilities or similar systems installed by a discharger when necessary to achieve compliance with the conditions of this General Permit.

6. Property Rights

This General Permit does not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor does it authorize any infringement of Federal, State, or local laws or regulations.

7. Duty to Provide Information

The discharger shall furnish the RWQCB, State Water Resources Control Board, or USEPA, within a reasonable time, any requested information to determine compliance with this General Permit. The discharger shall also furnish, upon request, copies of records required to be kept by this General Permit.

8. Inspection and Entry

The discharger shall allow the RWQCB, SWRCB, USEPA, and/or, in the case of construction sites which discharge through a municipal separate storm sewer, an authorized representative of the municipal operator of the separate storm sewer system receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

- a. Enter upon the discharger's premises at reasonable times where a regulated construction activity is being conducted or where records must be kept under the conditions of this General Permit;
- b. Access and copy at reasonable times any records that must be kept under the conditions of this General Permit;
- c. Inspect at reasonable times the complete construction site, including any off-site staging areas or material storage areas, and the erosion/sediment controls; and
- d. Sample or monitor at reasonable times for the purpose of ensuring General Permit compliance.

9. Signatory Requirements

- a. All Notice of Intents (NOIs), Notice of Terminations (NOTs), SWPPPs, certifications, and reports prepared in accordance with this Order submitted to the SWRCB shall be signed as follows:
 - (1) For a corporation: by a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means: (a) a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or (b) the manager of the construction activity if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;
 - (2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
 - (3) For a municipality, State, Federal, or other public agency: by either a principal executive officer, ranking elected official, or duly authorized representative. The principal executive officer of a Federal agency includes the chief executive officer of the agency or the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of USEPA).
- b. All SWPPPs, reports, certifications, or other information required by the General Permit and/or requested by the RWQCB, SWRCB, USEPA, or the local storm water management agency shall be signed by a person described above or by a duly authorized representative. A person is a duly authorized representative if:
 - (1) The authorization is made in writing by a person described above and retained as part of the SWPPP; or

- (2) The authorization specifies either an individual or a position having responsibility for the overall operation of the construction activity, such as the position of manager, operator, superintendent, or position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position).
- c. If an authorization is no longer accurate because a different individual or position has responsibility for the overall operation of the construction activity, a new authorization must be attached to the SWPPP prior to submittal of any reports, information, or certifications to be signed by the authorized representative.

10. Certification

Any person signing documents under Section C, Provision 9 above, shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete.

I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

11. Anticipated Noncompliance

The discharger will give advance notice to the RWQCB and local storm water management agency of any planned changes in the construction activity which may result in noncompliance with General Permit requirements.

12. Penalties for Falsification of Reports

Section 309(c)(4) of the CWA provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit, including reports of compliance or noncompliance shall upon conviction, be punished by a fine of not more than \$10,000 or by imprisonment for not more than two years or by both.

13. Oil and Hazardous Substance Liability

Nothing in this General Permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the discharger is or may be subject to under Section 311 of the CWA.

14. Severability

The provisions of this General Permit are severable; and, if any provision of this General Permit or the application of any provision of this General Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this General Permit shall not be affected thereby.

15. Reopener Clause

This General Permit may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, receipt of USEPA guidance concerning regulated activities, judicial decision, or in accordance with 40 Code of Federal Regulations (CFR) 122.62, 122.63, 122.64, and 124.5.

16. Penalties for Violations of Permit Conditions

- a. Section 309 of the CWA provides significant penalties for any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any such section in a permit issued under Section 402. Any person who violates any permit condition of this General Permit is subject to a civil penalty not to exceed \$27,500 per calendar day of such violation, as well as any other appropriate sanction provided by Section 309 of the CWA.
- b. The Porter-Cologne Water Quality Control Act also provides for civil and criminal penalties which in some cases are greater than those under the CWA.

17. Availability

A copy of this General Permit shall be maintained at the construction site during construction activity and be available to operating personnel.

18. Transfers

This General Permit is not transferable. A new owner of an ongoing construction activity must submit a NOI in accordance with the requirements of this General Permit to be authorized to discharge under this General Permit. An owner who sells property covered

by this General Permit shall inform the new owner of the duty to file a NOI and shall provide the new owner with a copy of this General Permit.

19. Continuation of Expired Permit

This General Permit continues in force and effect until a new General Permit is issued or the SWRCB rescinds this General Permit. Only those dischargers authorized to discharge under the expiring General Permit are covered by the continued General Permit.

APPENDIX 9

SAM Program and Soils Remediation Plan

**SAM TO BE PROVIDED WITHIN 60 DAYS PRIOR
TO SOIL REMEDIATION ACTIVITIES**

APPENDIX 10

Construction Schedule

APPENDIX 11

Annual Compliance Certification

APPENDIX 12

City of Carlsbad SUSMP

City of Carlsbad



Engineering Standards

**Volume 4
Storm Water Standards Manual**

2008 Edition

**CITY OF CARLSBAD
ENGINEERING STANDARDS**

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-

REVISIONS/ADDENDUM		
CHAPTER/ PAGE/DWG.	ITEM	REVISION DATE

Section 1

STORM WATER STANDARDS MANUAL INTRODUCTION

This manual was prepared in response to the 2007 update to the California Regional Water Quality Control Board San Diego Region Order No. R9-2007-01, NPDES No. CAS0108758 Waste Discharge Requirements for Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds of the County of San Diego County, the San Diego Unified Port District, and the San Diego County Regional Airport Authority (Municipal Permit).

To accommodate the new Municipal storm water requirements, the City's Storm Water Standards were revised and revamped to: (1) accommodate the requirements of the updated Municipal Permit; (2) consolidate construction BMP standards into one location; (3) clarify existing standards and incorporate the new standards; and, (4) incorporate the requirements of the General Construction Permit, the General Linear Utility Permit and the General Industrial Activity Permit. The new manual will, when completed, consolidate all storm water BMP standards for post construction, construction and business activity requirements into one comprehensive manual entitled the "City of Carlsbad Storm Water Standards Manual" hereinafter referred to as "Storm Water Standards Manual".

The new Storm Water Standards Manual is comprised of four primary sections as follows;

1. Section 1 – Introduction
2. Section 2 – Storm Water Management Plan (SWMP) Standards includes standards and requirements for the preparation of permanent post construction BMPs including post construction inspection and inventory maintenance requirements. This section is based upon the Copermittes' revised interim model SUSMP document.
3. Section 3 – Construction Storm Water Pollution Prevention Plan (SWPPP) Standards – includes standards and requirements for the preparation of a Construction SWPPP in accordance with the Municipal Permit, General Construction Permit and General Linear Utility Permit.
4. Section 4 – This Section is currently reserved for the Business Activity Storm Water Pollution Prevention Plan (SWPPP) Standards.

The Storm Water Standards Manual is intended to be used at all phases of the development process. The manual also has application to City Capital Improvement Program development process.

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Section 2
Standard Urban Storm Water Mitigation Plan (SUSMP)
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2.1 STANDARD URBAN STORM WATER MITIGATION PLAN (SUSMP) INTRODUCTION

2.1.1 Standard Urban Storm Water Mitigation Plan Organization

This plan provides information to project applicants on compliance with the permanent storm water quality requirements for development projects in the City of Carlsbad. This plan guides the project applicant through the selection, design, and incorporation of storm water BMPs into the project's design plan.

Section 2.1, "Introduction," describes storm water pollution background information and legal or regulatory requirements associated with storm water pollution control.

Section 2.2, "Project Review & Permitting Process," outlines the project plan review and approval process for discretionary actions for development projects. Applicants should use Section 2.2 as the roadmap to navigate through this plan and ensure storm water requirements are incorporated into their projects. The following sections provide technical information necessary to incorporate the storm water requirements in the review process outlined in Section 2.2.

Section 2.3, "Permanent Storm Water BMP Selection Procedure," lists the permanent storm water BMP requirements, which are organized in a progression intended to dovetail with a typical project planning and design process and maximize storm water protection while minimizing project costs.

Section 2.4, "Implementation & Maintenance of Requirements," describes how implementation and maintenance of permanent BMPs must be assured prior to discretionary approval. This section provides a process and requirements for executing a maintenance agreement with the City.

The Appendices to the Standard Urban Storm Water Mitigation Plan contain information either necessary or designed to provide guidance in completing the storm water requirements in this plan.

2.1.2 Background

Urban runoff discharged from municipal storm water conveyance systems has been identified by local, regional, and national research programs as one of the principal causes of water quality problems in most urban areas. The City of Carlsbad's storm water conveyance system, which collects runoff from our streets, rooftops, driveways, parking lots, and other impervious areas, flows to our beaches without receiving treatment (our storm water conveyance system is separate from our sanitary sewer system). Urban runoff potentially contains a host of pollutants like trash and debris, bacteria and viruses, oil and grease, sediments, nutrients, metals, and toxic chemicals. These contaminants can adversely affect receiving and coastal waters, associated wildlife, and public health. Urban runoff pollution is not only a problem during rainy seasons, but also year-round due to many types of urban water use that discharge runoff (dry weather flow) to the storm water conveyance system.

Land development and construction activities significantly alter drainage patterns and contribute pollutants to urban runoff primarily through erosion and removal or change of existing natural vegetation during construction, and the creation of new impervious surfaces, such as parking lots, which often permanently contribute pollutants throughout the "use" of the project site. When homes, work places, recreational areas, roads, parking lots, and structures are built, new impervious areas are built- creating the potential for an impact to water quality. The natural landscape's ability to infiltrate and cleanse storm water and urban runoff is "capped" by the impervious surfaces. As impervious surfaces increase, water that normally would have percolated into the soil now flows over the land surface directly to downstream wetlands, creeks, and eventually the Pacific Ocean. Accordingly, increases in impervious cover can increase the frequency and intensity of storm water flows. Second, new impervious surfaces often become a source of pollutants associated with development, such as automotive fluids, cleaning solvents, toxic or hazardous chemicals, detergents, sediment, metals, pesticides, oil and grease, and food wastes. These pollutants, which are often temporarily captured on impervious surfaces, are transported to the storm water conveyance system by storm water and urban runoff. The pollutants flow untreated through the storm water conveyance system and ultimately into our creeks, rivers, beaches, and ocean. With the growing concerns of urban runoff and storm water pollution, local, state, and federal agencies devised

regulations requiring development planning and construction controls to treat storm water-related pollution from new development projects before it reaches any receiving waters.

Order R9-2007-0001 was issued on January 24, 2007 to the City of Carlsbad, the County of San Diego, the San Diego Unified Port District, the San Diego Regional Airport Authority, and 17 other cities in the region by the San Diego Regional Water Quality Control Board (Regional Board), which requires the implementation of storm water regulations addressing storm water pollution issues in development planning and construction associated with private and public development projects. Specifically, development projects are required to include storm water best management practices (BMPs) both during construction, and in the projects permanent design, to reduce pollutants discharged from the project site, to the maximum extent practicable.

The primary objectives of the Storm Water Standards requirements are to: (1) Effectively prohibit non-storm water discharges; and (2) Reduce the discharge of pollutants from storm water conveyance systems to the Maximum Extent Practicable (MEP statutory standard) throughout the use of a developed site. To address pollutants that may be generated from new development once the site is in use, the Municipal Permit further requires that the City implement a series of permanent BMPs described in a document called the Model Standard Urban Storm Water Mitigation Plan, or SUSMP (pronounced "sue- sump"), which was approved by the Regional Board on June 12, 2002.

2.1.3 Legal Framework

The requirement to implement storm water BMP requirements for development projects is based on Section 402 (p) of the Clean Water Act. The Federal Clean Water Act amendments of 1987 established a framework for regulating storm water discharges from municipal, industrial, and construction activities under the NPDES program. Under the Federal Clean Water Act, municipalities throughout the nation are issued a Municipal NPDES Permit. The primary goal of the Municipal Permit is to stop polluted discharges from entering the storm water conveyance system and local receiving and coastal waters.

In California, the State Water Resources Control Board (SWRCB), through the nine Regional Boards, administers the NPDES storm water municipal permitting program. Based on the San Diego Municipal Permit issued by the San Diego Regional Board, the City is required to develop and implement permanent storm water BMPs addressing pollution from new development projects.

2.2 PROJECT REVIEW AND PERMITTING PROCESS

2.2.1 Introduction to Review and Permitting Process

The City of Carlsbad's Storm Water Management and Discharge Control Ordinance (Carlsbad Municipal Code Chapter 15.12), requires that all new development and redevelopment activities comply with the storm water pollution prevention requirements. These storm water pollution prevention requirements, which are described in detail in Section 2.3, "Permanent Storm Water Best Management Practices Selection Procedure," are site specific and vary based on the project's potential impact on receiving water quality.

The steps below describe the elements of the plan review and permitting processes for storm water best management practice (BMP) requirements. The flow chart in Figure 1, "Review Process for Discretionary Actions" demonstrates how storm water requirements are incorporated into projects requiring subdivision approvals, development permits or other discretionary actions.

For projects that do not require discretionary action, City staff will require that SUSMP requirements are incorporated into the project design and shown on the plans prior to issuance of any ministerial permit.

The process for issuance of ministerial projects includes (1) receipt of an application, (2) determination of application completeness, (3) staff review of application, including appropriate storm water requirements and (4) issuance of a ministerial permit. The applicants are required to complete a "Standard Urban Storm Water Mitigation Plan Questionnaire" (Appendix A) as a part of their project submittal to determine the level of storm water requirements, including SUSMP requirements that will be a part of the project design and shown on the plans.

2.2.2 Step 1 : Determine Applicable Permanent Storm Water BMP Requirements

Prior to submittal, applicants must complete the "Standard Urban Storm Water Mitigation Plan Questionnaire" in Appendix A. This questionnaire must be completed, signed by the responsible party for the project, and submitted with your permit application. The questionnaire will determine if the project requires Standard BMPs, Priority BMPs or is exempt from SUSMP requirements as described below. Projects meeting priority requirements must include all required components of a Storm Water Management Plan (SWMP) with their project application prior to deeming the application package complete.

Note: The questionnaire form referenced above must be completed for all permit applications, even if previous approvals exist. Projects requesting additional construction permits or discretionary approvals, even though previous permits and/or approvals have been obtained, will be required to comply with the storm water requirements in this document

2.2.3 Permanent Storm Water BMP Requirements

2.2.3.1 Standard Project Requirements.

Projects subject to only the standard permanent storm water requirements must incorporate the LID site design and source control requirements identified in Sections 2.3.3.1 and 2.3.3.2, into the project (see Table 1). Refer to Section 2.2.4 “Step 2 - Prepare & Submit Appropriate Plans,” for guidance in the BMP design process.

2.2.3.2 Priority Project Requirements

All new development and significant redevelopment projects that fall into one of the following “priority project” categories are subject to these SUSMP requirements, subject to the lawful prior approval provisions of the Municipal Permit. In the instance where a project feature, such as a parking lot, falls into a priority project category, the entire project footprint is subject to these SUSMP requirements. These categories are:

Residential development of 10 units or more

Commercial development greater than 1 acre

Heavy industry development greater than 1 acre

Automotive repair shops

Restaurants

Hillside development greater than 5,000 square feet

Projects located within or directly adjacent to or directly discharging to receiving waters within Environmentally Sensitive Areas that create 2,500 square feet or more of impervious surface or increase the area of imperviousness to 10% or more of its naturally occurring condition

Projects greater than 2,500 square feet of impervious surface that discharge to receiving waters within or adjacent to Environmentally Sensitive Areas

Parking Lots 5,000 square feet or more impervious surface or with > 15 parking spaces 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 of impervious surface

Retail gasoline outlets 5,000 square feet or more or with a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

Project is located within 200 feet of the Pacific Ocean and (1) creates more than 2,500 square feet of impermeable surface or (2) increases the impermeable surface on the property by more than 10%.

Limited Exclusion: Trenching and resurfacing work associated with utility projects are not considered priority projects; resurfacing and reconfiguring surface parking lots and existing roadways; new sidewalk construction, pedestrian ramps, or bikelane on existing roads; and routine replacement of damaged pavement, such as pothole repair. Parking lots, buildings and other structures associated with utility projects are subject to SUSMP requirements if one or more of the criteria for the above categories are met.

Projects subject to priority project permanent storm water requirements must incorporate all applicable requirements in Section 2.3.3, “Establish Permanent Storm Water Best Management Practices,” (requirements BMP-1 through BMP-33) into the project design. This includes the LID site design and source control BMPs, BMPs applicable to individual priority project categories, and treatment control BMP requirements. If a priority project meets more than one priority project category definition, as shown in Table 1, the project is subject to all BMPs applicable to individual priority project categories that apply. For example, if a project is proposing to build 50 attached residential units and a 6,000 square foot restaurant with a 70-space surface parking lot, the project would be subject to the individual priority project category BMP requirements for “Attached Residential Development,” “Restaurants,” and “Parking Lots,” as shown in Table 1, below. Refer to Section 2.2.4 “Step 2 - Prepare & Submit Appropriate Plans,” for guidance in the permanent BMP design process.

Table 1

Standard Development Project & Priority Project Storm Water BMP Requirements Matrix

	Site Design BMPs ⁽¹⁾	Source Control BMPs ⁽²⁾	BMPs Applicable to Individual Priority Project Categories ⁽³⁾										Treatment Control BMPs ⁽⁴⁾	
			a. Private Roads	b. Residential Driveways & Guest Parking	c. Dock Areas	d. Maintenance Bays	e. Vehicle Wash Areas	f. Equipment Wash Areas	g. Outdoor Processing Areas	h. Surface Parking Areas	i. Fueling Areas	j. Hillside Landscaping		
Standard Projects	R	R	R	R	R	R	R	R	R	R	R	R	R	O
Priority Projects:														
Detached Residential Development	R	R	R	R									R	S
Attached Residential Development	R	R	R											S
Commercial Development greater than 100,000 ft ²	R	R			R	R	R		R					S
Heavy industry /industrial	R	R	R		R	R		R	R	R				S
Automotive Repair Shop	R	R			R	R	R	R				R		S
Restaurants	R	R			R			R						S
Steep Hillside Development greater than 5,000 ft ²	R	R	R										R	S
Parking Lots	R	R								R ⁽⁵⁾				S
Retail Gasoline Outlets	R	R				R	R	R		R	R			S
Streets, Highways & Freeways	R	R												S
<p>R = Required; select one or more applicable and appropriate BMPs from the applicable steps in Section III.2.A-D, or equivalent as identified in Appendix B.</p> <p>O = Optional/ or may be required by City staff. As appropriate, applicants are encouraged to incorporate treatment control BMPs and BMPs applicable to individual priority project categories into the project design. City staff may require one or more of these BMPs, where appropriate.</p> <p>S = Select one or more applicable and appropriate treatment control BMPs from Appendix B.</p> <p>(1) Refer to Section 2.3.3.1</p> <p>(2) Refer to Section 2.3.3.2.</p> <p>(3) Priority project categories must apply specific storm water BMP requirements, where applicable. Priority projects are subject to the requirements of all priority project categories that apply. Refer to Section 2.3.3.3</p> <p>(4) Refer to Section 2.3.3.4</p> <p>(5) Applies if the paved area totals >5,000 square feet or with >15 parking spaces and is potentially exposed to urban runoff.</p>														

2.2.4 Step 2 : Prepare and Submit Appropriate Plans.

After determining the general categories of storm water requirements that apply to the project in Step 1 (e.g., priority project permanent BMPs and/or standard permanent BMPs), refer to the instructions in this step (see below) to determine what analysis and/or specific BMP requirements in Section 3.0 of the SUSMP must be provided and/or incorporated into the project.

NOTE: Projects are only required to provide applicable BMPs. For example, an attached residential development project subject to the priority project requirements would not have to meet the “private road” requirements in this plan if no private roads were proposed. In addition, the City Engineer may approve proposed alternatives to any of the BMP requirements in this plan if they are determined to be applicable and equally effective. In all cases, priority projects shall meet the numeric sizing treatment standards in Table 3.

2.2.5 Permanent Storm Water BMPs

2.2.5.1 Standard Project Requirements

Projects subject to only standard permanent BMP requirements need only to complete the “Identify Pollutants from the Project Area” procedure (Section 2.3.2.1), and then incorporate the requirements in Section 2.3.3.1, “LID Site Design BMPs” and Section 2.3.3.2, “Source Control BMPs”. Applicants must incorporate all necessary permanent BMPs into the project plans prior to submittal, regardless of project type. Analysis of the project’s anticipated pollutants of concern must also be included with the project submittal.

2.2.5.2 Priority Project Requirements

Projects subject to the priority project permanent BMP requirements must complete all of the analyses required in Section 2.3.2, “Identify Pollutants and Conditions of Concern,” and incorporate all of the applicable BMP requirements in Section 2.3.3, “Establish Permanent Storm Water BMP Requirements”. Applicants must incorporate all necessary permanent BMPs into the project plans prior to submittal, regardless of project type. In addition, projects subject to priority project requirements must prepare and submit a Storm Water Management Plan (SWMP) in accordance with required sections as listed in Appendix C. Analysis of the project’s anticipated pollutants of concern, anticipated pollutants of concern in downstream receiving waters, and conditions of concern, must also be included in the Storm Water Management Plan as part of the project submittal. After preparing plans and supporting documents according to the requirements in this plan, submit plans to the City for review (See Step 3)

2.2.6 Step 3 – Determine Adequacy of Proposed Plans.

Under the authority of the City Engineer, staff will review submitted plans for compliance with the applicable storm water requirements contained in this plan. The City Engineer may approve proposed alternatives to the BMP requirements in this plan if they are determined to be applicable and equally effective. Additional analysis or information may be required to enable staff to determine the adequacy of proposed BMPs, and will be requested through a project issues report following the conclusion of a staff review cycle. After all storm water requirements have been approved by the City Engineer, proceed to Step 4 to assure implementation and maintenance of the approved BMPs through permit conditions, plan notes, and maintenance agreements.

2.2.7 Step 4 -- Assure Implementation and Maintenance of Requirements.

Applicants must provide assurances that permanent storm water BMPs will be constructed and permanently maintained throughout the use of a developed site. The summary below describes how permanent BMP requirements must be assured during both discretionary approval processes. After the City Engineer has approved all permanent BMPs, refer to Section 4, “Implementation & Maintenance Requirements” to determine how permanent BMP implementation and maintenance will be assured.

For any discretionary action, permanent storm water requirements shall be incorporated into the project design and be shown on the plans. In addition, the project will be conditioned to execute a maintenance agreement for ongoing permanent BMP maintenance, satisfactory to the City Engineer, prior to the issuance of any construction permits. This requirement shall be noted on the plans for the discretionary action.

2.3 PERMANENT BEST MANAGEMENT PRACTICES SELECTION PROCEDURE

2.3.1 INTRODUCTION

The following process should be followed to determine the permanent BMPs for the applicant's project.

2.3.2 IDENTIFY POLLUTANTS AND CONDITIONS OF CONCERN

2.3.2.1 Identify Pollutants from the Project Area

Using Table 2, below, identify the project's anticipated pollutants. 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. Projects meeting the definition of more than one project category shall identify all general pollutant categories that apply. Descriptions of the general pollutant categories listed in Table 2 are listed in Appendix F under the definition of "pollutants of concern."

Table 2

Anticipated and Potential Pollutants Generated by Land Use Type

<i>Project Categories</i>	<i>General Pollutant Categories</i>								
	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Detached Residential Development	X	X			X	X	X	X	X
Attached Residential Development	X	X			X	P ⁽¹⁾	P ⁽²⁾	P ⁽¹⁾	X
Commercial Development >100,000 ft ²	P ⁽¹⁾	P ⁽¹⁾		P ⁽²⁾	X	P ⁽⁵⁾	X	P ⁽³⁾	P ⁽⁵⁾
Heavy industry /industrial development	X		X	X	X	X	X		
Automotive Repair Shops			X	X ⁽⁴⁾⁽⁵⁾	X		X		
Restaurants					X	X	X	X	
Steep Hillside Development >5,000 ft ²	X	X			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.									

2.3.2.2 Identify Pollutants of Concern in Receiving Waters

For priority projects, the following analysis shall be conducted and reported in the project's Storm Water Management Plan:

1. For each of the proposed project discharge points, identify the receiving water(s), including hydrologic unit basin number(s), as identified in the most recent version of the *Water Quality Control Plan for the San Diego Basin*¹, prepared by the San Diego Regional Water Quality Control Board.
2. Identify any receiving waters, into which the developed area would discharge to, listed on the most recent list of Clean Water Act Section 303(d) impaired water bodies². List any and all pollutants for which the receiving waters are impaired.
3. Compare the list of pollutants for which the receiving waters are impaired with the pollutants anticipated to be generated by the project (as discussed in Section 2.3.2.1). Any pollutants identified in the process described in Section 2.3.2.1 which are also causing impairment of receiving waters shall be considered pollutants of concern.

2.3.2.3 Identify Conditions of Concern

For priority projects where downstream erosion is a potential, the following analysis shall be conducted and reported in the project's Storm Water Management Plan:

1. Evaluate the project's conditions of concern in a drainage study report prepared by a registered civil engineer in the State of California, with experience in fluvial geomorphology and water resources management. The report shall consider the project area's location (from the larger watershed perspective), topography, soil and vegetation conditions, percent impervious area, natural and infrastructure drainage features, wet season groundwater depth, and any other relevant hydrologic and environmental factors to be protected specific to the project area's watershed.
2. As part of the drainage study, a qualified, licensed professional shall provide a report on proposed infiltration techniques (trenches, basins, dry wells, permeable pavements with underground reservoir for infiltration) regarding any potential adverse geotechnical concerns. Geotechnical conditions such as: slope stability, expansive soils, compressible soils, seepage, groundwater depth, and loss of foundation or pavement subgrade strength should be addressed, and mitigation measures provided.
3. As part of the drainage study, the civil engineer shall conduct a field reconnaissance to observe and report on downstream conditions, including undercutting erosion, slope stability, vegetative stress (due to flooding, erosion, water quality degradation, or loss of water supplies) and the area's susceptibility to erosion or habitat alteration as a result of an altered flow regime.
4. The Drainage study shall compute rainfall runoff characteristics from the project area including at a minimum, peak runoff, time of concentration, and detention volume (if appropriate). These characteristics shall be developed for the two-year and 10-year frequency, six-hour or 24-hour, type B storm for the Carlsbad area in San Diego County (as described in the San Diego County Hydrology Plan, September 2002). The 6-hour Type B storm yields larger peak discharges for certain smaller drainage areas (usually less than 10 square miles, depending upon area, time to peak, CN, frequency, etc.). The 24-hour Type B storm yields larger peak discharges for larger drainage areas (usually greater than 10 square miles, depending upon area, time to peak, CN, frequency, etc.). The largest peak flow should be included in the report. The report shall also report the project's conditions of concern based on the hydrologic and downstream conditions discussed above. Where downstream conditions of concern have been identified, the drainage study shall establish that pre-project hydrologic conditions that minimize impacts on those downstream conditions of concern would be either improved or maintained by the proposed project, satisfactory to the City Engineer, by incorporating the permanent BMP requirements identified in Section 2.3.3, below.

For Priority Development Projects that disturb 50 acres or more:

1. Priority Development Projects' post-project runoff flow rates and durations shall not exceed pre-project runoff flow rates and durations (Interim Hydromodification Criteria), where the increased

1. Go to: <http://www.swrcb.ca.gov/~rwqcb9/programs/basinplan.html>

2. Under Section 303(d) of the 1972 Clean Water Act, states, territories and authorized tribes are required to develop a list of water quality limited segments. These waters on the list do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. Go to: http://www.swrcb.ca.gov/tmdl/303d_lists.html. San Diego is in Region 9 (a link is provided).

discharge flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses, attributable to changes in flow rates and durations.

2. Priority Development Projects disturbing 50 acres or more shall implement hydrologic controls to manage post-project runoff flow rates and durations as required by the Interim Hydromodification Criteria.

2.3.3 ESTABLISH PERMANENT STORM WATER BEST MANAGEMENT PRACTICES

After identifying the project's pollutants of concern, and conditions of concern (for priority projects), in Section 3.1, projects subject to standard or priority project requirements shall implement all applicable LID site design, and source control BMPs listed below. Projects subject to priority project requirements must also implement the BMPs applicable to individual priority project categories and structural treatment control BMPs. Applicants may employ alternative comparable and equally effective LID site design and source control BMPs (including requirements applicable to individual priority project categories), satisfactory to the City Engineer.

Projects are encouraged to address these objectives through the creation of a hydrologically functional project design that attempts to mimic the natural hydrologic regime. Mimicking a site's natural hydrologic regime can be pursued by:

- Reducing imperviousness (such as, new surface parking lots), conserving natural resources and areas, maintaining and using natural drainage courses in the storm water conveyance system, and minimizing clearing and grading.
- Providing runoff storage measures dispersed throughout a site's landscape with the use of bioretention facilities and detention, retention, and infiltration practices.
- Implementing on-lot hydrologically functional landscape design and management practices.

These design principles offer an innovative approach to urban storm water management, one that does not rely on the conventional end-of-pipe or in-the-pipe structural methods but instead strategically integrates storm water controls throughout the urban landscape. Useful resources for applying these principles, referenced in the appendix, include *Start at the Source* (1999), and *Low-Impact Development Design Strategies* (1999) (see Appendix D). Effective source controls offer another strategy to reduce a project's need for treatment. Applicants are encouraged to design projects so that runoff is treated by LID site design BMPs, such as rooftop runoff treated in landscaping, so that it may be applied towards the numeric sizing treatment standards, satisfactory to the City Engineer. Therefore, projects shall incorporate, where applicable, storm water BMPs into the project design, in the following progression:

- LID Site Design BMPs
- Source Control BMPs
- BMPs for Individual Priority Project Categories (these are LID site design and source control BMPs)
- Treatment Control BMPs

The series of best management practices listed in Section 2.3.3 have been organized sequentially to allow the applicant and design professional to incorporate the LID site design, source control BMPs, and where necessary, requirements applicable to individual priority project categories and treatment control BMPs in this progression.

2.3.3.1 LID Site Design BMPs

Projects shall be designed so as to minimize directly connected impervious surfaces and to promote infiltration using LID techniques. Projects shall, to the maximum extent practicable, minimize the introduction of pollutants and conditions of concern that may result in significant impacts, generated from site runoff to the storm water conveyance system. Projects shall also control post-development peak storm water runoff discharge rates and velocities to maintain or reduce pre-development downstream erosion and to protect stream habitat. Projects can address these objectives through the creation of a hydrologically functional project design that attempts to mimic the natural hydrologic regime. The following are LID Site Design BMPs to be implemented in order to achieve the requirements.

Maintain Pre-Development Rainfall Runoff Characteristics

Control post-development peak storm water runoff discharge rates and velocities to maintain or reduce pre-development downstream erosion by applying the following concepts:

- BMP-1 Minimize and disconnect impervious surfaces. (1) Increase building density (number of stories above or below ground); (2) construct walkways, trails, patios, overflow parking lots and alleys and other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials; (3) construct streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and a walkable environment for pedestrians are not compromised; and (4) minimize the use of impervious surfaces, such as decorative concrete, in the landscape design.
- BMP-2 Conserve natural areas, soils and vegetation and provide buffer zones between natural water bodies and the project footprint. (1) Concentrate or cluster development on the least environmentally sensitive portions of a site while leaving the remaining land in a natural, undisturbed condition; (2) Use natural drainage systems to the maximum extent practicable (natural drainages and vegetated swales are preferred over using lined channels or underground storm drains, and; (3) minimize soil compaction.
- BMP-3 Minimize Directly Connected Impervious Areas. (1) Where landscaping is proposed, drain rooftops into adjacent landscaping prior to discharging to the storm water conveyance system; and (2) where landscaping is proposed, drain impervious parking lots, sidewalks, walkways, trails, and patios into adjacent landscaping.
- BMP-4 Maximize canopy interception and water conservation. (1) Preserve existing native trees and shrubs; and (2) plant additional native or drought tolerant trees and large shrubs in place of non-drought tolerant exotics.

Protect Slopes and Channels

- BMP-5 Convey runoff safely from the tops of slopes.
- BMP-6 Vegetate slopes with native or drought tolerant vegetation.
- BMP-7 Stabilize permanent channel crossings.
- BMP-8 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.
- BMP-9 Minimize disturbances to natural drainages

2.3.3.2 Source Control BMPs

Design Outdoor Material Storage Areas to Reduce Pollution Introduction

- BMP-10 Hazardous materials with the potential to contaminate urban runoff shall be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with rain, runoff or spillage to the storm water conveyance system; and (2) protected by secondary containment structures such as berms, dikes, or curbs. The storage area shall be paved and sufficiently impervious to contain leaks and spills, and have a roof or awning to minimize direct precipitation within the secondary containment area.

Design Trash Storage Areas to Reduce Pollution Introduction

- BMP-11 Trash storage areas shall be: (1) 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; and, (2) contain attached lids on all trash containers that exclude rain; or (3) contain a roof or awning to minimize direct precipitation.

Employ Integrated Pest Management Principles

Integrated pest management (IPM) is an ecosystem-based pollution prevention 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 plant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment. More information may be obtained at the UC Davis website (<http://www.ipm.ucdavis.edu/WATER/U/index.html>).

- BMP-12 Eliminate and/or reduce the need for pesticide use in the project design by: (1) Plant pest-resistant or well-adapted plant varieties such as native plants; and (2) Discourage pests by modifying the site and landscaping design. Pollution prevention is the primary “first line of defense” because pollutants that are never used do not have to be controlled or treated (methods which are inherently less efficient).
- BMP-13 Distribute IPM educational materials to future site residents/tenants. Minimally, educational materials must address the following topics: (1) Keeping pests out of buildings and landscaping using barriers, screens, and caulking; (2) Physical pest elimination techniques, such as, weeding, squashing, trapping, washing, or pruning out pests; (3) Relying on natural enemies to eat pests; (4) Proper use of pesticides as a last line of defense. More information may be obtained at the UC Davis website (<http://www.ipm.ucdavis.edu/WATER/U/index.html>).

Use Efficient Irrigation Systems & Landscape Design

In compliance with the Water Conservation in Landscaping Act, the following methods to reduce excessive irrigation runoff shall be implemented:

- BMP-14 Employ rain shutoff devices to prevent irrigation during and after precipitation.
- BMP-15 Design irrigation systems to each landscape area's specific water requirements.
- BMP-16 Use flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.

Provide Storm Water conveyance System Stenciling and Signage

- BMP-17 Provide concrete stamping, or equivalent, of all storm water conveyance system inlets and catch basins within the project area with prohibitive language (e.g., “No Dumping – I Live in <<name receiving water>>”), satisfactory to the City Engineer. Stamping may also be required in Spanish.
- BMP-18 Post signs and prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area, trailheads, parks and building entrances.

2.3.3.3 BMPs Applicable to Individual Priority Project Categories

Where identified in Table 1, the following requirements shall be incorporated into applicable priority projects. Projects shall adhere to each of the individual priority project category requirements that apply to the project (e.g., a restaurant with more than 15 parking spaces would be required to incorporate the requirements for ‘c. Dock Areas’, ‘f. Equipment Wash Areas’, and ‘h. Surface Parking Areas’ into the project design).

Private Roads

- BMP-19 The design of private roadway drainage shall use at least one of the following (for further guidance, see Start at the Source [1999]): (1) rural swale system- street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings; (2) urban curb/swale system- street slopes to curb, periodic swale inlets drain to vegetated swale/biofilter; or (3) dual drainage system- first flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder.

Residential Driveways & Guest Parking

- BMP-20 Driveways shall have one of the following: (1) shared access; (2) flared entrance (single lane at street); (3) wheelstrips (paving only under tires); (4) porous paving; or (5) designed to drain into landscaping prior to discharging to the storm water conveyance system.
- BMP-21 Uncovered temporary or guest parking on private residential lots shall be: (1) paved with a permeable surface; or (2) designed to drain into landscaping prior to discharging to the storm water conveyance system.

Dock Areas

- BMP-22 Loading/unloading dock areas shall include the following: (1) cover loading dock areas, or design drainage to preclude urban run-on and runoff; and (2) An acceptable method of containment and pollutant removal, such as a shut-off valve and containment area. Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

Maintenance Bays

- BMP-23 Maintenance bays shall include at least one of the following: (1) repair/ maintenance bays shall be indoors; or, (2) designed to preclude urban run-on and runoff.
- BMP-24 Maintenance bays shall include 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 water conveyance system is prohibited.

Vehicle & Equipment Wash Areas

- BMP-25 Areas for washing/steam cleaning of vehicles and areas for outdoor equipment/accessory washing and steam cleaning shall be: (1) self-contained to preclude run-on and run-off, covered with a roof or overhang, and equipped with a clarifier or other pretreatment facility; and (2) properly connected to a sanitary sewer.

Outdoor Processing Areas

- BMP-26 Outdoor processing areas shall: (1) cover or enclose areas that would be the most significant source of pollutants; or, (2) slope the area toward a dead-end sump; or, (3) discharge to the sanitary sewer system.
- BMP-27 Grade or berm processing area to prevent run-on from surrounding areas.
- BMP-28 Installation of storm drains in areas of equipment repair is prohibited.

Surface Parking Areas

- BMP-29 Where landscaping is proposed in surface parking areas (both covered and uncovered), incorporate landscape areas into the drainage design.
- BMP-30 Overflow parking (parking in excess of the project's minimum parking requirements) should be constructed with permeable paving.

Non-Retail Fueling Areas

Non-Retail fueling areas shall be designed with the following:

- BMP-31 Fuel dispensing area that is: (1) paved with Portland cement concrete or equivalent smooth impervious surface (asphalt concrete is prohibited); (2) designed to 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; (3) sloped to prevent ponding; (4) separated from the rest of the site by a grade break that prevents run-on of urban runoff; and (5) designed to drain to the project's treatment control BMP(s) prior to discharging to the storm water conveyance system.
- BMP-32 Overhanging roof structure or canopy that is: (1) equal to or greater than the area within the fuel dispensing area's grade break; and (2) designed not to drain onto or across the fuel dispensing area.

Steep Hillside Landscaping

- BMP-33 Steep hillside areas disturbed by project development shall be landscaped with deep-rooted, drought tolerant plant species selected for erosion control, in accordance with the Landscape Technical Plan.

2.3.3.4 Treatment Control BMPs

Where identified in Table 1, and after LID site design and source control BMPs have been incorporated into the project, applicants of priority projects shall design a single or combination of treatment control BMPs designed to infiltrate, filter, and/or treat runoff from the project footprint to one of the "Numeric Sizing Treatment Standards" listed in Table 3, below. Applicants must use the Structural Treatment BMP Selection Procedure outlined in Section 2.3.3.5, below to select appropriate treatment control BMPs. Applicants are encouraged to design projects so that runoff is treated by LID site design BMPs, such as rooftop runoff treated in landscaping, so that it may be applied towards the numeric sizing treatment standards, satisfactory to the City Engineer. Treatment efficiencies can also be realized by locating treatment controls strategically within a drainage basin without being limited by the project boundary.

In all instances, structural treatment BMP(s) may be located on- or off-site, used singly or in combination, or shared by multiple new developments, pursuant to the following criteria:

1. All structural treatment control BMPs shall infiltrate, filter, and/or treat the required runoff volume or flow prior to discharging to any receiving water body supporting beneficial uses;
2. Post-construction structural treatment control BMPs for a single priority project shall collectively be designed to comply with the numeric sizing treatment standards;
3. Shared BMPs shall be operational prior to the use of any dependent development or phase of development. The shared BMPs shall only be required to treat the dependent developments or phases of development that are in use;
4. Interim storm water BMPs that provide equivalent or greater treatment than is required may be implemented by a dependent development until each shared BMP is operational. If interim BMPs are selected, the BMPs shall remain in use until permanent BMPs are operational.

Alternatively, a project proponent may elect to implement a combination of LID BMPs that either disperse and infiltrate, or direct to bioretention facilities, the flows from all impervious areas on-site. These BMPs are presumed to provide maximum extent practicable treatment for all pollutants of concern; therefore no further documentation of the treatment BMP selection process is required.

Treatment control BMPs with a high or medium pollutant removal efficiency for the project's most significant pollutant of concern shall be selected. Treatment control BMPs with a low removal efficiency ranking shall only be approved by the Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with a high or medium removal efficiency ranking are infeasible.

Treatment control BMPs shall not be constructed within a receiving water.

Table 3
Numeric Sizing Treatment Standards

<p><i>Volume</i></p> <ol style="list-style-type: none"> 1. Volume-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either: <ol style="list-style-type: none"> i. The volume of runoff produced from a 85th percentile storm event, as determined from isopluvial maps contained in the County of San Diego Hydrology Plan (0.6 inch approximate average for the San Diego County area) [Note: Applicants may calculate the 85th percentile storm event using local rain data, when available. See the County of San Diego's isopluvial map at http://www.sdcounty.ca.gov/dpw/engineer/flood.htm]; or ii. The volume of runoff produced by the 85th percentile storm event, determined as the maximized capture urban runoff volume for the area, from the formula recommended in <i>Urban Runoff Quality Management, WEF Plan of Practice No. 23/ ASCE Plan of Practice No. 87, page 175 Equation 5.2; (1998)</i>; or iii. The volume of annual runoff based on unit basin storage volume, to achieve 90 percent or more volume treatment by the method recommended in the latest edition of the <i>California Stormwater Best Management Practices Handbook</i>, or iv. The volume of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile 24-hour runoff event. <p style="text-align: center;"><u>OR</u></p> <p><i>Flow</i></p> <ol style="list-style-type: none"> 2. Flow-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either: <ol style="list-style-type: none"> 3.0 The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour for each hour of a storm event; or 4.0 The maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity, as determined from the local historical rainfall record, multiplied by a factor of two; or 5.0 The maximum flow rate of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile hourly rainfall intensity multiplied by a factor of two.
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2.3.3.5 Structural Treatment BMP Selection Procedure

Priority projects shall select a single or combination of treatment BMPs from the categories in Table 4 that maximize pollutant removal for the particular pollutant(s) of concern.

1. Determine if the project would discharge to a Clean Water Act Section 303(d) impaired receiving water. If any receiving waters for the project are impaired, note pollutant(s) receiving water(s) is/are listed for.
2. If the project is anticipated to generate a pollutant (per Table 2) that the receiving water is listed for, select one or more BMPs from Table 4 that maximize the pollutant removal for that pollutant. Any pollutants the project is expected to generate that are also causing a Clean Water Act section 303(d) impairment of the downstream receiving waters of the project shall be given top priority in selecting treatment BMPs
3. If none of the project's receiving waters are listed as impaired, select one or more BMPs from Table 4 that maximize the removal of the pollutants the project is anticipated to generate.

Alternative storm water BMPs not identified in Table 4 may be approved at the discretion of the City Engineer, provided the alternative BMP is as effective in removal of pollutants of concern as other feasible BMPs listed in Table 4.

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

2.3.3.6 Notes on Treatment Control BMP Categories

All rankings are relative. Ranking of all facilities assumes proper sizing, design, and periodic maintenance. Following are general descriptions of each category.

- **Bioretention Facilities** (infiltration planters, flow-through planters, bioretention areas, and bioretention swales). Facilities are designed to capture runoff and infiltrate slowly through soil media which also supports vegetation. Bioretention facilities, except for flow-through planters, effectively promote infiltration into native soils. In clay soils, facilities may capture excess treated runoff in an underdrain piped to the municipal storm drain system. Typical criteria: an infiltration surface area at least 4% of tributary impervious area, 6-inch average depth of top reservoir, 18-inch soil layer, 12-inch to 18-inch gravel subsurface storage layer.
- **Settling Basins and Wetlands** (extended detention basins, “wet” basins, decorative or recreational lakes or water features also used for stormwater treatment, constructed wetlands). Facilities are designed to capture a minimum water quality volume of 80% of total runoff and detain for a minimum of 48 hours. Some wetland designs have proven effective in removing nutrients, but performance varies.
- **Infiltration Facilities or Practices** (infiltration basins, infiltration trenches, dry wells, dispersal of runoff to landscape, pervious pavements). These facilities and landscape designs capture, retain, and infiltrate a minimum of 80% of runoff into the ground. Infiltration facilities are generally only feasible in permeable (Hydrologic Soil Group A or B) soils. Volume and area of infiltration facilities depends on soil permeability and safety factor used. Typical criteria: Infiltration facilities should have pretreatment to remove silt to prolong life of the facility. A 10-foot vertical separation from average seasonal groundwater depth is required. Dispersal to landscape may be accomplished in

any soil type and generally requires a maximum 2:1 ratio impervious:pervious and concave topography to ensure the first 1 inch of rainfall is retained.

- **Media Filters** (sand filters). Filters designed to treat runoff produced by a rainfall of 0.2 inches per hour (or $2 \times 85^{\text{th}}$ percentile hourly rainfall intensity) by slow infiltration through sand or other media. Typical criteria: Surface loading rate not to exceed 5 inches/hour. Entire surface of the sand must be accessible for maintenance.
- **High Rate Biofilters** (tree wells, typically proprietary). Biofilters with specially designed media to rapidly filter runoff while removing some pollutants. Filterra® (proprietary version) recommends surface loading rates of up to 100 inches/hour.
- **High-rate Media Filters** (typically proprietary). Vaults with replaceable cartridge filters filled with inorganic media.
- **Drainage Inserts** have low effectiveness in removing pollutants that tend to associate with fine particles and have medium effectiveness in removing coarse sediment and trash. They are sometimes used to augment more effective treatment facilities and are sometimes used alone when more effective facilities have been deemed infeasible.

2.3.3.7 Notes on Pollutants of Concern

In Table 4, Structural Treatment Control BMP Selection Matrix, pollutants of concern are grouped as coarse pollutants, pollutants that tend to associate with fine particles, and pollutants that remain dissolved.

Pollutant	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	
Nutrients		X	X
Heavy Metals		X	
Organic Compounds		X	
Trash & Debris	X		
Oxygen Demanding		X	
Bacteria		X	
Oil & Grease		X	
Pesticides		X	

2.3.3.8 Restrictions on the Use of Infiltration Treatment BMPs

Treatment control BMPs that are designed to primarily function as infiltration devices shall meet the following conditions (these conditions do not apply to treatment BMPs which allow incidental infiltration and are not designed to primarily function as infiltration devices, such as grassy swales, detention basins, vegetated buffer strips, constructed wetlands, etc.): (1) urban runoff from commercial developments shall undergo pretreatment to remove both physical and chemical contaminants, such as sedimentation or filtration, prior to infiltration; (2) all dry weather flows shall be diverted from infiltration devices except for those non-storm water discharges authorized pursuant to 40 CFR 122.26(d)(2)(iv)(B)(1): diverted stream flows, rising ground waters, uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to storm water conveyance systems, uncontaminated pumped ground water, foundation drains, springs, water from crawl space pumps, footing drains, air conditioning condensation, flow from riparian habitats and wetlands, water line flushing, landscape irrigation, discharges from potable water sources other than water main breaks, irrigation water, individual residential car washing, and dechlorinated swimming pool discharges; (3) pollution prevention and source control BMPs shall be implemented at a level appropriate to protect groundwater quality at sites where infiltration structural treatment BMPs are to be used; (4) the vertical distance from the base of any infiltration structural treatment BMP to the seasonal high groundwater mark shall be at least 10 feet. Where groundwater does not support beneficial uses, this vertical distance criterion may be reduced, provided groundwater quality is maintained; (5) the soil through which infiltration is to occur shall have physical and chemical characteristics that are adequate for proper infiltration durations and treatment of urban runoff for the protection of groundwater beneficial

uses³; (6) the horizontal distance between the base of any infiltration structural BMP and any water supply wells shall be 100 feet or as determined appropriate by the City Engineer.

Notification to neighboring jurisdictions may be required where staff determines the infiltration BMP(s) may impact the groundwater in a neighboring jurisdiction.

2.3.3.9 Structural Treatment Limited Exclusions

Proposed restaurants, where the land area for development or redevelopment is less than 5,000 square feet, are excluded from the numerical sizing criteria requirements listed in Table 3.

Where significant redevelopment results in an increase of less than 50 percent of the impervious surfaces of a previously existing development, and the existing development was not subject to priority project requirements, the numeric sizing criteria apply only to the addition, and not to the entire development.

2.4 IMPLEMENTATION AND MAINTENANCE REQUIREMENTS

2.4.1 Introduction

After all project BMPs have been approved by the City Engineer, applicants must ensure implementation and maintenance of the BMPs according to the processes outlined in the applicable sections for projects requesting discretionary actions and/or construction permits. In addition, any project that will require a "General NPDES Permit for Storm Water Discharges Associated with Industrial Activities," shall include the following note on the plans and condition in the permit/approval:

"Industrial NPDES Permit Requirement

The Permittee or designee shall provide evidence of coverage under the General Industrial National Pollutant Discharge Elimination System Permit, in the form of a Notice of Intent (NOI) filed with the State Water Resources Control Board, prior to the issuance of any construction permits."

2.4.2 Discretionary Actions

Projects that include permanent BMPs shall be conditioned to require the applicant or designee to execute a maintenance agreement for ongoing permanent BMP maintenance in accordance with the program outlined in the "Permanent Storm Water BMP Maintenance Agreement Requirements" below, satisfactory to the City Engineer, prior to the issuance of any construction permits. This requirement shall be noted on the plans for the discretionary action. The permanent BMPs shall be graphically shown on the plans, where possible, and made a condition of the project's permit/approval.

2.4.3 Requirements of Plan

The City has adopted an approach for ensuring verification that all permanent post construction BMPs are constructed per the requirements of the approved plans. To ensure that all permanent post construction BMPs for a particular project are installed/constructed at the conclusion of the project, the City requires developer preparation of a single plan BMP sheet as part of the plan submittals.

The single plan BMP sheet will include a site plan of the project calling out the location of each required LID site design, source control and treatment control BMP. In addition, the plan will contain a matrix listing of the required BMPs cross referenced with a list of the specific construction drawing sheet where the specified BMP construction is detailed. A copy of the single plan BMP sheet will be attached to each construction drawing set (building, mass grading, finished grading, improvements, and grading) highlighting the BMPs.

At a minimum, the plan sheet will have the following information included:

- 1) Entire property on one map
- 2) Drainage areas/direction of flows

³ Soils at infiltration sites must have the following properties: Organic Content (OC) > 5%, pH between 6-8, Cation exchange capacity (CEC) > 5 meq/100g soil, in drill-hole conductivity valve of 0.5 in/hr or greater.

- 3) Private storm drain systems
- 4) Nearby waterbodies
- 5) Location of storm drain conveyance systems
- 6) Location of proposed stormwater controls and BMPs, including detention basins
- 7) Locations of impervious and pervious areas (hatched)
- 8) Location where materials would be exposed to stormwater (hatched)
- 9) Areas of potential erosion (hatched)
- 10) All site design and source control BMPs shown, detailed and/or listed in the General Notes on BMP Plan Sheet
- 11) All treatment control BMPs shown, detailed and called out on the plan sheet
- 12) Delineated areas draining to each treatment control BMP
- 13) Call out the 85th percentile discharge rates that are tributary to each entry point of the treatment control BMPs
- 14) Call out the pollutant types that are expected at each treatment control BMP
- 15) Signature Block for City Engineer
- 16) Inspection Signature Blocks for Building, Landscape and Engineering Inspectors

2.4.4 Permanent BMP Maintenance Agreement Requirements

Applicants shall propose a maintenance agreement assuring all permanent BMPs will be maintained throughout the “use” of a project site, satisfactory to the City Engineer (see Appendix E for a list of potential mechanisms). For projects with discretionary actions, the project's permit shall be conditioned to require the applicant or designee to execute a maintenance agreement for ongoing permanent BMP maintenance, satisfactory to the City Engineer, prior to the issuance of any construction permits. This requirement shall be noted on the plans for the discretionary action. City-approved method of permanent BMP maintenance shall be incorporated into, and shall be consistent with permits issued by resource agencies, before decision-maker approval of discretionary actions. In all instances, the applicant shall provide proof of execution of a City-approved method of permanent BMP maintenance repair and replacement before the issuance of construction approvals.

The maintenance agreement shall include the following:

1. *Operation & Maintenance (O&M) Plan:* The applicant shall include an Operation & Maintenance (O&M) plan, prepared satisfactory to the City, with the approved maintenance agreement, which describes the designated responsible party to manage the storm water BMP(s), employee's training program and duties, operating schedule, maintenance frequency, routine service schedule, specific maintenance activities (including maintenance of storm water conveyance system stamps), copies of resource agency permits, and any other necessary activities. At a minimum, maintenance agreements shall require the applicant to provide inspection and servicing of all permanent treatment BMPs on an annual basis. The project proponent or City-approved maintenance entity shall complete and maintain O&M forms to document all maintenance requirements. Parties responsible for the O&M plan shall retain records for at least 5 years. These documents shall be made available to the City for inspection upon request at any time.
2. *Access Easement/Agreement:* The applicant shall execute an access easement to the official maintenance entity that shall be binding on the land throughout the life of the project, until such time that the permanent treatment BMP requiring access is no longer required to be in use, satisfactory to the City. This access easement may be necessary in the event that the property owner does not adequately maintain the permanent stormwater BMP and the City maintains the BMP.

APPENDIX A – SUSMP Checklist



DEVELOPMENT APPLICATION STORM WATER STANDARDS QUESTIONNAIRE

INSTRUCTIONS:

This questionnaire must be completed by applicant in advance of submitting for a development application (subdivision and land use planning approvals and construction permits). The results of the questionnaire determine the level of storm water pollution prevention standards applied to a proposed development or redevelopment project. Many aspects of project site design are dependent upon the storm water pollution protection standards applied to a project.

Applicant responses to the questionnaire represent an initial assessment of the proposed project conditions and impacts. City staff has responsibility for making the final assessment after submission of the development application. A staff determination that the development application is subject to more stringent storm water standards, than initially assessed by the applicant, will result in the return of the development application as incomplete.

If applicants are unsure about the meaning of a question or need help in determining how to respond to one or more of the questions, they are advised to seek assistance from Engineering Department Development Services staff.

A separate completed and signed questionnaire must be submitted for each new development application submission. Only one completed and signed questionnaire is required when multiple development applications for the same project are submitted concurrently. In addition to this questionnaire, applicants for construction permits must also complete, sign and submit a Construction Activity Storm Water Standards Questionnaire.

To address pollutants that may be generated from new development, the City requires that new development and significant redevelopment priority projects incorporate Permanent Storm Water Best Management Practices (BMPs) into the project design, which are described in Section 2 of the City's Storm Water Standards Manual. This questionnaire should be used to categorize new development and significant redevelopment projects as priority or non-priority, to determine what level of storm water standards are required or if the project is exempt.

1. *Is your project a **significant redevelopment**?*

Definition:

Significant redevelopment is defined as the creation or addition of at least 5,000 square feet of impervious surface on an already developed site.

Significant redevelopment includes, but is not limited to: the expansion of a building footprint; addition to or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction remodeling; replacement of an impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction.

Note: If the Significant Redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SUSMP requirements, the numeric sizing criteria discussed in Section F.1.b. (2)(c) applies only to the addition, and not to the entire development.

2. *If your project **IS** considered significant redevelopment, then please skip Section 1 and proceed with Section 2.*

3. *If your project **IS NOT** considered significant redevelopment, then please proceed to Section 1.*

SECTION 1

NEW DEVELOPMENT

PRIORITY PROJECT TYPE Does your project meet one or more of the following criteria:	YES	NO
1. <u>Home subdivision of 100 units or more.</u> Includes SFD, MFD, Condominium and Apartments		
2. <u>Residential development of 10 units or more.</u> Includes SFD, MFD, Condominium and Apartments		
3. <u>Commercial and industrial development greater than 100,000 square feet including parking areas.</u> Any development on private land that is not for heavy industrial or residential uses. Example: Hospitals, Hotels, Recreational Facilities, Shopping Malls, etc.		
4. <u>Heavy Industrial / Industry greater than 1 acre (NEED SIC CODES FOR PERMIT BUSINESS TYPES)</u> SIC codes 5013, 5014, 5541, 7532-7534, and 7536-7539		
5. <u>Automotive repair shop.</u> SIC codes 5013, 5014, 5541, 7532-7534, and 7536-7539		
6. <u>A New Restaurant where the land area of development is 5,000 square feet or more including parking areas.</u> SIC code 5812		
7. <u>Hillside development</u> (1) greater than 5,000 square feet of impervious surface area and (2) development will grade on any natural slope that is 25% or greater		
8. <u>Environmentally Sensitive Area (ESA).</u> Impervious surface of 2,500 square feet or more located within, "directly adjacent" ² to (within 200 feet), or "discharging directly to" ³ receiving water within the ESA ¹		
9. <u>Parking lot.</u> Area of 5,000 square feet or more, or with 15 or more parking spaces, and potentially exposed to urban runoff		
10. <u>Retail Gasoline Outlets – serving more than 100 vehicles per day</u> Serving more than 100 vehicles per day and greater than 5,000 square feet		
11. <u>Streets, roads, highways, and freeways.</u> Project would create a new paved surface that is 5,000 square feet or greater.		
12. <u>Coastal Development Zone.</u> Within 200 feet of the Pacific Ocean and (1) creates more than 2500 square feet of impermeable surface or (2) increases impermeable surface on property by more than 10%.		

1 Environmentally Sensitive Areas include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); water bodies designated with the RARE beneficial use by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); areas designated as preserves or their equivalent under the Multi Species Conservation Program within the Cities and Count of San Diego; and any other equivalent environmentally sensitive areas which have been identified by the Copermitees.

2 "Directly adjacent" means situated within 200 feet of the environmentally sensitive area.

3 "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 flow from adjacent lands.

Section 1 Results:

If you answered **YES** to **ANY** of the questions above you have a **PRIORITY** project and **PRIORITY** project requirements **DO** apply. A Storm Water Management Plan, prepared in accordance with City Storm Water Standards, must be submitted at time of application. Please check the "MEETS PRIORITY REQUIREMENTS" box in Section 3.

If you answered **NO** to **ALL** of the questions above, then you are a **NON-PRIORITY** project and **STANDARD** requirements apply. Please check the "DOES NOT MEET PRIORITY Requirements" box in Section 3.

SECTION 2

SIGNIFICANT REDEVELOPMENT:	YES	NO
-----------------------------------	------------	-----------

1. Is the project an addition to an existing priority project type? (Priority projects are defined in Section 1)		
--	--	--

If you answered **YES**, please proceed to question 2.

If you answered **NO**, then you **ARE NOT** a significant redevelopment and you **ARE NOT** subject to **PRIORITY** project requirements, only **STANDARD** requirements. Please check the "DOES NOT MEET PRIORITY Requirements" box in Section 3 below.

2. Is the project one of the following:		
---	--	--

- | | | |
|---|--|--|
| a. Trenching and resurfacing associated with utility work? | | |
| b. Resurfacing and reconfiguring surface parking lots? | | |
| c. New sidewalk construction, pedestrian ramps, or bike land on public and/or private existing roads? | | |
| d. Replacement of damaged pavement? | | |

If you answered **NO** to **ALL** of the questions, then proceed to Question 3.

If you answered **YES** to **ONE OR MORE** of the questions then you **ARE NOT** a significant redevelopment and you **ARE NOT** subject to **PRIORITY** project requirements, only **STANDARD** requirements. Please check the "DOES NOT MEET PRIORITY Requirements" box in Section 3 below.

3. Will the development create or add at least 5,000 square feet of impervious surfaces on an existing development or, be located within 200 feet of the Pacific Ocean and (1)create more than 2500 square feet of impermeable surface or (2) increases impermeable surface on property by more than 10%?		
---	--	--

If you answered **YES**, you **ARE** a significant redevelopment, and you **ARE** subject to **PRIORITY** project requirements. Please check the "MEETS PRIORITY REQUIREMENTS" box in Section 3 below.

If you answered **NO**, you **ARE NOT** a significant redevelopment, and you **ARE NOT** subject to **PRIORITY** project requirements, only **STANDARD** requirements. Please check the "DOES NOT MEET PRIORITY Requirements" box in Section 3 below.

SECTION 3

Questionnaire Results:

- MY PROJECT **MEETS PRIORITY REQUIREMENTS**, MUST COMPLY WITH PRIORITY PROJECT STANDARDS AND MUST PREPARE A STORM WATER MANAGEMENT PLAN FOR SUBMITTAL AT TIME OF APPLICATION.
- MY PROJECT **DOES NOT MEET PRIORITY REQUIREMENTS** AND MUST ONLY COMPLY WITH STANDARD STORM WATER REQUIREMENTS.

Applicant Information and Signature Box

Address:		Assessor Parcel Number(s):	
Applicant Name:		Applicant Title:	
Applicant Signature:		Date:	

This Box for City Use Only

City Concurrence:	Yes	No
By:		
Date:		
Project ID:		

APPENDIX B

EXAMPLE PERMANENT STORM WATER BEST MANAGEMENT PRACTICES

The following are a list of BMPs that may be used to minimize the introduction of pollutants of concern that may result in significant impacts to receiving waters. Other BMPs approved by the Development Services Department as being equal or more effective in pollutant reduction than comparable BMPs identified below are acceptable. All BMPs must comply with local zoning and building codes and other applicable regulations.

LID Site Design BMPs

Minimizing Impervious Areas.

Reduce sidewalk widths.

Incorporate landscaped buffer areas between sidewalks and streets.

Design residential streets for the minimum required pavement widths.

Minimize the number of residential street cul-de-sacs and incorporate landscaped areas within cul-de-sac centers with curb-cuts to reduce their impervious cover.

Use open space development that incorporates smaller lot sizes.

Increase building density while decreasing the building footprint.

Reduce overall lot imperviousness by promoting alternative driveway surfaces and shared driveways that connect two or more homes together.

Reduce overall imperviousness associated with parking lots by providing compact car spaces, minimizing stall dimensions, incorporating efficient parking lanes, and using pervious materials in spillover parking areas.

Increase Rainfall Infiltration.

Use permeable materials for private sidewalks, driveways, parking lots, and interior roadway surfaces (examples: hybrid lots, parking groves, permeable overflow parking, etc.).

Use curb-cuts to direct pavement runoff into swales, landscaping, and natural areas prior to entering the MS4.

Direct rooftop runoff to pervious areas such as yards, open channels, or vegetated areas, and avoid routing rooftop runoff to the roadway or the urban runoff conveyance system.

Pitch driveways and parking areas toward yards and vegetated areas prior to draining into the MS4.

Conserve and utilize natural soils and/or use amended soils to encourage light infiltration/ percolation.

Minimize disturbances to natural drainages

Minimize soil compaction in planned green space (landscaped areas, lawns, etc.) and re-till soils when compacted by grading/construction equipment.

Maximize Rainfall Interception.

Maximizing canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.

Cisterns / Rain barrels.

Foundation landscaping.

Minimize Directly Connected Impervious Areas (DCIAs):

Draining rooftops into adjacent landscaping prior to discharging to the storm drain.

Use curb-cuts to allow parking lots to drain into landscape areas co-designed as biofiltration areas and/or swales prior to draining into the MS4.

Draining roads, sidewalks, and impervious trails into adjacent landscaping.

Slope and Channel Protection.

Use of natural drainage systems to the maximum extent practicable.

Stabilized permanent channel crossings.

Planting native or drought tolerant vegetation on slopes.

Energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels.

Source Control BMPs

Storm drain system stenciling and signage

Outdoor material and trash storage area designed to reduce or control rainfall runoff

Efficient irrigation system

Treatment Control BMPs

Biofilters

Bioretention Swale (detains and infiltrates water through soil)

Stormwater Planter Box (open-bottomed)

Stormwater Flow-Through Planter (sealed bottom)

Vegetated filter strip

Bioretention Area

Vegetated / Rock SwaleVegetated filterVegetated Roofs / Modules / Walls

Detention Basins

Extended/dry detention basin with grass / vegetated lining

Extended/dry detention basin with impervious lining

Infiltration Facilities

Infiltration basin

Infiltration trench

Dry well

Permeable Paving

Gravel

Permeable asphalt

Pervious concrete

UnitPermeable unit pavers, ungrouted, set on sand or gravel

Subsurface Reservoir Bed

Wet Ponds and Wetlands

Wet pond (permanent pool)

Constructed wetland

Filtration Systems

Media filtration

Sand filtration

Hydrodynamic Separation Systems

Swirl Concentrator

Cyclone Separator

Trash Racks and Screens

APPENDIX C

STORM WATER MANAGEMENT PLAN GUIDELINES

Purpose

To describe the permanent storm water Best Management Practices (BMPs) that will be incorporated in the project to mitigate the impacts of urban runoff due to the development.

Minimum SWMP Requirements

The Storm Water Management Plan and Drainage Study Report shall be prepared by Civil Engineer registered in the State of California. The City staff may be able to provide resources for example SWMPs or SWMP templates.

SWMP Organization & Content

1. Table of Contents
2. Vicinity Map
3. Project Description
 - Narrative of project activities
4. Site Map
 - Entire property included on one map (use key map if multi-sheets)
 - Drainage areas/direction of flows
 - Private storm drain systems
 - Nearby water bodies and municipal storm drain inlets
 - Location of storm drain conveyance systems
 - Location of proposed stormwater controls and BMPs, including detention basins
 - Locations of impervious and pervious areas (hatched)
 - Location where materials would be exposed to stormwater (hatched)
 - Areas of potential erosion (hatched)
 - Location of building and activity areas (e.g. fueling islands, garages, waste container area, wash racks, hazardous material storage areas, etc.)
 - All site design and source control BMPs shown, detailed and/or listed in the General Notes on BMP Plan Sheet
 - All treatment control BMPs shown, detailed and called out on the plan sheet
 - Delineated areas draining to each treatment control BMP
 - Call out the 85th percentile discharge rates that are tributary to each entry point of the treatment control BMPs
 - Call out the pollutant types that are expected at each treatment control BMP
 - Signature Block for City Engineer
 - Inspection Signature Blocks for Building, Landscape and Engineering Inspectors
5. Identify Pollutants of Concern in Receiving Waters
 - Identify anticipated pollutants from project area in accordance with Section 3.1.1. of this document
 - Identify receiving waters, watershed and hydrologic unit basin number
 - Identify impaired water bodies downstream of the project and impairment
 - Identify primary pollutants of concern
 - Provide Drainage Study Report in accordance with Section 3.1.3. of this document
6. Identify Conditions of Concern
 - Provide Drainage Study Report
 - Identify conditions of concern
 - Provide runoff calculations

7. Identify LID Site Design BMPs
 - Maintain pre-development rainfall runoff characteristics
 - Protect slopes and channels

8. Identify Source Control BMPs
 - Materials Storage
 - Trash storage
 - IPM
 - Efficient irrigation and landscape design
 - Inlet stenciling and signage
 - Other controls (as applicable)

9. BMPs for individual Priority Project Categories (as applicable)
 - Private road
 - Residential driveways and guest parking
 - Dock areas
 - Maintenance bays
 - Vehicle wash areas
 - Outdoor processing areas
 - Surface parking areas
 - Non-retail fueling areas
 - Steep hillside landscaping

10. Identify Structural Treatment Control BMPs
 - Design criteria (include calculations)
 - Basis for selection (include targeted pollutants, justification, and alternative analysis)
 - Pollutant removal information (other than vendor specifications)
 - Restrictions, if appropriate
 - Location of BMPs
 - Literature References

11. BMP Maintenance Provisions
 - Party that will be responsible for maintenance (Name, address and phone number)
 - Recommended maintenance frequency
 - Maintenance instructions for each BMP type included
 - Adequate access and room for maintenance equipment provided
 - BMP Maintenance Agreement referenced

**CITY OF CARLSBAD
STORM WATER MANAGEMENT PLAN (SWMP)
SUBMITTAL REQUIREMENTS CHECKLIST**

PROJECT: _____
 REVIEWED BY: _____
 PRELIMINARY REVIEW: _____

DATE OF REPORT: _____
 DATE REVIEWED: _____

FINAL REVIEW: _____

No.	Requirement	Applicable? (Y/N)	Addressed? (Y/N)	Comment
	Prepared by a Registered Civil Engineer	Y		
1.	Table of Contents	Y		
2.	Vicinity Map	Y		
3.	Project Description	Y		
4.	Single BMP Plan Sheet as described in Section 2.4.3	Y		
	Entire property on one map	Y		
	Drainage areas/direction of flow	Y		
	Private storm drain systems	Y		
	Nearby water bodies/municipal storm drain inlets	Y		
	Location of storm water conveyance systems	Y		
	Location of existing/proposed storm water controls and BMPs	Y		
	Location of impervious areas	Y		
	Location where materials would be exposed to storm water	Y		
	Location of building and activity areas	Y		
	Areas of potential soil erosion	Y		
5.	Identification of Pollutants of Concern (POCs)	Y		
	Identification of pollutants from the project area	Y		
	Identification of receiving waters	Y		
	Identification of watershed and hydrologic unit basin number	Y		
	Identification of 303(d) listed receiving waters	Y		
	Identification of primary and secondary pollutants of concern	Y		
6.	Identification of Conditions of Concern (COCs)	Y		
	Drainage Study Report	Y		
	Identification of Conditions of Concern	Y		
	Runoff calculations	Y		
7.	Identify LID Site Design BMPs	Y		
	Maintain pre-development rainfall runoff characteristics	Y		

No.	Requirement	Applicable? (Y/N)	Addressed? (Y/N)	Comment
	Protect slopes and channels	Y		
8.	Identify Source Control BMPs	Y		
	Outdoor material storage areas			
	Trash storage areas			
	IPM – Integrated Pest Management Program			
	Efficient irrigation systems and landscape design			
	Storm drain system stenciling and signage			
9.	BMPs for Individual Priority Project Categories	Y		
	Private roads			
	Residential driveways and guest parking			
	Dock areas			
	Maintenance bays			
	Vehicle wash areas			
	Outdoor processing areas			
	Surface Parking Areas			
	Non-retail fueling areas			
	Steep Hillside landscaping			
10.	Treatment Control BMPs			
	LEAD method proposed?			
	Numeric sizing standards (design criteria)			
	Treatment Control BMP selection (include target pollutants, justification and alternative analysis)			
	Pollutant removal information (in addition to vendor specifications)			
	Restrictions on use of infiltration BMPs			
	Location of treatment control BMPs			
	Structural Treatment Limited Exclusion?			
	Literature references			
11.	Storm Water BMP Maintenance	Y		
General Comments:				
NA – Not applicable (no revision is required)				
Revisions to the SWMP are required for all those requirements listed in this table as applicable, but identified as not addressed with an N.				

APPENDIX D

SUGGESTED RESOURCES	HOW TO GET A COPY
<p>The County of San Diego Low Impact Development Handbook; Stormwater Management Strategies (2007)</p> <p>Presents guidance for LID stormwater planning and management techniques. Fact Sheets on LID BMPs are provided in the Appendices.</p>	<p>The County of San Diego The Department of Planning and Land Use 5201 Ruffin Road, Suite B San Diego, CA 92123 http://www.sdcounty.ca.gov/dplu/LID_PR.html www.sdcounty.ca.gov/dplu/</p>
<p>Better Site Design: A Handbook for Changing Development Rules in Your Community (1998)</p> <p>Presents guidance for different model development alternatives.</p>	<p>Center for Watershed Protection 8391 Main Street Ellicott City, MD 21043 410-461-8323 www.cwp.org</p>
<p>California Urban runoff Best Management Practices Handbooks (2003) for Construction Activity, Municipal, and Industrial/Commercial</p> <p>Presents a description of a large variety of Structural BMPs, Treatment Control, BMPs and Source Control BMPs</p>	<p>Los Angeles County Department of Public Works Cashiers Office 900 S. Fremont Avenue Alhambra, CA 91803 626-458-6959 www.cabmphandbooks.org</p>
<p>Caltrans Urban runoff Quality Handbook: Planning and Design Staff Guide (Best Management Practices Handbooks (1998)</p> <p>Presents guidance for design of urban runoff BMPs</p>	<p>California Department of Transportation P.O. Box 942874 Sacramento, CA 94274-0001 916-653-2975</p>
<p>Bioretention Plan (updated 2002)</p> <p>Presents guidance for designing, building, and maintaining bioretention facilities.</p>	<p>Prince George's County Watershed Protection Branch 9400 Peppercorn Place, Suite 600 Landover, MD 20785 http://www.co.pg.md.us/Government/AgencyIndex/DER/ESD/Bioretention/bioretention.asp</p>
<p>Contra Costa Clean Water Program Stormwater C.3 Guidebook</p> <p>Includes an integrated design approach to meet California Stormwater NPDES treatment and hydrograph modification management requirements using Low Impact Development site design techniques and facilities.</p>	<p>Contra Costa Clean Water Program 255 Glacier Drive Martinez, CA 94553 www.cccleanwater.org/construction/nd.php</p>
<p>Design of Stormwater Filtering Systems (1996) by Richard A. Claytor and Thomas R. Schuler</p> <p>Presents detailed engineering guidance on ten different urban runoff-filtering systems.</p>	<p>Center for Watershed Protection 8391 Main Street Ellicott City, MD 21043 410-461-8323</p>
<p>Development Planning for Stormwater Management, A Plan for the Standard Urban Stormwater Mitigation Plan (SUSMP), (May 2000)</p>	<p>Los Angeles County Department of Public Works http://dpw.co.la.ca.us/epd/ or http://www.888cleanLA.com</p>
<p>Florida Development Plan: A Guide to Sound Land and Water Management (1988)</p> <p>Presents detailed guidance for designing BMPs</p>	<p>Florida Department of the Environment 2600 Blairstone Road, Mail Station 3570 Tallahassee, FL 32399 850-921-9472</p>

SUGGESTED RESOURCES	HOW TO GET A COPY
<p>Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (1993) Report No. EPA-840-B-92-002.</p> <p>Provides an overview of, planning and design considerations, programmatic and regulatory aspects, maintenance considerations, and costs.</p>	<p>National Technical Information Service U.S. Department of Commerce Springfield, VA 22161 800-553-6847</p>
<p>Guide for BMP Selection in Urban Developed Areas (2001)</p>	<p>ASCE Envir. and Water Res. Inst. 1801 Alexander Bell Dr. Reston, VA 20191-4400 (800) 548-2723</p>
<p>Low-Impact Development Design Strategies - An Integrated Design Approach (June 1999)</p>	<p>Prince George's County, Maryland Department of Environmental Resource Programs and Planning Division 9400 Peppercorn Place Largo, Maryland 20774 http://www.co.pg.md.us/Government/DER/PPD/pgcounty/lidmain.htm</p>
<p>Maryland Stormwater Design Plan (1999)</p> <p>Presents guidance for designing urban runoff BMPs</p>	<p>Maryland Department of the Environment 2500 Broening Highway Baltimore, MD 21224 410-631-3000</p>
<p>National Stormwater Best Management Practices (BMP) Database, Version 1.0</p> <p>Provides data on performance and evaluation of urban runoff BMPs</p>	<p>American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191 703-296-6000</p>
<p>National Stormwater Best Management Practices Database (2001)</p>	<p>Urban Water Resources Research Council of ASCE Wright Water Engineers, Inc. (303) 480-1700</p>
<p>Operation, Maintenance and Management of Stormwater Management (1997)</p> <p>Provides a thorough look at storm water practices including, planning and design considerations, programmatic and regulatory aspects, maintenance considerations, and costs.</p>	<p>Watershed Management Institute, Inc. 410 White Oak Drive Crawfordville, FL 32327 850-926-5310</p>
<p>Portland Stormwater Management Plan (2004)</p> <p>Includes design illustrations and criteria for bioretention facilities.</p>	<p>Environmental Services 1120 SW 5th Ave., Rm. 1000 Portland, OR 97204 503-823-7740 http://www.portlandonline.com/bes/index.cfm?c=35122&</p>
<p>Potential Groundwater Contamination from Intentional and Non-Intentional Stormwater Infiltration</p>	<p>Report No. EPA/600/R-94/051, USEPA (1994).</p>
<p>Preliminary Data Summary of Urban runoff Best Management Practices (August 1999)</p> <p>EPA-821-R-99-012</p>	<p>http://www.epa.gov/ost/stormwater/</p>

SUGGESTED RESOURCES	HOW TO GET A COPY
Reference Guide for Stormwater Best Management Practices (July 2000)	City of Los Angeles Urban runoff Management Division 650 South Spring Street, 7th Floor Los Angeles, California 90014 http://www.lacity.org/san/swmd/
Second Nature: Adapting LA's Landscape for Sustainable Living (1999) by Tree People Detailed discussion of BMP designs presented to conserve water, improve water quality, and achieve flood protection.	Tree People 12601 Mullholland Drive Beverly Hills, CA 90210 (818) 623-4848 Fax (818) 753-4625
Start at the Source (1999) Detailed discussion of permeable pavements and alternative driveway designs presented.	Bay Area Stormwater Management Agencies Association 2101 Webster Street Suite 500 Oakland, CA 510-286-1255 www.basmaa.org
Stormwater Management in Washington State (1999) Vols. 1-5 Presents detailed guidance on BMP design for new development and construction.	Department of Printing State of Washington Department of Ecology P.O. Box 798 Olympia, WA 98507-0798 360-407-7529
Stormwater, Grading and Drainage Control Code, Seattle Municipal Code Section 22.800-22.808, and Director's Rules, Volumes 1-4. (Ordinance 119965, effective July 5, 2000)	City of Seattle Department of Design, Construction & Land Use 700 5th Avenue, Suite 1900 Seattle, WA 98104-5070 (206) 684-8880 http://www.ci.seattle.wa.us/dclu/Codes/sgdcode.htm
Texas Nonpoint Source Book – Online Module (1998) www.txnpsbook.org Presents BMP design and guidance information on-line	Texas Statewide Urban runoff Quality Task Force North Central Texas Council of Governments 616 Six Flags Drive Arlington, TX 76005 817-695-9150
The Practice of Watershed Protection by Thomas R. Shchuler and Heather K. Holland	Center for Watershed Protection 8391 Main Street Ellicott City, MD 21043 410-461-8323 www.cwp.org
Urban Storm Drainage, Criteria Plan – Volume 3, Best Management Practices (1999) Presents guidance for designing BMPs	Urban Drainage and Flood Control District 2480 West 26th Avenue, Suite 156-B Denver, CO 80211 303-455-6277

APPENDIX E

POTENTIAL PERMANENT TREATMENT BMP MAINTENANCE MECHANISMS

1. Project proponent agreement to maintain storm water BMPs: The City may enter into a contract with the project proponent obliging the project proponent to maintain, repair and replace the storm water BMP as necessary into perpetuity. Security may be required.
2. Assessment districts: The City may approve an Assessment District or other funding mechanism created by the project proponent to provide funds for storm water BMP maintenance, repair and replacement on an ongoing basis. Any agreement with such a District shall be subject to the Public Entity Maintenance Provisions above.
3. Lease provisions: In those cases where the City holds title to the land in question, and the land is being leased to another party for private or public use, the City may assure storm water BMP maintenance, repair and replacement through conditions in the lease.
4. Public entity maintenance: The City may approve a public or acceptable quasi-public entity (e.g., the County Flood Control District, or annex to an existing assessment district, an existing utility district, a state or federal resource agency, or a conservation conservancy) to assume responsibility for maintenance, repair and replacement of the permanent treatment BMP. Unless acceptable to the City, public entity maintenance agreements shall ensure estimated costs are front-funded or reliably guaranteed, (e.g., through a trust fund, assessment district fees, bond, letter of credit or similar means). In addition, the City may seek protection from liability by appropriate releases and indemnities. The City shall have the authority to approve storm water BMPs proposed for transfer to any other public entity within its jurisdiction before installation. The City shall be involved in the negotiation of maintenance requirements with any other public entities accepting maintenance responsibilities within their respective jurisdictions; and in negotiations with the resource agencies responsible for issuing permits for the construction and/or maintenance of the facilities. The City must be identified as a third party beneficiary empowered to enforce any such maintenance agreement within their respective jurisdictions.

The City may accept alternative maintenance mechanisms if such mechanisms are as protective as those listed above.

APPENDIX F

DEFINITIONS

“Attached Residential Development” means any development that provides 10 or more residential units that share an interior/exterior wall. This category includes, but is not limited to: dormitories, condominiums and apartments.

“Automotive Repair Shop” means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

“Commercial Development” means any development on private land that is not exclusively heavy industrial or residential uses. The category includes, but is not limited to: mini-malls and other business complexes, shopping malls, hotels, office buildings, public warehouses, hospitals, laboratories and other medical facilities, educational institutions, recreational facilities, plant nurseries, car wash facilities, automotive dealerships, commercial airfields, and other light industrial complexes.

“Commercial Development greater than 1 acre” means any commercial development that result in the disturbance of one acre or more of land.

“Detached Residential Development” means any development that provides 10 or more freestanding residential units. This category includes, but is not limited to: detached homes, such as single-family homes and detached condominiums.

“Directly Connected Impervious Area (DCIA)” means the area covered by a building, impermeable pavement, and/ or other impervious surfaces, which drains directly into the storm drain without first flowing across permeable vegetated land area (e.g., lawns).

“Environmentally Sensitive Areas” means areas that include, but are not limited to, all Clean Water Act 303(d) impaired water bodies (“303[d] water bodies”); areas designated as an “Area of Special Biological Significance” (ASBS) by the State Water Resources Control Board (*Water Quality Control Plan for the San Diego Basin* (1994) and amendments); water bodies designated as having a RARE beneficial use by the State Water Resources Control Board (*Water Quality Control Plan for the San Diego Basin* (1994) and amendments), or areas designated as preserves or their equivalent under the Multiple Species Conservation Program (MSCP) within the Cities and County of San Diego. The limits of Areas of Special Biological Significance are those defined in the *Water Quality Control Plan for the San Diego Basin* (1994 and amendments). Environmentally sensitive area is defined for the purposes of implementing SUSMP requirements, and does not replace or supplement other environmental resource-based terms, such as “Environmentally Sensitive Lands,” employed by Copermittees in their land development review processes. As appropriate, Copermittees should distinguish between environmentally sensitive area and other similar terms in their Local SUSMPs.

“Hillside” means lands that have a natural gradient of 25 percent (4 feet of horizontal distance for every 1 foot of vertical distance) or greater and a minimum elevation differential of 50 feet, or a natural gradient of 200 percent (1 foot of horizontal distance for every 2 feet of vertical distance) or greater and a minimum elevation differential of 10 feet.

“Hillside development greater than 5,000 square feet” means any development that would create more than 5,000 square feet of impervious surfaces in hillsides with known erosive soil conditions.

“Hydromodification” means the change in the natural hydrologic processes and runoff characteristics (i.e. interception, infiltration, overland flow, interflow and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and changes in sediment transport. In addition, alternation of stream and river channels, installation of dams and water impoundments, and excessive streambank and shoreline erosion are also considered hydromodification, due to their disruption of natural watershed hydrologic processes....

“Infiltration” means the downward entry of water into the surface of the soil.

“Low Impact Development (LID)” means a stormwater management and land development strategy that emphasizes conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions.

“Maximum Extent Practicable (MEP)” means the technology-based standard established by Congress in the Clean Water Act 402(p)(3)(B)(iii) that municipal dischargers of urban runoff must meet. MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) in combination with treatment

methods serving as a backup (additional lines of defense).

“Natural Drainage” means a natural swale or topographic depression which gathers and/or conveys runoff to a permanent or intermittent watercourse or waterbody.

“New Development” means land disturbing activities; surface grading for structural development, including construction or installation of a building or structure, the creation of impervious surfaces; and land subdivision.

“Parking Lot” means land area or facility for the temporary parking or storage of motor vehicles used personally, or for business or commerce.

“Projects Discharging to Receiving Waters within Environmentally Sensitive Areas” means all development and significant redevelopment that would create 2,500 square feet of impervious surfaces or increase the area of imperviousness of a project site to 10% or more of its naturally occurring condition, and either discharge urban runoff to a receiving water within or directly adjacent (where any portion of the project footprint is located within 200 feet of the environmentally sensitive area) to an environmentally sensitive area, or discharge to a receiving water within an environmentally sensitive area without mixing with flows from adjacent lands (where the project footprint is located more than 200 feet from the environmentally sensitive area).

“Project Footprint” means the limits of all grading and ground disturbance, including landscaping, associated with a project.

“Receiving Waters” means surface bodies of water, which directly or indirectly receive discharges from urban runoff conveyance systems, including naturally occurring wetlands, streams (perennial, intermittent, and ephemeral (exhibiting bed, bank, and ordinary high water mark)), creeks, rivers, reservoirs, lakes, lagoons, estuaries, harbors, bays and the Pacific Ocean. The Copermittee shall determine the definition for wetlands and the limits thereof for the purposes of this definition, provided the Copermittee definition is as protective as the Federal definition utilized by the United States Army Corps of Engineers and the United States Environmental Protection Agency. Constructed wetlands are not considered wetlands under this definition, unless the wetlands were constructed as mitigation for habitat loss. Other constructed BMPs are not considered receiving waters under this definition, unless the BMP was originally constructed in receiving waters.

Construction of treatment control BMPs is prohibited in “Receiving Waters” may not be used to satisfy SUSMP requirements

“Residential Development” means any development on private land that provides living accommodations for one or more persons. This category includes, but is not limited to: single-family homes, multi-family homes, condominiums, and apartments.

“Restaurant” means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet shall meet all SUSMP requirements except for structural treatment BMP and numeric sizing criteria requirement and hydromodification requirement.

“Sediment” means soils or other surficial materials eroded and then transported or deposited by the action of wind, water, ice, or gravity. Sediments can increase turbidity, clog fish gills, reduce spawning habitat, lower young aquatic organisms survival rates, smother bottom dwelling organisms, and suppress aquatic vegetation growth.

“Significant Redevelopment” means development that would create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site that falls under a priority development project categories. Where redevelopment results in an increase of less than 50% of the impervious surfaces of a previously existing development, and the existing development was not subject to SUSMP requirements, the numeric sizing criteria discussed in (***) applies only to the addition, and not to the entire development. When redevelopment results in an increase of more than 50% of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development. Significant redevelopment includes, but is not limited to: the expansion of a building footprint; addition to or replacement of a structure; replacement of an impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Significant redevelopment does not include trenching and resurfacing associated with utility work; resurfacing and reconfiguring surface parking lots; new sidewalk construction, pedestrian ramps, or bikelane on existing roads; and replacement of damaged pavement.

“LID site design BMP” also known as a significant part of Low Impact Development (LID), means any project design feature that reduces the amount of impervious surfaces, disconnects impervious surfaces, reduces creation or severity of potential pollutant sources, and/or reduces the alteration of the project site's natural flow regime.

Redevelopment projects that are undertaken to remove pollutant sources (such as existing surface parking lots and other impervious surfaces) or to reduce the need for new roads and other impervious surfaces (as compared to conventional or low-density new development) by incorporating higher densities and/or mixed land uses into the project design, are also considered LID site design BMPs.

“Source Control BMP (both structural and non-structural)” means land use or site planning practices, or structures that aim to prevent urban runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff. Examples include roof structures over trash or material storage areas, and berms around fuel dispensing areas.

“Storm Water Best Management Practice (BMP)” means any schedules of activities, prohibitions of practices, general good house keeping practices, pollution prevention and educational practices, maintenance procedures, structural treatment BMPs, and other management practices to prevent or reduce to the maximum extent practicable the discharge of pollutants directly or indirectly to receiving waters. Storm Water BMPs also include treatment requirements, operating procedures and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. This SUSMP groups storm water BMPs into the following categories: LID site design, source control, and treatment control (pollutant removal) BMPs.

“Storm Water Conveyance System” means private and public drainage facilities by which storm water may be conveyed to Receiving Waters, such as: natural drainages, ditches, roads, streets, constructed channels, aqueducts, storm drains, pipes, street gutters, or catch basins.

“Streets, Roads, Highways, and Freeways” means any project that is not part of a routine maintenance activity, and would create a new paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles and other vehicles. For the purposes of SUSMP requirements, Streets, Roads, Highways and Freeways do not include trenching and resurfacing associated with utility work; applying asphalt overlay to existing pavement; new sidewalk, pedestrian ramps, or bikelane construction on existing roads; and replacement of damaged pavement.

“Treatment Control (Structural) BMP” means any engineered system designed and constructed to remove pollutants from urban runoff. Pollutant removal is achieved by simple gravity settling of particulate pollutants, filtration, biological uptake, media adsorption or any other physical, biological, or chemical process.

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Section 3

Construction SWPPP Standards and Requirements

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3.1 Construction SWPPP Standards Introduction

3.1.1 Background Information

The Construction Storm Water Pollution Prevention Plan (SWPPP) standards and requirements described herein were established to ensure construction compliance with the City of Carlsbad Storm Water Ordinance and the Municipal Permit (as issued by the California Regional Water Quality Control Board). This section must be used in conjunction with other sections of this manual to ensure full compliance with both construction and post construction storm water requirements. This section addresses the need for temporary Best Management Practices (BMPs) during construction activities to minimize the mobilization of pollutants such as sediment and to minimize the exposure of storm water to pollutants.

Pursuant to Titles 11, 15 and 18 of the Carlsbad Municipal Code, all construction activities within the City, whether the City issues a construction permit or not, are subject to the provisions of the standards and requirements of this manual.

The water quality protection measures and construction procedures described in this section of the manual are intended to ensure construction activity compliance with the following State and Regional water quality permits:

Municipal Permit -more particularly described as San Diego California Regional Water Quality Control Board San Diego Region Order No. R9-2007-01, NPDES No. CAS0108758 Waste Discharge Requirements for Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds of the County of San Diego County, the San Diego Unified Port District, and the San Diego County Regional Airport Authority and any amendment, revision or re-issuance thereof; and,

General Construction Permit - more particularly described as NPDES General Permit for Storm Water Discharges Associated with Construction Activity, Water Quality Order No. 99-08-DWQ, NPDES No. CAS000002, issued by the State Water Resources Control Board (Construction General Permit), and any amendment, revision or re-issuance thereof; and,

General Linear Utility Permit - more particularly described as NPDES General Permit for Storm Water Discharges Associated with Construction Activity from Small Linear Underground/Overhead Projects, Water Quality Order 2003-0007 – DWQ, and any amendment, revision or re-issuance thereof.

3.1.2 Standards Applicability to Construction Projects

All construction activities in the City of Carlsbad are subject to the requirements of the Municipal Permit. Construction activities that meet one or more of the following criteria are additionally subject to the requirements of the General Construction Permit.

Construction activities that:

- 1) Disturb one or more acres of land area;
- 2) Form part of a larger common plan of development that encompasses one or more acres of soil disturbance; or
- 3) Have the potential for significant water quality impairment.

The General Construction Permit does not apply to routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of an existing facility, nor does it include emergency construction activities required to protect public health and safety. Developers/owners/contractors should confirm with the San Diego Regional Water Quality Control Board (SDRWQCB) staff whether or not a particular routine maintenance activity is subject to the General Construction Permit.

Construction of small linear utility facility projects that are not subject to the General Construction Permit are subject to the requirements of the General Linear Utility Permit. This includes but is not limited to construction of any conveyance pipe for transportation of gaseous, liquid, liquescent or slurry material; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications; and, associated ancillary facilities. Developers/owners/contractors should confirm with the SDRWQCB staff whether or not a particular underground or overhead utility construction project is subject to the General Linear Utility Permit.

3.2 Construction SWPPP Requirements and Approval Process

3.2.1 Construction SWPPP Tier Levels

Every construction activity within the City that has the potential to negatively affect water quality must prepare a construction storm water pollution prevention plan (Construction SWPPP) whether or not the City issues a construction permit for the activity. To ensure compliance with all the various State and Regional permitting regulations, the City established a three-tiered system for the preparation of Construction SWPPPs. The tiers range from Tier 3 representing the highest threat to water quality to Tier 1 representing the lowest threat to water quality. The threshold triggers for each of the three tier levels are generally described below together with a reference to the applicable Construction SWPPP standards.

Tier 3 - Construction activities that impact one or more acres (individually or cumulatively through phased construction) or that pose a significant potential for storm water quality impairment must prepare a Tier 3 Construction SWPPP in conformance with the standards and requirements of the Construction General Permit and City Standards.

Tier 2 – Construction activities that impact less than one acre and that pose a moderate threat to storm water quality must prepare a Tier 2 Construction SWPPP in conformance with City Standards. In the case of small linear underground/overhead utility projects, the project must also demonstrate compliance with the General Linear Utility Permit.

Tier 1 – Construction activities that impact less than one acre and pose a low threat to storm water quality must prepare a Tier 1 Construction SWPPP in conformance with City Standards. In the case of small linear underground/overhead utility projects, the project must also demonstrate compliance with the General Linear Utility Permit.

Exempt - Construction activities that pose no threat to storm water quality are exempt from the preparation of a Construction SWPPP; however, the construction activities must still comply with all construction BMPs required pursuant to Title 15 of the CMC and these standards.

3.2.2 Determination of Construction SWPPP Tier Level

The worksheet entitled “Project Threat Assessment Worksheet for Determination of Construction SWPPP Tier Level”, attached as Appendix A, shall be used to determine the appropriate tier level of Construction SWPPP for a proposed construction project. The worksheet is also used to determine whether the project is exempt from Construction SWPPP requirements.

To make a determination, the project reviewer starts with the assessment criteria located at the top of the worksheet along the left hand column and works downward through the various threat categories and assessment criteria. At the first point where the proposed project makes a match with the assessment criteria, a check is made in the box next to the criteria. The tier level listed in the right hand column in the same row as the selected assessment criteria is the required Construction SWPPP Tier Level for the project.

If none of the boxes in the Significant, Moderate or Low Threat Project Assessment Criteria categories are checked, then the project is exempt from the Construction SWPPP requirements. Proposed construction projects may be considered categorically exempt from the Construction SWPPP requirements when, and if, the project only requires issuance of one or more of the construction permit types shown on Table 1 below.

Exempt projects must still comply with all storm water best management practices pursuant to Title 15 of the Carlsbad Municipal Code and City Standards. If in the opinion of the City Engineer, an otherwise exempt project is, or potentially could pose, a threat to storm water quality, the City Engineer may require preparation and implementation of a Construction SWPPP at a tier level commensurate with the storm water threat

Table 1	
City Construction Permit Types Exempt from Construction SWPPP Requirements	
Electrical Permit Fire Additional Permit Fire Alarm Permit Fixed Systems Permit Haul Route Permit Mechanical Permit Mobile Home Permit Oversize Load Permit	Patio Deck Plumbing Permit Sign Permit Spa – Factory Made Sprinkler Permit Water Discharge Permit Water Meter Permit

Cautionary Note - The Project Threat Assessment Worksheet represents the project proponent's assessment of the threat posed by a proposed construction project. City staff has responsibility for making the final assessment regarding the need for and tier level of Construction SWPPP required. The City staff decision is made after submission of the plan review application. A staff determination that the construction plan review application is subject to the preparation of a Construction SWPPP, or is subject to more stringent Construction SWPPP requirement than initially assessed by the applicant (project proponent), will result in the return of the plan review application as incomplete.

If applicants are unsure about the meaning of any of the assessment criteria described in the worksheet or need help in determining how to respond to one or more of the assessment criteria, they are strongly

encouraged to seek assistance from Engineering Department Development Services staff prior to preparation of the Construction SWPPP and submission for construction plan review.

3.2.3 Preparation of a Construction SWPPP

The project proponent is responsible for preparation of the appropriate tier level Construction SWPPP. Tier 2 and Tier 3 Construction SWPPPs shall be prepared in accordance with the requirements of this manual. All Tier 2 and Tier 3 SWPPPs shall be written, amended and certified by a Qualified SWPPP Preparer.

A Qualified SWPPP Preparer shall have one of the following registrations or certifications:

1. A California registered civil engineer,
2. A California registered geologist,
3. A California registered landscape architect,
4. A professional hydrologist registered through the American Institute of Hydrology,
5. A certified professional soil scientist registered through the Soil Science Society of America,
6. A certified professional in erosion and sediment control registered through Certified Professional in Erosion and Sediment Control, Inc.,
7. A certified professional in storm water quality registered through Certified Professional in Erosion and Sediment Control, Inc., or
8. A certified professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies.

Any hydrology or hydraulic calculations, soils reports or geotechnical reports prepared in support of a Tier 2 or Tier 3 Construction SWPPP must be prepared by a professional engineer with appropriate registration qualifications issued by the State of California.

The City Engineer may approve alternative means for establishing the certification of a Qualified SWPPP Preparer for Tier 2 or Tier 3 Construction SWPPPs upon submittal of a letter by the project proponent requesting approval of an alternative certification and presenting due cause why such alternative certification should be considered.

Projects requiring a Tier 1 Construction SWPPP shall use the City's standard Tier 1 Construction SWPPP Template attached as Appendix G. No special qualification is required to prepare a Tier 1 Construction SWPPP.

3.2.4 Storm Water Certification Forms

For non-exempt projects, the project proponent must submit a certified Construction SWPPP (of the appropriate tier level) concurrent with any application for construction plan review including submittals for building plans, public and private improvement plans, grading plans, blasting plans, demolition plans, landscape plans and plans for right-of-way construction activities.

In addition to any other required construction plan review application submittal requirements, the project proponent must submit a completed and signed Storm Water Compliance Certification statement on the form prescribed in this Manual. A separate certification form is used corresponding to each of the three Construction SWPPP tier levels and for exempt projects. Copies of the required Storm Water Compliance Forms for Tier 2 and 3 Construction SWPPPs and for exempt projects are attached as Appendix B. The Storm Water Compliance statement for a Tier 1 Construction SWPPP is incorporated into the City's standard form Tier 1 Construction SWPPP attached as Appendix H.

After submittal of the application, City staff will review the Storm Water Compliance statement and either note concurrence with the proponents threat assessment at the bottom right hand corner of the Storm Water Compliance Form or reject the application as incomplete and return the application submittal package with a written explanation why the project threat assessment should be changed. See Cautionary Note in Section 3.2.1 above.

3.2.5 Project Threat to Storm Water Quality

Before a project construction permit can be issued for any project not found exempt from the Construction SWPPP requirements, a project's perceived threat to storm water quality must be determined. The Municipal Permit mandates that the City provide inspection commensurate with a project's perceived threat to storm water quality. The assessment criteria used to determine a project's perceived threat to storm water quality is not the same as the assessment criteria used to determine the tier level of Construction SWPPP for a project.

The worksheet entitled "Construction Threat Assessment Worksheet for Determination of Project's Perceived Threat to Storm Water Quality", attached as Appendix A, is used to determine the appropriate perceived threat to storm water compliance for a particular project. The perceived threat to storm water quality priority level, determined by the Construction Threat Assessment Worksheet, is directly related to the frequency of storm water compliance inspections required under the Municipal Permit and is one of the factors used in the determination of the City Construction SWPPP inspection fee for a project. For more detailed information on storm water compliance inspections please refer to Section 3.4 of this manual.

3.2.6 Tier 3 Construction SWPPP Requirements

For projects that result in the disturbance of one acre or more of soil (individually or cumulatively through phased construction) and/or are determined to have a significant potential for water quality impairment, a Tier 3 Construction SWPPP shall be prepared in accordance with the requirements of the General Construction Permit and these standards.

3.2.61 Required Elements for Tier 3 Construction SWPPP

A Tier 3 Construction SWPPP must contain all of the elements required by the General Construction Permit, the Municipal Permit and these standards. The *TIER 3 CONSTRUCTION SWPPP REQUIRED ELEMENTS CHECKLIST*, attached as Appendix B, provides a complete listing of the required elements for a Tier 3 Construction SWPPP together with the regulatory source for each listed element. The checklist utilizes the same formatting as the checklist prepared by the State Water Resources Control Board entitled *STORM WATER POLLUTION PREVENTION PLAN AND MONITORING PROGRAM CHECKLIST*, modified to include elements required by the Municipal Permit and these standards.

The checklist is provided as an aid to those unfamiliar in the preparation of a Tier 3 Construction SWPPP. It is a comprehensive list of issues a SWPPP preparer must consider during the development of the document. Many sites, especially small construction sites, will not need to address some of the listed elements because they are not relevant to the site, the construction activities planned, or the construction materials used. The list allows the preparer to consider the applicability of the element to the specific circumstances of the site, and then determine to what extent the element should be addressed in the SWPPP.

The elements in the checklist are derived from Sections A, B, and C of the General Construction Permit, Section D.2. of the Municipal Permit, and these standards. The specific regulatory permit or City Standard section is listed in the second column. The third column indicates the page number(s) in the SWPPP document where the line item element is addressed. If the required element is not applicable to the specific project, then N/A should be noted in the fourth column. The fifth column is a space to note the scheduled date where any specified BMP elements will be implemented.

The use of this checklist does not guarantee compliance with the General Construction Storm Water Permit or these standards. Additionally, using the checklist to generate a Tier 3 Construction SWPPP is not a substitute for knowledge of the permit requirement. The checklist serves as a guidance document only. A site specific Tier 3 Construction SWPPP must be combined with proper and timely installation of the BMPs, thorough and frequent inspections, maintenance, and documentation.

3.2.6.2 Required Format for a Tier 3 Construction SWPPP

A Tier 3 Construction SWPPP shall be formatted in accordance with the SWPPP template included in the latest version of the "*California Stormwater BMP Handbook Construction*" prepared by the California Storm Water Quality Association (CASQA). As an alternative, the developer may use the Construction SWPPP format presented in the latest edition of the "*Stormwater Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual*" prepared by Caltrans. The developer/owner/applicant must request approval for the use of the Caltrans format prior to submittal.

As an aide to the preparation of a Tier 3 Construction SWPPP document, the preparer may utilize the *Tier 3 CONSTRUCTION SWPPP CASQA FORMAT CHECKLIST (CASQA SWPPP Checklist)* included in Appendix C. The Tier 3 CASQA SWPPP Checklist is used by the City during its review of the Tier 3 Construction SWPPP documents.

The use of the checklist does not guarantee compliance with the General Construction Storm Water Permit or these standards. Additionally, using the checklist to generate a Tier 3 Construction SWPPP is not a substitute for knowledge of the permit requirement. The checklist serves as a guidance document only. A site specific Tier 3 Construction SWPPP must be combined with proper and timely installation of the BMPs, thorough and frequent inspections, maintenance, and documentation.

3.2.6.3 General Construction Permit Compliance Procedures

The General Construction Permit requires certain standard notifications to be made to the San Diego Regional Water Quality Control Board (SDRWQCB) prior to initiation of construction and after completion of construction as follows:

Notice of Intent (NOI) - It is the responsibility of the owner/developer/applicant to obtain coverage under the General Construction Permit through the filing of a Notice of Intent (NOI) with the SDRWQCB prior to commencement of construction activities. After City approval of the Tier 3 Construction SWPPP and prior to signature of the grading plans and/or issuance of grading permit for the project, the owner/developer/applicant shall submit the City approved Tier 3 Construction Permit, a filing fee and other required documentation to the SDRWQCB. Upon filing of the NOI, the project will be assigned a Waste Discharger's Identification (WDID) number by the SDRWQCB. The WDID number must be added into the Tier 3 Construction SWPPP and affixed onto the respective construction plans.

Notice of Termination (NOT) – Upon completion of the construction activity or transfer of ownership, the landowner shall file a NOT with the SDRWQCB certifying that all State and local requirements have been met in accordance with Special Provisions for Construction Activity, C.7, of the General Construction Permit.

Landowners who fail to obtain coverage of the General Construction Permit for storm water discharges to surface waters will be in violation of the CWA and the California Water Code.

To obtain a copy of the General Construction Permit, general information about the permit, fact sheets and copies of the various forms described below, visit the following website:

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

Once at the site click on the highlighted link titled "Construction General Permit, 99-08-DWQ".

3.2.7 Tier 2 Construction SWPPP Requirements

Construction activities that impact less than one acre and pose a moderate threat to water quality (as determined by the moderate threat assessment criteria contained in the Project Threat Assessment Worksheet attached as Appendix A) must prepare a Tier 2 Construction SWPPP in conformance with City Standards. Small linear underground or overhead utility projects must also comply with the requirements of the General Linear Utility Permit.

3.2.7.1 Required Elements for Tier 2 Construction SWPPP

A Tier 2 Construction SWPPP shall contain all of the elements as described on the "TIER 2 CONSTRUCTION SWPPP CHECKLIST" attached as Appendix G.

The use of the checklist does not guarantee compliance with these standards. The checklist serves as a guidance document only. A site specific Tier 2 Construction SWPPP must be combined with proper and timely installation of the BMPs, thorough and frequent inspections, maintenance, and documentation.

3.2.7.2 Required Format for Tier 2 Construction SWPPP

A Tier 2 Construction SWPPP shall be formatted in accordance with the template attached as Appendix E.

For small linear utility construction project subject to the General Linear Utility Permit, the project proponent shall follow the requirements of the General Linear Utility Permit for preparation of a Tier 2 Construction SWPPP. The Tier 2 SWPPP specified in the General Linear Utility Permit shall be submitted to the City in lieu of the City standard form Tier 2 Construction SWPPP.

3.2.8 Tier 1 Construction SWPPP Requirements

Construction activities that impact less than one acre and pose a low threat to water quality (as determined by the low threat assessment criteria contained in the Project Threat Assessment Worksheet attached as Appendix A) must prepare a standard format Tier 1 Construction SWPPP in conformance with City Standards. Small linear underground or overhead utility projects must also comply with the requirements of the General Linear Utility Permit.

3.2.8.1 Required Standard Format for Tier 1 Construction SWPPP

A Tier 1 Construction SWPPP shall utilize the standard form Tier 1 Construction SWPPP template attached as Appendix H. The standard form template includes the two legal sized sheets containing standard storm water prevention construction notes, a project information block, a Storm Water Compliance Statement, City approval block and a Best Management Practice (BMP) Checklist Table.

A Tier 1 level project that receives a "low perceived threat to storm water quality" rating as determined by the Construction Threat Assessment Worksheet, attached as Appendix C, need only complete and sign the first two sheets of the template. A Tier 1

level project that receives a “medium perceived threat to storm water quality” rating as determined by the Construction Threat Assessment Worksheet must additionally, attach a site plan map sheet(s) showing the proposed construction site and depicting the areas of proposed construction and proposed location of structural BMPs. For a more detail description regarding the site plan requirements, see the site plan instruction sheet included with the template in Appendix H.

For all Tier 1 Construction SWPPPs, the property owner or owner’s agent must complete the information in the Project Information block, check the appropriate boxes in the BMP Checklist Table and fill out and sign the Storm Water Compliance Statement. The form is intended to be completed as an “over the counter” type document for processing of construction permits for projects with a “low perceived threat to storm water quality”. Projects with a “medium perceived threat to storm water quality”, may require additional staff time to review the site plan included with the Tier 1 Construction SWPPP.

The BMP Checklist Table on page two of the standard form template is intended to be completed by the project proponent. The project proponent begins by checking the box to the left of each construction activity that will be performed during construction of the proposed project. Then, for each checked activity, the project proponent will pick one or more of the BMPs described along the top of the table that will be used to prevent storm water pollution resulting from that specific activity. The project proponent will then make a check in the box along the particular construction activity row that corresponds with the column for each BMP selected to help mitigate the potential storm water pollution effects of the activity. This process is repeated until all appropriate BMP boxes have been checked corresponding to each of the checked construction activities. Blank columns are included on the form to allow the applicant to add additional proposed BMPs not included on the standard table.

The owner/developer/contractor performing the construction work is responsible for ensuring that each of the selected BMPs is appropriately incorporated into the project during construction. The use of the BMP Checklist Table does not guarantee compliance with these standards. The BMP Checklist Table serves as a guidance document only. Additional BMPs may be required if the selected BMP(s) are shown to be ineffective or not relevant to a particular construction activity.

For small linear utility construction project subject to the General Linear Utility Permit, the project proponent shall follow the requirements of the General Linear Utility Permit for preparation of a Tier 1 Construction SWPPP. The Tier 1 SWPPP specified in the General Linear Utility Permit shall be submitted to the City in lieu of the City standard form Tier 1 Construction SWPPP.

3.2.9 General Linear Utility Permit Compliance Procedures

The General Linear Utility Permit requires certain standard notifications to be made to the San Diego Regional Water Quality Control Board (SDRWQCB) prior to initiation of construction and after completion of construction as described below. To obtain a copy of the General Linear Utility Permit, general information about the permit, fact sheets and copies of the various forms described below, visit the following website:

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

Once at the site click on the highlighted link titled “Small LUP General Permit”.

3.2.9.1 Notice of Intent (NOI)

It is the responsibility of the owner/developer/applicant to obtain coverage under the General Linear Permit through the filing of a Notice of Intent (NOI) with the SDRWQCB prior to commencement of construction activities. After City approval of the Tier 2 or Tier 1 Construction SWPPP and prior to issuance of grading and/or right-of-way permit for the project, the project proponent shall submit the City approved Construction Permit, a filing fee and other required documentation to the SDRWQCB. Upon filing of the NOI, the project will be assigned a Waste Discharger’s Identification (WDID) number by the SDRWQCB. The WDID number must be added into the Construction SWPPP and affixed onto the respective construction plans

3.2.9.2 General Linear Utility Permit - Tier 1 SWPPP

A single Tier 1 SWPPP prepared in accordance with the General Linear Utility Permit may authorize construction of any number of small utility projects. The Notice of Intent (NOI) and corresponding WDID number remains in effect until the discharger requests termination and such termination request is approved by the SDRWQCB.

3.2.9.2.1 Linear Construction Activity Notification (LCAN)

Prior to initiation of construction for each small utility project covered by the Tier 1 SWPPP, the discharger must submit a LCAN to the SDRWQCB prior to start of construction on the form provided for such purpose by the SDRWQCB. Alternatively, the discharger may submit a LCAN at least quarterly listing multiple small utility projects that will be constructed during the next quarter.

3.2.9.2.2 Linear Construction Termination Notification (LCTN)

At the conclusion of construction of small utility project covered by a Tier 1 SWPPP, the discharger must file a LCTN with the SDRWQCB certifying that the site was in full compliance with the requirements of the General Linear Utility Permit. The discharger may submit a single LCTN for multiple projects completed over a specified period of time. The LCTN submittal must include all required documentation requested by the SDRWQCB.

3.2.9.3 Notice of Termination (NOT)

Upon completion of the construction activity the discharger shall file a NOT with the SDRWQCB certifying that all construction activities were completed in full compliance with the requirements of the General Linear Utility Permit. For Tier 1 SWPPPs, filing of the NOT, and approval of the NOT by the SDRWQCB, will terminate permit coverage and work on additional small utility projects will no longer be permitted without obtaining a new Tier 1 or Tier 2 SWPPP. A NOT for a Tier 2 SWPPP indicates that the specified small utility project is complete and all work was done in compliance with the General Linear Utility Permit. When filing the NOT dischargers must use the NOT forms provided by the SDRWQCB.

3.2.9.4 City General Operating Permit (GOP)

The City's GOP procedures are intended to provide a mechanism for utility operators to conduct routine maintenance operations under a single permit. To avoid the need for preparing and processing separate Construction SWPPPs for each routine maintenance operation, the City will allow preparation of a single Tier 1 Construction SWPPP to cover multiple small utility projects. The process will follow the same procedures as for a Tier 1 SWPPP prepared and processed in accordance with City Standards and the requirements of the General Linear Utility Permit.

The notification procedures described above shall apply with the following addition:

1. A copy of each LCAN shall be faxed to the City Construction Management and Inspection Division a minimum of 24 hours prior to start of construction. A copy of the fax notification shall be kept at the construction site. The copy shall be presented and shown upon demand to any City Official for verification of authority to work. A lack of 24-hour notification to the City for intended work may subject the operator to a stop-work notice.
2. A copy of the LCTN shall be submitted to the City Construction Management and Inspection Division concurrent with its submittal to the RWQCB.
3. A copy of the NOT shall be submitted to the City Construction Management and Inspection Division concurrent with its submittal to the RWQCB.

Any Small Utility Project that meets the requirements of a Tier 2 SWPPP pursuant to the General Linear Utility Permit requirements shall process a Tier 2 SWPPP consistent with Tier 2 Construction SWPPP procedures described above.

3.3 Construction BMP Standards

3.3.1 Background Information

Construction Best Management Practices (BMPs) are the schedules of activities, prohibitions of practices, maintenance procedures and other management practices employed during construction activities to prevent or reduce pollution of the ocean, lagoons, lakes, streams and other sensitive water bodies and water courses. Construction BMPs also include the physical devices and structural construction control measures designed to prevent soil erosion from occurring or to contain sediment before it leaves the construction site. The BMPs required pursuant this manual are also intended to protect the health, safety and welfare of the public and to prevent damage to adjoining public and private property resulting from construction activities.

The City of Carlsbad has adopted the California Stormwater Quality Association “Construction Stormwater Best Management Practice Handbook” (CASQA Construction Handbook) latest edition as its preferred source for construction BMPs. All BMP reference numbers used in this manual correspond to the BMP Fact Sheets included within the CASQA Construction Handbook unless specifically noted otherwise. With the approval of the City Engineer, or his/her designee, the City may accept comparable BMPs from reputable alternative sources such as Caltrans.

This manual is not intended as a comprehensive engineering or design manual on BMPs. The engineer or other qualified person, who prepares the Construction SWPPP, must utilize their individual knowledge and experience of BMPs together with the tools and reference materials described in this manual, or found elsewhere, to prepare an appropriate and adequate Construction SWPPP document.

The BMP categories below coincide with the BMP categories described in the CASQA Construction Handbook and provide a kind of checklist of the BMPs that are to be included in a Construction SWPPP. The combination or suite of BMPs that are included in a Construction SWPPP must reflect the specific conditions at the proposed construction site. An effective SWPPP includes a suite of BMPs that are designed to work together.

3.3.2 Minimum BMP Requirements

In accordance with the Municipal Permit, minimum BMPs must be installed for all projects to be implemented year-round. Because all sites, regardless of the priority, must be protected to prevent discharges to the maximum extent practicable, the minimum BMP requirements are the same for all projects requiring a Construction SWPPP. Each site must be protected by an effective combination of erosion and sediment controls, non-storm water management, materials and waste management controls, and general site management controls. The sections following this section

describe the minimum BMPs for each of the above listed BMP types that must be incorporated into each Construction SWPPP prepared in accordance with these standards.

If particular BMPs are infeasible at any specific site, the owner/developer/contractor must install other equivalent BMPs. At any time of the year, an inactive site must be fully protected from erosion and discharges of sediment. A site will be considered inactive if construction activities have ceased for a period of ten or more consecutive days. It is also the owner/developer/contractors responsibility at both active and inactive sites to implement a plan to address all potential storm water and non-storm water discharges.

3.3.3 Erosion and Sediment Control BMPs

Erosion and sediment control BMPs are the structural and non-structural practices used during the construction process to keep sediment in place (erosion control) and to capture any sediment that is moved by stormwater before it leaves the site (sediment control). Erosion controls, keeping soil where it is, are the heart of any effective Construction SWPPP. The Construction SWPPP should rely on erosion controls as the primary means of preventing stormwater pollution. Sediment controls provide a necessary second line of defense to properly designed and installed erosion controls.

3.3.3.1 Erosion Control BMPs

Erosion control is any source control practice that protects the soil surface and prevents soil particles from being detached by rainfall, flowing water or wind. Erosion control is referred to as soil stabilization. Erosion control consists of preparing the soil surface and implementing one or more of the BMPs shown in Table 2.

All inactive soil-disturbed areas on the project site, and most active areas prior to the onset of rain, must be protected from erosion. Soil disturbed areas may include relatively flat areas as well as slopes. Typically, steep slopes and large exposed areas require the most robust erosion controls; flatter slopes and smaller areas still require protection, but less costly materials may be appropriate for these areas, allowing savings to be directed to the more robust BMPs for steep slopes and large exposed areas. To be effective, erosion control BMPs must be implemented at slopes and disturbed areas to protect them from concentrated flows.

CASQA BMP#	BMP Name
EC-1	Scheduling
EC-2	Preservation of Existing Vegetation
EC-3	Hydraulic Mulch
EC-4	Hydroseeding
EC-5	Soil Binders
EC-6	Straw Mulch
EC-7	Geotextiles & Mats
EC-8	Wood Mulching
EC-9	Earth Dikes and Drainage Swales
EC-10	Velocity Dissipation
EC-11	Slope Drains
EC-12	Streambank Stabilization
EC-13	Polyacrylamide

Some erosion control BMPs can be used effectively to temporarily prevent erosion by concentrated flows. These BMPs, used alone or in combination, prevent erosion by intercepting, diverting, conveying, and discharging concentrated flows in a manner that prevents soil detachment and transport. Temporary concentrated flow conveyance controls may be required to direct run-on around or through the project in a non-erodible fashion. Temporary concentrated flow conveyance controls include EC-9 (Earth Dikes and Drainage Swales), EC-10 (Velocity Dissipation Devices) and EC-11 (Slope Drains).

3.3.3.2 Sediment Control BMPs

Sediment control is any practice that traps soil particles after they have been detached and moved by rain, flowing water, or wind. Sediment control measures are usually passive systems that rely on filtering or settling the particles out of the water or wind that is transporting them. Sediment control practices include the BMPs listed in Table 3.

Sediment control BMPs include those practices that intercept and slow or detain the flow of stormwater to allow sediment to settle and be trapped. Sediment control practices can consist of installing linear sediment barriers (such as silt fence, sandbag barrier, and straw bale barrier); providing fiber rolls, gravel bag berms, or check dams to break up slope length or flow; or constructing a sediment trap or sediment basin. Linear sediment barriers are typically placed below the toe of exposed and erodible slopes, down-slope of exposed soil areas, around soil stockpiles, and at other appropriate locations along the site perimeter.

Table 3 Sediment Control BMPs	
CASQA BMP#	BMP Name
SE-1	Silt Fence
SE-2	Sediment Basin
SE-3	Sediment Trap
SE-4	Check Dam
SE-5	Fiber Rolls
SE-6	Gravel Bag Berm
SE-7	Street Sweeping and Vacuuming
SE-8	Sandbag Barrier
SE-9	Straw Bale Barrier
SE-10	Storm Drain Inlet Protection
SE-11	Chemical Treatment

A few BMPs may control both sediment and erosion, for example, fiber rolls and sand bag barriers. The CASQA Construction Handbook classifies these BMPs as either erosion control (EC) or sediment control (SC) based on the BMPs most common and effective use. Sediment control BMPs are most effective when used in conjunction with erosion control BMPs. The combination of erosion control and sediment control is usually the most effective means to prevent sediment from leaving the project site and potentially entering storm drains or receiving waters. The City of Carlsbad requires that the discharger implement an effective combination of erosion and sediment controls.

Under limited circumstances, sediment control, alone may be appropriate. For example, applying erosion control BMPs to an area where excavation, filling, compaction, or grading is currently under way may not be feasible when storms come unexpectedly. Use of sediment controls by establishing perimeter control on these areas may be appropriate and allowable provided the following conditions are met:

- Weather monitoring is under way.
- Inactive soil-disturbed areas have been protected with an effective combination of erosion and sediment controls.
- An adequate supply of sediment control materials is stored on-site and there are sufficient forces of labor and equipment available to implement sediment controls on the active area prior to the onset of rain.
- The SWPPP adequately describes the methods to protect active areas.

3.3.3.3 Wind Erosion Control BMPs

Wind erosion control consists of applying water or other dust palliatives to prevent or alleviate dust nuisance. Wind erosion control best management practices BMPs are shown in Table 4.

Table 4 Wind Erosion Control BMPs	
CASQA BMP#	BMP Name
WE-1	Wind Erosion Control

Other BMPs that are sometimes applied to disturbed soil areas in order to control wind erosion are BMPs EC-2 through EC-7, shown in Section 3.3.2.1 above. Be advised that many of the dust palliatives may contain compounds that have an unknown effect on stormwater. A sampling and analysis protocol to test for stormwater contamination from exposure to such compounds is required in the SWPPP.

3.3.3.4 Tracking Control BMPs

Tracking control consists of preventing or reducing the tracking of sediment off-site by vehicles leaving the construction area. Tracking control best management practices (BMPs) are shown in Table 5.

Table 5 Tracking Control BMPs	
CASQA BMP#	BMP Name
TR-1	Stabilized Construction Ingress/Egress
TR-2	Stabilized Construction Roadway
TR-3	Ingress/Egress Tire Wash

Attention to control of tracking sediment off site is highly recommended, as dirty streets and roads near a construction site create a nuisance to the public and generate constituent complaints to elected officials and regulators. These complaints often result in immediate inspections and regulatory actions.

3.3.4 Non-Storm Water Management BMPs

Carlsbad Standards prohibit the discharge of materials other than stormwater and authorized non-stormwater discharges. It is recognized that certain non-stormwater discharges may be necessary for the completion of construction projects. Such discharges include but are not limited to irrigation of vegetative erosion control measures, pipe flushing and testing, and street cleaning.

Non-stormwater management BMPs are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source or eliminating off-site discharge. These practices involve day-to-day operations of the construction site and are usually under the control of the contractor. These BMPs are also referred to as “good housekeeping practices” which involve keeping a clean, orderly construction site.

Non-stormwater management BMPs also include procedures and practices designed to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning, fueling, and maintenance operations to stormwater drainage systems or to watercourses.

Table 6 lists standard non-stormwater management BMPs. All these BMPs must be implemented depending on the conditions and applicability of deployment described as part of the BMP.

Table 6 Non-Storm Water Management BMPs	
CASQA BMP#	BMP Name
NS-1	Water Conservation Practices
NS-2	Dewatering Operations
NS-3	Paving and Grinding Operations
NS-4	Temporary Stream Crossing
NS-5	Clear Water Diversion
NS-6	Illicit Connection/Discharge
NS-7	Potable Water/Irrigation
NS-8	Vehicle and Equipment Cleaning
NS-9	Vehicle and Equipment Fueling
NS-10	Vehicle and Equipment Maintenance
NS-11	Pile Driving Operations
NS-12	Concrete Curing
NS-13	Concrete Finishing
NS-14	Material and Equipment Use
NS-15	Demolition Adjacent to Water
NS-16	Temporary Batch Plants

It is recommended that owners and contractors be vigilant regarding implementation of these BMPs, including making their implementation a condition of continued employment, and part of all prime and subcontract agreements. By doing so, the chance of inadvertent violation by an uncaring individual can be prevented, potentially saving thousands of dollars in fines and project delays. Also, if procedures are not properly implemented and/or if BMPs are compromised then the discharge is subject to sampling and analysis requirements contained in the General Construction Permit.

3.3.5 Waste Management and Materials Pollution Control BMPs

Waste management and materials pollution control BMPs, like non-stormwater management BMPs, are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with stormwater. These BMPs also involve day-to-day operations of the construction site, are under the control of the contractor, and are additional “good housekeeping practices” which involve keeping a clean, orderly construction site.

Waste management consists of implementing procedural and structural BMPs for handling, storing, and disposing of wastes generated by a construction project. The objective is to prevent the release of waste materials into stormwater runoff or discharges through proper management of the following types of wastes:

- Solid
- Sanitary
- Hazardous
- Equipment-related wastes

Materials pollution control (also called materials handling) consists of implementing procedural and structural BMPs in the handling, storing, and the use of construction materials. The BMPs are intended to prevent the release of pollutants during stormwater and non-stormwater discharges. The objective is to prevent or reduce the opportunity for contamination of stormwater runoff from construction materials by covering and/or providing secondary containment of storage areas, and by taking adequate precautions when handling materials. These controls must be implemented for all applicable activities, material usage, and site conditions.

Table 7 lists the waste management and materials pollution control BMPs. It is important to note that these BMPs should be implemented depending on the conditions/applicability of deployment described as part of the BMP.

3.3.6 General Site Management Requirements

Every construction site shall implement the following minimum general site management requirements:

1. Emphasize pollution prevention where appropriate; and,

Table 7 Waste Management and Materials Pollution Control BMPs	
CASQA BMP#	BMP Name
WM-1	Material Delivery and Storage
WM-2	Material Use
WM-3	Stockpile Management
WM-4	Spill Prevention and Control
WM-5	Solid Waste Management
WM-6	Hazardous Waste Management
WM-7	Contaminated Soil Management
WM-8	Concrete Waste Management
WM-9	Sanitary/ Septic Waste Management
WM-10	Liquid Waste Management

2. Implement all the requirements of the site approved Construction SWPPP to manage storm water and non-storm water discharges from the site at all times; and,
3. Minimize areas that are cleared and graded to only the portion of the site that is necessary for construction; and,
4. Minimize exposure time of disturbed soil areas; and,
5. Minimize grading during the wet season and coincide grading with seasonal dry weather periods to the extent feasible. If grading does occur during the wet season, then implement additional BMPs for any rain events that may occur; and,
6. Limit the amount of exposed soil allowed at one time to the amount that which can be adequately protected by deploying standby erosion control and sediment control BMPs prior to a predicted rainstorm; and,
7. Temporarily stabilize and/or re-seed disturbed soil areas as rapidly as possible; and,
8. Preserve the natural hydrologic features of the site where feasible; and,
9. Preserve riparian buffers and corridors where feasible; and,
10. Maintain all BMPs until removed; and,
11. Retain, reduce and properly manage all pollutant discharges on-site to the MEP standard.

3.3.6.1 Dry Season Site Management Requirements

The following minimum BMPs must be in place at all construction sites throughout the year during both the wet and dry seasons:

1. All graded areas must have erosion protection BMPs properly installed
2. Adequate perimeter protection BMPs must be installed and maintained.
3. Adequate sediment control BMPs must be installed and maintained.
4. Adequate BMPs to control offsite sediment tracking must be installed and maintained.
5. A minimum of 125% of the material needed to install standby BMPs to protect the exposed areas from erosion and prevent sediment discharges, must be stored onsite. Areas already protected from erosion using physical stabilization or established vegetation stabilization BMPs are not considered to be “exposed” for purposes of this requirement.
6. The owner/developer/contractor must have an approved “weather triggered” action plan and be able to deploy standby BMPs to completely protect the exposed portions of the site within 48 hours of a predicted storm event (a predicted storm event is defined as a forecasted, 40% chance of rain by 5-day National Weather Service). On request, the owner/developer/contractor must provide proof of this capability that is acceptable to the City.
7. Deployment of physical or vegetation erosion control BMPs must commence as soon as slopes are completed. The project proponent may not continue to rely on the ability to deploy standby BMP materials to prevent erosion of slopes that have been completed.
8. The area that can be cleared, graded, and left exposed at one time is limited to the amount of acreage that the contractor can adequately protect prior to a predicted rainstorm. For larger sites, grading should be phased (See Section 3.3.8). It may be necessary to deploy erosion and sediment control BMPs in

areas that are not completed, but are not actively being worked before additional grading is done.

3.3.6.2 Rainy Season Site Management Requirements

In addition to the dry season requirements described above, the following additional minimum BMPs must be in place at all sites during the rainy season, which is defined as October 1st through April 30th:

- 1) Erosion control, perimeter protection and sediment control BMPs must be upgraded if necessary to provide sufficient protection for storms likely to occur during the rainy season.
- 2) Adequate physical or vegetation erosion control BMPs must be installed and established for all completed slopes prior to the start of the rainy season. These BMPs must be maintained throughout the rainy season. If a selected BMP fails, it must be repaired and improved, or replaced with an acceptable alternate as soon as it is safe to do so. The failure of a BMP indicates it was not adequate for the circumstances in which it was used. Repairs or replacements must therefore put a more robust BMP in place.
- 3) The amount of exposed soil allowed at one time shall not exceed that which can be adequately protected by deploying standby erosion control and sediment control BMPs prior to a predicted rainstorm.
- 4) A disturbed area that is not completed but that is not being actively graded must be fully protected from erosion if left for 10 or more days. The ability to deploy standby BMP materials is not sufficient for these areas. BMPs must actually be deployed.
- 5) All vegetation erosion control must be established prior to the rainy season to be considered as an effective BMP.

3.3.7 Additional Controls for Construction Sites

For project sites that are tributary to 303(d) water body segments that are impaired for sediment, the following BMPs must be implemented at all times to the maximum extent possible:

- Maintain vegetative cover as much as possible by developing the project in a phased approach to reduce the amount of exposed soil at any one time.
- Limit the areas of active construction to five acres at any one time.
- Provide 100 percent soil cover for all areas of inactive construction throughout the entire time of construction, on a year-round basis.
- Provide appropriate perimeter control at all appropriate locations along the site perimeter and at all inlets to the storm drain system at all times during the rainy season.
- Provide vegetated buffer strips between the active construction area and any water bodies.
- Provide stabilized construction entrances and limit all vehicle and foot traffic to those entrances.

Where the provisions described above can not be accommodated, additional or supplemental controls shall be recommended. The City Engineer or designee shall have the authority to approve supplemental or alternative control methods based upon an evaluation of the proposed control and the sites potential threat to storm water quality impairment.

3.3.8 Maximum Disturbed Area for Erosion Control

The active disturbed soil area of any project site shall be not more than 50 acres for an individual grading permit or a combination of grading permits under an associated Tentative or Final Map. The City may approve, on a case-by-case basis, expansions of the active disturbed soil area limit if adequate site protection is demonstrated. At all times, sufficient soil stabilization and sediment control materials shall be maintained on site to provide adequate site protection.

3.3.9 Advanced Treatment Methods

Advanced Treatment is defined in the Municipal Permit as the use “of mechanical or chemical means to flocculate and remove suspended sediment from runoff from construction sites prior to discharge.”

If a project meets all of the following criteria, advanced treatment will be required:

1. All or part of the site is within 200 feet of waters named on the CWA Section 303(d) list of Water Quality Limited Segments as impaired for sedimentation and/or turbidity;
2. The disturbance area is greater than five acres, including all phases of the development;
3. The disturbed slopes are steeper than 4:1 with at least 10 feet of relief, and drain toward a Section 303(d) listed receiving water for sedimentation or turbidity;
4. The site contains a predominance of soils with USDA-NRCS Erosion factors k_f greater than or equal to 0.4.

Advanced treatment may be required on sites that do not meet all four of the criteria for exceptional threat to water quality listed above at the discretion of the City Engineer based on a record on non-compliance.

Treatment effluent water quality shall meet or exceed the water quality objectives for sediment, turbidity, pH, and toxicity as listed in the Water Quality Control Plan for the San Diego Basin (9) for inland surface waters and lagoons and estuaries for the appropriate hydrologic unit.

Prior to obtaining a grading permit, the applicant shall submit, to the satisfaction of the City Engineer, the following:

1. An operations and maintenance schedule for all advanced treatment methods.

2. A monitoring plan for all required BMPs and water quality for all proposed work deemed necessary to achieve project water quality goals.
3. A written training plan for certification and documentation of necessary training and refreshers of staff.

The discharger shall either deploy Advanced Treatment Methods or comply with source control procedures described below.

- Maintain vegetative cover as much as possible by developing the project in a phased approach to reduce the amount of exposed soil at any one time.
- Limit the areas of active construction to five acres at any one time.
- Provide 100 percent soil cover for all areas of inactive construction throughout the entire time of construction, on a year-round basis.
- Provide appropriate perimeter control at all appropriate locations along the site perimeter and at all inlets to the storm drain system at all times during the rainy season.
- Provide vegetated buffer strips between the active construction area and any water bodies.
- Provide stabilized construction entrances and limit all vehicle and foot traffic to those entrances.

3.3.10 City Standard Water Pollution Prevention Notes

All Tier 2 and Tier 3 Construction SWPPPs shall include the City Standard Storm Water Pollution Prevention notes as specified in Appendix I. The notes shall be placed upon the Construction SWPPP drawing or, in the case of a Tier 3 Construction SWPPP, on the grading plan. The Qualified Plan Preparer may include supplemental Storm Water Pollution Prevention notes to address specific requirements of the proposed project and/or construction site. The City Engineer or designee may also request inclusion of supplemental Storm Water Pollution Prevention notes to address specific construction activities or site issues.

3.4 Storm Water BMP Inspection and Maintenance

3.4.1 General information

Construction is a dynamic operation where changes are expected. Storm water BMPs for construction sites are usually temporary measures that require frequent maintenance to maintain their effectiveness and may require relocation, revision and re-installation, particularly as project grading progresses. Therefore, in addition to City inspections, owner/developer/contractor self-inspections are required.

3.4.2 Inspection of Construction Sites

All construction sites are subject to site inspection by City staff in accordance with the Carlsbad Municipal Code, the Municipal Permit, City's policies and procedures and these standards. Additionally, owner/developer/contractors are required to perform self-inspection of construction sites, for projects requiring a Tier 2 or Tier 3 Construction SWPPP, in accordance with these standards.

The City of Carlsbad will evaluate the adequacy of the owner's/contractor's site management for storm water pollution prevention, inclusive of BMP implementation, on construction sites based on performance standards for storm water BMPs. Poor BMP practices shall be challenged. Performance standards shall include:

1. Prevent increase in pollution to the maximum extent practicable.
2. Minimize slope erosion.
3. Control discharge velocities moving offsite to limit down stream erosion potential to the pre-construction levels.

3.4.3 City Storm Water BMP Inspection Frequency

Each construction site must be inspected by City staff for compliance with storm water standards at the minimum frequency as shown in Table 8. Site-specific inspection frequencies are reevaluated periodically, particularly when grading activities are being conducted during the rainy season. The need for additional inspections may vary depending upon several factors including:

- Site conditions;
- Previous violations;
- History of developer or contractor past performance;
- Grading during rainy season; and,
- Weather patterns.

Table 8		
	Inspection Frequency	
Site Threat to Water Quality	Rainy Season Oct 1st – April 30th	Dry Season May 1st – September 30th
High	Bi-weekly	As-needed
Medium	Monthly	As-needed
Low	As-needed	As-needed

The minimum inspection frequency is based upon a project’s perceived Threat to Water Quality (TTWQ) and whether or not the construction occurs during the wet or dry season. Each project site is assigned one of three priorities to describe its TTWQ - low, medium or high. The worksheet entitled “Construction Threat Assessment Worksheet for Determination of Project’s Perceived Threat to Water Quality”, attached as Appendix A, is used to determine a construction site’s TTWQ priority.

3.4.4 City Storm Water BMP Inspection Requirements

City inspection of construction sites for storm water compliance shall include, but not be limited to the following:

1. Assessment of BMP effectiveness including implementation of an effective combination of erosion, sediment and non-stormwater BMPs to meet the City’s minimum water quality protection requirements and prevent the discharge of pollutants into storm water and receiving waters, and
2. Check for coverage under the General Construction Permit (Regional Board Notice of Intent (NOI) and/or Waste Discharge Identification No. (WDID No.)) during initial inspection;
3. Ensure compliance with the City’s applicable ordinances, permits and other site-specific requirements;
4. Visual observations for non-stormwater discharges, potential illicit connections and potential discharge of pollutants in stormwater runoff;
5. Ensure proper implementation of plans and specifications,
6. Education and outreach on stormwater pollution prevention as needed;
7. Ensure that the project proponents implement their stormwater management on a year-round basis, and;
8. Creation of a written or electronic inspection report

City inspection staff will utilize the following framework when conducting an inspection:

1. Review the site erosion control and BMP implementation plans and determine whether they are being properly implemented;
2. Determine if BMPs are being used in accordance with the intent of all laws and approved plans;

3. Determine whether BMPs are effectively being implemented and maintained properly; and
4. Determine whether the owner/developer/contractor is making appropriate adjustments when ineffective BMPs are found.

For projects subject to the State General Construction Permit, the RWQCB is responsible for verifying and enforcing requirements of the General Construction Permit. The City inspection staff will continue to work with RWQCB staff in assuring compliance at these sites. City staff will document observations of potential violations and will notify the RWQCB of the noncompliance in accordance with Order R9-2007-0001 if the noncompliance poses a threat to human or environmental health.

Regardless of any inspections conducted by the City, property owners or contractors are required to prevent any construction-related materials, trash, wastes, spills or residues from entering a storm water conveyance system.

3.4.5 Qualified Person Required

All construction sites requiring a Tier 2 or Tier 3 Construction SWPPP are required to employ a Qualified Person to ensure proper installation and maintenance of the project BMPs. The Qualified Person shall:

1. Be trained and competent in the use of BMPs, shall be on site daily, although not necessarily full time, to evaluate the conditions of the site with respect to storm water pollution prevention. This qualified contact person shall represent the contractor/owner on storm water issues.
2. Shall implement the conditions of the Storm Water Pollution Prevention Plan, contract documents and/or local ordinances with respect to erosion and sediment control and other waste management regulations.
3. Be responsible for monitoring the weather and implementation of any emergency plans as needed. The weather shall be monitored on a 5-day forecast plan and a full BMP protection plan shall be activated when there is a 40% chance of rain.
4. Be responsible for overseeing any site grading and operations and evaluating the effectiveness of the BMPs. This person shall modify the BMPs as necessary to keep the dynamics of the site in compliance. This person or other qualified persons are responsible for checking the BMPs routinely for maintenance and documenting the BMPs being implemented.

Appendix A

Project Threat Assessment Worksheet for Determination of Construction SWPPP Tier Level



Project Threat Assessment Worksheet for Determination of Construction SWPPP Tier Level

Project Storm Water Threat Assessment Criteria*	Construction SWPPP Tier Level
<p><u>Significant Threat Assessment Criteria</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> My project includes clearing, grading or other disturbances to the ground resulting in soil disturbance totaling one or more acres including any associated construction staging, equipment storage, stockpiling, pavement removal, refueling and maintenance areas; or, <input type="checkbox"/> My project is part of a phased development plan that will cumulatively result in soil disturbance totaling one or more acres including any associated construction staging, equipment storage, refueling and maintenance areas; or, <input type="checkbox"/> My project is located inside or within 200 feet of an environmentally sensitive area (see City ESA Proximity map) and has a significant potential for contributing pollutants to nearby receiving waters by way of storm water runoff or non-storm water discharge(s). 	Tier 3
<p><u>Moderate Threat Assessment Criteria</u></p> <p>My project does not meet any of the Significant Threat Assessment Criteria described above and meets one or more of the following criteria:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Project requires a grading plan pursuant to the Carlsbad Grading Ordinance (Chapter 15.16 of the Carlsbad Municipal Code); or, <input type="checkbox"/> Project will result in 2,500 square feet or more of soils disturbance including any associated construction staging, stockpiling, pavement removal, equipment storage, refueling and maintenance areas and project meets one or more of the additional following criteria: <ul style="list-style-type: none"> • located within 200 feet of an environmentally sensitive area or the Pacific Ocean; and/or, • disturbed area is located on a slope with a grade at or exceeding 5 horizontal to 1 vertical; and/or • disturbed area is located along or within 30 feet of a storm drain inlet, an open drainage channel or watercourse; and/or • construction will be initiated during the rainy season or will extend into the rainy season (Oct. 1 through April 30). 	Tier 2
<p><u>Low Threat Assessment Criteria</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> My project does not meet any of the Significant or Moderate Threat criteria, is not an exempt permit type (see City's list of Permit Types Exempt from Construction SWPPP requirements) and project meets one or more of the following criteria: <ul style="list-style-type: none"> • results in some soil disturbance; and/or • includes outdoor construction activities (such as roofing, saw cutting, equipment washing, material stockpiling, vehicle fueling, waste stockpiling) 	Tier 1
<p><u>No Threat Project Assessment Criteria</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> My project is in a category of permit types exempt from City Construction SWPPP requirements (see City's list of Permit Types Exempt from Construction SWPPP requirements) and/or does not meet any of the High, Moderate or Low Threat criteria described above. 	Exempt

* The City Engineer may authorize minor variances from the Storm Water Threat Assessment Criteria in special circumstances where it can be shown that a lesser or higher Construction SWPPP Tier Level is warranted in the opinion of the City Engineer

Appendix B

Storm Water Certification Forms



Storm Water Compliance Form For a Tier 3 Construction SWPPP

I am applying to the City of Carlsbad for the following type of construction permit(s):

Grading Permit

Building Permit

Right-of-Way Permit

My project requires preparation and approval of a Tier 3 Construction Storm Water Pollution Prevention Plan (SWPPP) because my project meets one or more of the following criteria demonstrating that the project potentially poses a significant threat to storm water quality:

- My project includes clearing, grading or other disturbances to the ground resulting in soil disturbance totaling one or more acres including any associated construction staging, equipment storage, stockpiling, pavement removal, refueling and maintenance areas; or,
- My project is part of a phased development plan that will cumulatively result in soil disturbance totaling one or more acres including any associated construction staging, equipment storage, stockpiling, pavement removal, refueling and maintenance areas; or,
- My project is located inside or within 200 feet of an environmentally sensitive area and has a significant potential for contributing pollutants to nearby receiving waters by way of storm water runoff or non-storm water discharge(s).

I CERTIFY TO THE BEST OF MY KNOWLEDGE THAT THE ABOVE CHECKED STATEMENTS ARE TRUE AND CORRECT.

I AM SUBMITTING FOR CITY APPROVAL A TIER 3 CONSTRUCTION SWPPP PREPARED IN ACCORDANCE WITH CITY STANDARDS AND THE REQUIREMENTS OF THE STATE WATER RESOURCES CONTROL BOARD GENERAL PERMIT FOR CONSTRUCTION ACTIVITIES - WATER QUALITY ORDER NO 99-08-DWQ (GENERAL CONSTRUCTION PERMIT) AND ANY AMENDMENT, REVISION OR RE-ISSUANCE THEREOF.

I UNDERSTAND AND ACKNOWLEDGE THAT I MUST SUBMIT THE CITY APPROVED TIER 3 CONSTRUCTION SWPPP TO THE SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD TOGETHER WITH A NOTICE OF INTENTION (NOI), AN APPROPRIATE FILING FEE AND OTHER REQUIRED DOCUMENTATION AND RECEIVE A STATE WASTE DISCHARGER'S IDENTIFICATION (WDID) NUMBER PRIOR TO CITY ISSUANCE OF THE ABOVE REQUESTED CONSTRUCTION PERMIT(S).

I ALSO UNDERSTAND AND ACKNOWLEDGE THAT I MUST ADHERE TO, AND AT ALL TIMES, COMPLY WITH THE CITY APPROVED TIER 3 CONSTRUCTION SWPPP THROUGHOUT THE DURATION OF THE CONSTRUCTION ACTIVITIES UNTIL THE CONSTRUCTION WORK IS COMPLETE AND APPROVED BY THE CITY OF CARLSBAD.

Owner/Owner's Authorized Agent Information and Signature Box

This Box for City Use Only

Address/Location:		Assessor Parcel Number(s):	
Owner/Owner's Authorized Agent Name:		Title:	
Owner/Owner's Authorized Agent Signature:		Date:	

City Concurrence:	Yes	No
By:		
Date:		
Project ID:		



Storm Water Compliance Form For a Tier 2 Construction SWPPP

I am applying to the City of Carlsbad for one or more the following type of construction permit(s):

Grading Permit

Building Permit

Right-of-Way Permit

My project does not meet any of the following criteria for a project that poses a significant threat to storm water quality:

- ✓ My project does not include clearing, grading or other ground disturbances resulting in soil disturbance totaling one or more acres including any associated construction staging, equipment storage, stockpiling, pavement removal, refueling and maintenance areas; and,
- ✓ My project is not part of a phased development plan that will cumulatively result in soil disturbance totaling one or more acres including any associated construction staging, equipment storage, stockpiling, pavement removal, refueling and maintenance areas; and,
- ✓ My project is not located inside or within 200 feet of an environmentally sensitive area and will not have a significant potential for contributing pollutants to nearby receiving waters by way of storm water runoff or non-storm water discharge(s).

My project requires preparation and approval of a Tier 2 Construction Storm Water Pollution Prevention Plan (SWPPP) because my project meets one or more of the following criteria demonstrating that the project potentially poses a moderate threat to storm water quality:

- My project requires a grading plan pursuant to the Carlsbad Grading Ordinance (Chapter 15.16 of the Carlsbad Municipal Code); and/or,
- My Project will result in 2,500 square feet or more of soils disturbance including any associated construction staging, stockpiling, pavement removal, equipment storage, refueling and maintenance areas and, my project meets one or more of the following additional criteria:
 - Project is located within 200 feet of an environmentally sensitive area or the Pacific Ocean;
 - Project's disturbed area is located on a slope with a grade at or exceeding 5 horizontal to 1 vertical;
 - Project's disturbed area is located along or within 30 feet of a storm drain inlet, an open drainage channel or watercourse; and/or
 - Project will be initiated during the rainy season or will extend into the rainy season (Oct. 1 through April 30).

I CERTIFY TO THE BEST OF MY KNOWLEDGE THAT THE ABOVE CHECKED STATEMENTS ARE TRUE AND CORRECT. I AM SUBMITTING FOR CITY APPROVAL A TIER 2 CONSTRUCTION SWPPP PREPARED IN ACCORDANCE WITH THE REQUIREMENTS OF CITY STANDARDS.

I UNDERSTAND AND ACKNOWLEDGE THAT I MUST ADHERE TO, AND AT ALL TIMES, COMPLY WITH THE CITY APPROVED TIER 2 CONSTRUCTION SWPPP THROUGHOUT THE DURATION OF THE CONSTRUCTION ACTIVITIES UNTIL THE CONSTRUCTION WORK IS COMPLETE AND APPROVED BY THE CITY OF CARLSBAD.

Owner/Owner's Authorized Agent Information and Signature Box

This Box for City Use Only

Address/Location:		Assessor Parcel Number(s):	
Owner/Owner's Authorized Agent Name:		Title:	
Owner/Owner's Authorized Agent Signature:		Date:	

City Concurrence:	Yes	No
By:		
Date:		
Project ID:		



Storm Water Compliance Exemption Form

I am applying to the City of Carlsbad for the following type(s) of construction permit:

Building Permit Right-of-Way Permit

- My project is categorically exempt from the requirement to prepare a storm water pollution prevention plan (SWPPP) because it only requires issuance of one or more of the following permit types:

Electrical Permit Fire Additional Permit Fire Alarm Permit Fixed Systems Permit Haul Route Permit Mechanical Permit Mobile Home Permit Oversize Load Permit	Patio Deck Plumbing Permit Sign Permit Spa – Factory Made Sprinkler Permit Water Discharge Permit Water Meter Permit
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- My project is exempt from the requirement to prepare a storm water pollution prevention plan (SWPPP) because it meets the “no threat” assessment criteria on the City’s Project Threat Assessment Worksheet for Determination of Construction SWPPP Tier Level.

I CERTIFY TO THE BEST OF MY KNOWLEDGE THAT THE ABOVE CHECKED STATEMENTS ARE TRUE AND CORRECT.

I UNDERSTAND AND ACKNOWLEDGE THAT EVEN THOUGH THIS PROJECT DOES NOT REQUIRE PREPARATION OF A CONSTRUCTION SWPPP, I MUST STILL ADHERE TO, AND AT ALL TIMES DURING CONSTRUCTION ACTIVITIES FOR THE PERMIT TYPE(S) CHECKED ABOVE, COMPLY WITH THE STORM WATER BEST MANAGEMENT PRACTICES PURSUANT TO TITLE 15 OF THE CARLSBAD MUNICIPAL CODE AND TO CITY STANDARDS.

Owner/Owner's Authorized Agent Information and Signature Box

This Box for City Use Only

Address/Location: Number(s):		Assessor Parcel
Owner/Owner's Authorized Agent Name:	Title:	
Owner/Owner's Authorized Agent Signature:	Date:	

City Concurrence:	Yes	No
By:		
Date:		
Project ID:		

Appendix C

Construction Threat Assessment Worksheet for Determination of Threat to Storm Water Quality



Construction Threat Assessment Worksheet for Determination of a Project's Perceived Threat to Storm Water Quality

Construction SWPPP Tier Level	Construction Threat Assessment Criteria*	Perceived Threat to Storm Water Quality
Tier 3	<u>Tier 3 – High Construction Threat Assessment Criteria</u> <input type="checkbox"/> Project site is 50 acres or more and grading will occur during the rainy season <input type="checkbox"/> Project site is 1 acre or more in size and is located within the Buena Vista or Agua Hedionda Lagoon watershed, inside or within 200 feet of an environmentally sensitive area (ESA) or discharges directly to an ESA <input type="checkbox"/> Soil at site is moderately to highly erosive (defined as having a predominance of soils with USDA-NRCS Erosion factors k_f greater than or equal to 0.4) <input type="checkbox"/> Site slope is 5 to 1 or steeper <input type="checkbox"/> Construction is initiated during the rainy season or will extend into the rainy season (Oct. 1 through April 30). <input type="checkbox"/> Owner/contractor received a Storm Water Notice of Violation within past two years	High
	<u>Tier 3 – Medium Construction Threat Assessment Criteria</u> All projects not meeting Tier 3 High Construction Threat Assessment Criteria	Medium
Tier 2	<u>Tier 2 High Construction Threat Assessment Criteria</u> <input type="checkbox"/> Project is located within the Buena Vista or Agua Hedionda Lagoon watershed, inside or within 200 feet of an environmentally sensitive area (ESA) or discharges directly to an ESA <input type="checkbox"/> Soil at site is moderately to highly erosive (defined as having a predominance of soils with USDA-NRCS Erosion factors k_f greater than or equal to 0.4) <input type="checkbox"/> Site slope is 5 to 1 or steeper <input type="checkbox"/> Construction is initiated during the rainy season or will extend into the rainy season (Oct. 1 through April 30). <input type="checkbox"/> Owner/contractor received a Storm Water Notice of Violation within past two years <input type="checkbox"/> Site results in one half acre or more of soil disturbance	High
	<u>Tier 2 – Medium Construction Threat Assessment Criteria</u> <input type="checkbox"/> All projects not meeting Tier 2 High Construction Threat Assessment Criteria	Medium
Tier 1	<u>Tier 1 - Medium Inspection Threat Assessment Criteria</u> <input type="checkbox"/> Project is located within the Buena Vista or Agua Hedionda Lagoon watershed, within or directly adjacent to an environmentally sensitive area (ESA) or discharges directly to an ESA <input type="checkbox"/> Soil at site is moderately to highly erosive (defined as having a predominance of soils with USDA-NRCS Erosion factors k_f greater than or equal to 0.4) <input type="checkbox"/> Site slope is 5 to 1 or steeper <input type="checkbox"/> Construction is initiated during the rainy season or will extend into the rainy season (Oct. 1 through April 30). <input type="checkbox"/> Owner/contractor received a Storm Water Notice of Violation within past two years <input type="checkbox"/> Site results in one half acre or more of soil disturbance	Medium
	<u>Tier 1 - Low Inspection Threat Assessment Criteria</u> <input type="checkbox"/> All projects not meeting Tier 1 Medium Construction Threat Assessment Criteria	Low
Exempt	- Not Applicable -	Exempt

* The City Engineer may authorize minor variances from the Construction Threat Assessment Criteria in special circumstances where it can be shown that a lesser or higher amount of storm water compliance inspection is warranted in the opinion of the City Engineer

Appendix D

Tier 3 Construction SWPPP Required Elements Checklist



TIER 3 CONSTRUCTION SWPPP REQUIRED ELEMENTS CHECKLIST

Project Name _____ Project ID _____ SWPPP Preparer _____ Date _____

Construction SWPPP Required Element	Reference Document and Section (1)	Page Number (2)	Not Applicable N/A	Implementation Date (3)
GCP Section A. Storm Water Pollution Prevention Plan (SWPPP)				
<i>Vicinity Map (graphic)</i>	<i>GCP A.5.a.1</i>			
Major roadways, geographic features or landmarks	<i>GCP A.5.a.1</i>			
Site perimeter	<i>GCP A.5.a.1</i>			
Geographic features	<i>GCP A.5.a.1</i>			
General topography	<i>GCP A.5.a.1</i>			
<i>Site Map (graphic)(can modify Parcel Map)</i>	<i>GCP A.5.a.2</i>			
Site perimeter	<i>GCP A.5.a.2</i>			
Existing and proposed buildings, lots, and roadways	<i>GCP A.5.a.2</i>			
Storm water collection and discharge points	<i>GCP A.5.a.2</i>			
General topography before and after construction	<i>GCP A.5.a.2</i>			
Anticipated discharge location(s)	<i>GCP A.5.a.2</i>			
Drainage patterns	<i>GCP A.5.a.2</i>			
Relevant drainage areas 2	<i>GCP A.5.a.</i>			
Temporary on-site drainage	<i>GCP A.5.a.2</i>			
<i>Drainage (graphic)</i>	<i>GCP A.5.b.1</i>			
Drainage patterns	<i>GCP A.5.b.1</i>			
Slopes after major grading	<i>GCP A.5.b.1</i>			
Calculations for storm water run-on	<i>GCP A.5.b.1</i>			
BMPs that divert off-site drainage from going through site	<i>GCP A.5.b.1</i>			
<i>Storm Water Inlets (graphic)</i>	<i>GCP A.5.b.2</i>			
Drainage patterns to storm water inlets or receiving water	<i>GCP A.5.b.2</i>			
BMPs that protect storm water inlets or receiving water	<i>GCP A.5.b.2</i>			
<i>Site History/Past Site Usage (Real Estate Broker Disclosure may be sufficient)</i>	<i>GCP A.5.b.3</i>			
Description of toxic materials treated, stored, or spilled on site	<i>GCP A.5.b.3</i>			
BMPs that minimize contact of contaminants with storm water	<i>GCP A.5.b.3</i>			
<i>Location of Areas Designated for: (graphic)</i>	<i>GCP A.5.b.4</i>			

(1) Reference Document Legend: GCP = General Construction Permit; MP = Municipal Permit; CSWSM = City Storm Water Standards Manual

(2) Indicate the page number where the information is located in your SWPPP. If the information is not applicable to your site, construction activities, or construction materials, check the N/A box. Your SWPPP does not have to address items which are not applicable to your situation.

(3) Date that the BMP will be installed on the site

Construction SWPPP Required Element	Reference Document and Section (1)	Page Number (2)	Not Applicable N/A	Implementation Date (3)
Soil or waste storage	<i>GCP A.5.b.4</i>			
Vehicle storage & service	<i>GCP A.5.b.4</i>			
Construction material loading, unloading, and access	<i>GCP A.5.b.4</i>			
Equipment storage, cleaning, maintenance	<i>GCP A.5.b.4</i>			
<i>BMP Descriptions for: (graphic or narrative)</i>	<i>GCP A.5.b.5</i>			
Waste handling and disposal areas	<i>GCP A.5.b.5</i>			
On-site storage and disposal of construction materials and waste	<i>GCP A.5.b.5</i>			
BMPs to minimize exposure of storm water to construction materials, equipment, vehicles, waste	<i>GCP A.5.b.5</i>			
<i>Post Construction BMPs</i>	<i>GCP A.5.b.6</i> <i>See A. 10</i>			
<i>Additional Information</i>	<i>GCP A.5. c</i>			
Description of other pollutant sources and BMPs that cannot be shown graphically	<i>GCP A.5.c.1</i>			
Pre-construction control practices	<i>GCP A.5.c.1</i>			
Inventory of materials and activities that may pollute storm water	<i>GCP A.5.c.2</i>			
BMPs to reduce/eliminate potential pollutants listed in the inventory	<i>GCP A.5.c.2</i>			
Runoff coefficient (before & after)	<i>GCP A.5.c.3</i>			
Percent impervious (before & after)	<i>GCP A.5.c.3</i>			
Copy of the NOI and WDID #	<i>GCP A.5.c.4</i>			
Construction activity schedule	<i>GCP A.5.c.5</i>			
Contact information	<i>GCP A.5.c.6</i>			
EROSION CONTROL	<i>GCP A.6</i>			
<i>The SWPPP shall include: (graphic)</i>	<i>GCP A.6.a-c</i>			
Areas of vegetation on site	<i>GCP A.6.a.1</i>			
Areas of soil disturbance that will be stabilized during rainy season	<i>GCP A.6.a.2</i>			
Areas of soil disturbance which will be exposed during any part of the rainy season	<i>GCP A.6.a.3</i>			
Construction phase / BMP sequencing schedule including supplemental pre-rain action plan for erosion control measures	<i>GCP A.6.a.4</i>			
BMPs for erosion control	<i>GCP A.6.b</i>			

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(3) Date that the BMP will be installed on the site

Construction SWPPP Required Element	Reference Document and Section (1)	Page Number (2)	Not Applicable N/A	Implementation Date (3)
BMPs to control wind erosion	<i>GCP A.6.c</i>			
SEDIMENT CONTROL	<i>GCP A.8</i>			
Description/Illustration of BMPs to prevent increase of sediment load in discharge	<i>GCP A.8</i>			
Construction phase / BMP sequencing schedule including supplemental pre-rain action plan for sediment control measures	<i>GCP A.8</i>			
NON-STORM WATER	<i>GCP A.9</i>			
Description of non-storm water discharges to receiving waters	<i>GCP A.9</i>			
Locations of discharges	<i>GCP A.9</i>			
Description of BMPs	<i>GCP A.9</i>			
Name and phone number of qualified person responsible for non-storm water management	<i>GCP A.9</i>			
POST-CONSTRUCTION	<i>GCP A.10</i>			
Description and location of BMPs	<i>GCP A.10</i>			
Operation/Maintenance of BMPs after project completion (including funding)	<i>GCP A.10</i>			
MAINTENANCE, INSPECTIONS, AND REPAIR	<i>GCP A.11</i>			
Name and phone number of qualified person responsible for inspections	<i>GCP A.11</i>			
Inspection checklist: date, weather, inadequate BMPs, visual observations of BMPs, corrective action, inspector's name, title, signature	<i>GCP A.11.a-f</i>			
OTHER REQUIREMENTS	<i>GCP A.12-16</i>			
Documentation of all training	<i>GCP A.12</i>			
List of Contractors/Subcontractors	<i>GCP A.13</i>			
GCP Section B. Monitoring and Reporting Requirements				
Description of site inspection plans	<i>GCP B.3</i>			
Compliance certification (annually 7/1) if project is under active construction	<i>GCP B.4</i>			
Noncompliance reporting	<i>GCP B.5</i>			
Records of all inspections; compliance certifications; noncompliance reports, etc.	<i>GCP B.6</i>			

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(3) Date that the BMP will be installed on the site

Construction SWPPP Required Element	Reference Document and Section (1)	Page Number (2)	Not Applicable N/A	Implementation Date (3)
Monitoring program for sediment contribution from direct discharges to impaired water bodies	<i>GCP B.7</i>			
Monitoring program for pollutants not visually detectable in storm water (nonvisible pollutants)	<i>GCP B.8</i>			
GCP Section C. Standard Provisions for Construction Activities				
Signed Certification for SWPPP, reports, amendments, etc. Who is authorized to sign and by what authority has the duly authorized representative been assigned?	<i>GCP C.9,10</i>			
Location of General Permit and SWPPP on site during construction activities	<i>GCP C. 17</i>			
MP Section D.2 Construction Component				
GENERAL SITE MANAGEMENT	MP D.2.c.(1)(a)			
Pollution prevention, where appropriate	MP D.2.c.(1)(a)i. and CSWSM 3.3.2			
Development and implementation of a storm water site management plan	MP D.2.c.(1)(a)ii. and CSWSM 3.3.6			
Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction	MP D.2.c.(1)(a)iii. and CSWSM 3.3.6.1			
Minimization of exposure time of disturbed soil areas	MP D.2.c (1)(a)iv. and CSWSM 3.3.6.1			
Minimization of grading during the wet season and correlation of grading with seasonal dry weather periods to the extent feasible	MP D.2.c.(1)(a)v. and CSWSM 3.3.6.1			
Limitation of grading to a maximum disturbed area of 50 acres	MP D.2.c.(1)(a)vi. and CSWSM 3.3.8			
Temporary stabilization and reseeded of disturbed soil areas as rapidly as feasible	MP D.2.c.(1)(a)vii. and CSWSM 3.3.6.1			
Preservation of natural hydrologic features where feasible;	MP D.2.c. (1)(a)viii. and CSWSM 3.3.6			
Preservation of riparian buffers and corridors where feasible	MP D.2.c.(1)(a)ix. and CSWSM 3.3.6			
Maintenance of all BMPs, until removed	MP D.2.c.(1)(a)x. and CSWSM 3.3.6			
Retention, reduction, and proper management of all pollutant discharges on site to	MP D.2.c.(1)(a)xi. and			

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(3) Date that the BMP will be installed on the site

Construction SWPPP Required Element	Reference Document and Section (1)	Page Number (2)	Not Applicable N/A	Implementation Date (3)
the MEP standard	CSWSM 3.3.6			
EROSION AND SEDIMENT CONTROLS	MP D.2.c.(1)(b) and CSWSM 3.3.3			
Erosion prevention, to be used as the most important measure for keeping sediment on site during construction, but never as the single method	MP D.2.c.(1)(b)i. and CSWSM 3.3.3			
Sediment controls, to be used as a supplement to erosion prevention for keeping sediment on-site during construction	MP D.2.c.(1)(b)ii. and CSWSM 3.3.3			
Slope stabilization on all inactive slopes during the rainy season and during rain events in the dry season	MP D.2.c (1)(b)iii. and CSWSM 3.3.6.1&2			
Slope stabilization on all active slopes during rain events regardless of the season	MP D.2.c (1)(b)iv. and CSWSM 3.3.6.1			
Permanent re-vegetation or landscaping as early as feasible.	MP D.2.c.(1)(b)v. and CSWSM 3.3.6			
ADVANCED TREATMENT CONTROLS Addition of advanced treatment controls for projects that are determined to be an exceptional threat to water quality	MP D.2.c.(2) and CSWSM 3.3.9			
Operations and Maintenance Schedule	CSWSM 3.3.9			
Advanced treatment Monitoring Plan	CSWSM 3.3.9			
Advanced Treatment Training Plan	CSWSM 3.3.9			
Alternative Source Control Procedures in Lieu of Advanced Treatment Control Noted on Plans	CSWSM 3.3.9			
YEAR ROUND BMP IMPLEMENTATION	MP D.2.c.(3) and CSWSM 3.3.6			
Plan for year round implementation of minimum BMPs that can vary based upon wet and dry seasons	MP D.2.c.(3) and CSWSM 3.3.6			
ADDITIONAL CONTROLS FOR SITES TRIBUTARY TO CWA SECTION 303(d) IMPAIRED WATERS	MP D.2.c.(4) and CSWSM 3.3.7			
Maintain vegetative cover as much as possible by developing the project in a phased approach to reduce the amount of exposed soil at any one time.	CSWSM 3.3.7			
Limit the areas of active construction to five acres at any one time.	CSWSM 3.3.7			

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(3) Date that the BMP will be installed on the site

Construction SWPPP Required Element	Reference Document and Section (1)	Page Number (2)	Not Applicable N/A	Implementation Date (3)
Provide 100 percent soil cover for all areas of inactive construction throughout the entire time of construction, on a year-round basis.	CSWSM 3.3.7			
Provide appropriate perimeter control at all appropriate locations along the site perimeter and at all inlets to the storm drain system at all times during the rainy season	CSWSM 3.3.7			
Provide vegetated buffer strips between the active construction area and any water bodies.	CSWSM 3.3.7			
Provide stabilized construction entrances and limit all vehicle and foot traffic to those entrances.	CSWSM 3.3.7			
INSPECTION OF CONSTRUCTION SITE	MP D.2.d and CSWSM 3.4.3			
Inspection priority determined for site and frequency noted in SWPPP	MP D.2.d and CSWSM 3.4.3			
STANDARD STORM WATER POLLUTION PREVENTION NOTES	CSWSM 3.3.10			
Standard Storm Water Pollution Prevention Notes included on Grading Plans	CSWSM 3.3.10			

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(3) Date that the BMP will be installed on the site

Appendix E

TIER 3 Construction SWPPP Checklist (CASQA Format)



TIER 3 CONSTRUCTION SWPPP CASQA FORMAT CHECKLIST

Project Name _____

Planchecker _____

Project ID _____

Date _____

CASQA Section Number and Potential Required Elements	Required for Project	Planchecker Verification
General Formatting		
Tabbed separators included between Sections		
Section - 100 SWPPP Certifications and Approval		
100.1 - SWPPP Certification by Preparer		
Project name, grading permit, building permit, discretionary permit number(s), APN at top of form		
Certification signed and dated by person responsible for preparation of the SWPPP		
Name, title and telephone number of the person signing the form		
SWPPP and Monitoring Program Checklist in Attachment L completed		
Notice of Intent (NOI) attached, completed and signed by Owner or Owner's agent		
100.2 - Owner Approval and Certification of SWPPP		
Project name, grading permit, building permit, discretionary permit number(s), APN at top of form		
Certification signed and dated by owners staff; specifically, the person responsible for preparation of the SWPPP and/or the person responsible for overall management of the site		
Name, title and telephone number of the person signing the form		
100.3 - Annual Compliance Certification		
Blank copy of the Annual Compliance of Compliance included as Attachment M		
Section 200 – SWPPP Amendments		
200.1 - SWPPP Amendment Certification and Approval		
Instructions and Blank Amendment Certification and Approval forms included		
200.2 - Amendment Log		
Instructions and Blank Amendment Log included		
Section 300 - Introduction and Project Description		
300.1 – Introduction and Project Description		
Projects legal description including County, City and address, proximity to receiving waters to which project will discharge including surface waters, drainage channels, and drainage systems; ownership of all drainage systems to which the project discharges		
300.2 – Unique Site Features		
Description of unique site features (water bodies, wetlands, environmentally sensitive areas, endangered or protected species, etc) and significant or high risk construction activities that may impact storm water quality. Include any		

unique features or activities within or adjacent to water bodies		
300.3 - Construction Site Estimates		
Construction site area in acres		
Runoff coefficient and percentage impervious area before and after construction		
Calculations for Coefficient change included in Attachment D		
Anticipated storm water run-on to the construction site		
Calculations for storm water run-on included in Attachment E		
300.4 - Project Schedule/Water Pollution Control Schedule		
Written and geographical project schedule including:		
Project start and finish dates		
Rainy season dates		
Annual certifications		
Mobilization dates		
Mass clearing and grubbing/roadside clearing dates		
Major grading/excavation dates		
Special dates named in other permits such as Fish and Game and Army Corps of Engineers Permits		
Dates for submittal of SWPPP Amendments required by the contract documents		
Annual submittal of rainy season implementation schedule if required by the Owner or Permittee		
Dates for implementation of pre-rainy season temporary soil stabilization and temporary sediment control BMPs, if required		
Rainy season implementation schedule including:		
Deployment of temporary soil stabilization BMPs		
Deployment of temporary sediment control BMPs		
Deployment of wind erosion control Bmps		
Deployment of tracking control BMPs		
Deployment of non-storm water BMPs		
Deployment of waste management and materials pollution control BMPs		
Non-rainy season implementation schedule		
Deployment of temporary soil stabilization BMPs		
Deployment of temporary sediment control BMPs		
Deployment of wind erosion control Bmps		
Deployment of tracking control BMPs		
Deployment of non-storm water BMPs		
Deployment of waste management and materials pollution control BMPs		
Paving, saw-cutting and any other pavement related operations		
Major planned stockpiling operations		

Dates for other significant long-term operations or activities that may plan non-storm water discharges such as dewatering, grinding, etc		
Final stabilization activities staged over time for each area of the project		
300.5 - Contact Information/List of Responsible Parties		
Name and telephone number(s) of the Contractor's Storm Water Pollution Prevention Manager (SWPPM) and required text		
Section 400 - References		
List of documents referenced in the SWPPP		
All Federal, State and City permits		
On-site project information including plans and specifications, geotechnical report(s), hydrology/hydraulic report(s), and other reports and regulatory guidance documents		
Each referenced document includes title, number (if applicable), author, date published and revision date		
Section 500 – Body of SWPPP		
500.1 - Objectives		
Required text included		
500.2 – Vicinity Map		
8 ½' x 11" color copy of USGS map or equal included as Attachment A displaying site perimeter, major roadways, geographic features and landmarks, adjacent water bodies, known wells, an outline of the off-site drainage area, anticipated discharge locations and general topography		
Brief narrative description of the vicinity map		
500.3 – Pollutant Source Identification and BMP Selection		
Required text included for each subsection		
500.3.1 – Inventory of Materials and Activities that May Pollute Storm Water		
List of all construction materials that have the potential to contribute to the discharge of pollutants to storm water and required text		
List of all construction activities that have the potential to contribute sediment to storm water discharges		
500.3.2 – Existing Pre-construction Control Measures		
List of any existing BMPs in place prior to construction used to reduce erosion, sediment or other pollutants in storm water discharges		
500.3.3 Nature of Fill Material and Existing Data Describing the Soil		
Description of the conditions of the fill materials and soils at the construction site including soil types, groundwater location and condition, dewatering operations, presence of existing toxic materials and contaminants and other relevant information		
500.3.4 Erosion Control (EC) (Soil Stabilization)		
Attachment C included. BMP Consideration Checklist filled out. Appropriate EC BMPs selected		
Introductory paragraphs the define EC and give general approach on how temporary EC BMPs will be implemented		

List all temporary EC BMPs to be used on the project		
Show temporary EC BMPs on the Water Pollution Control Drawings (WPCDs)		
Provide narrative description of temporary EC BMPs that cannot be adequately identified on the WPCDs		
Discussion of on-site availability of temporary EC materials and proposed mobilization and implementation of temporary EC BMPs in event of predicted rain. Explanation of how and when BMPs will be implemented when rain is forecasted		
Additional City Required Erosion Control Requirements		
Erosion prevention, to be used as the most important measure for keeping sediment on site during construction, but never as the single method		
Sediment controls, to be used as a supplement to erosion prevention for keeping sediment on-site during construction		
Slope stabilization on all inactive slopes during the rainy season and during rain events in the dry season		
Slope stabilization on all active slopes during rain events regardless of the season		
Permanent revegetation or landscaping as early as feasible.		
500.3.5 – Sediment Control (SC)		
Attachment C included. BMP Consideration Checklist filled out. Appropriate SC BMPs selected		
List all temporary SC BMPs to be used on the project		
Show temporary SC BMPs on the Water Pollution Control Drawings (WPCDs)		
Provide narrative description of temporary SC BMPs that cannot be adequately identified on the WPCDs		
BMPs used to divert off-site drainage around and/or through the construction site shown on WPCDs		
Discussion of on-site availability of temporary EC materials and proposed mobilization and implementation of temporary EC BMPs in event of predicted rain		
500.3.6 Tracking Control (TC)		
Attachment C included. BMP Consideration Checklist filled out. Appropriate TC BMPs selected		
List all temporary TC BMPs to be used on the project		
Show all ingress/egress points to project site on WPCDs and show or describe TC BMPs		
Provide narrative description of temporary TC BMPs that cannot be adequately identified on the WPCDs		
Discussion of road cleaning BMPs		
500.3.7 Wind Erosion Control (WEC)		
Attachment C included. BMP Consideration Checklist filled out. Appropriate WEC BMPs selected		
Narrative description of WEC BMPs to be used on project		
500.3.8 – Non-Storm Water Control (NSWC)		
All potential non-storm water discharges listed		
Attachment C included. BMP Consideration Checklist filled out. Appropriate NSWC BMPs selected		
Discuss how mobile operations, such as equipment maintenance and fueling, will be addressed		
Describe each planned NSW discharge from project including flow/quantity. If flow/quantity cannot be determined,		

then describe nature and extent of activity so quantity can be inferred		
Show NSWC BMPs on WPCDs and/or provide narrative description including path of discharge to storm inlet, drainage facilities or receiving waters		
Describe time period and frequency of each NSW activity that generates or may generate a discharge		
Describe mandatory NSWC BMPs and practices required by City , State or Federal agencies and provide details and schedules as appropriate. Include maintenance, inspection, testing and reporting procedures, if applicable. Include permit info for discharges covered by separate NPDES permit		
Describe selected NSWC BMPs and practices to minimize, contain and dispose of prohibited discharges. Include maintenance, inspection, testing and reporting procedures, if applicable		
Describe sediment controls for landscape irrigation run-off prior to establishment of vegetation		
Indicate how illicit connections and illegal discharges will be handled.		
Develop new owner notification pamphlet to make new owner aware of potential for unauthorized discharges and practices, if needed		
500.3.9 – Waste Management and Material Pollution Control (WMMPC)		
All potential WMMP activities listed		
Attachment C included. BMP Consideration Checklist filled out. Appropriate WMMPC BMPs selected		
Substitute safer, less polluting products where possible		
List selected WMMPC BMPs and describe proposed facilities for materials storage and waste management. Include schedules, inspection and maintenance requirements. Show on WPCDs as appropriate		
Describe proposed waste collection and removal schedule		
500.3.10 – Cost Breakdown for Water Pollution Control		
Water pollution control cost estimate sheet included		
Additional City Requirements		
Advanced Treatment Controls (If required. See Storm Water Standards Manual Section 3.3.9)		
Operations and Maintenance Schedule		
Advanced treatment Monitoring Plan		
Advanced Treatment Training Plan		
Alternative Source Control Procedures in Lieu of Advanced Treatment Control Noted on Plans		
Year Round BMP Implementation		
Plan for year round implementation of minimum BMPs that can vary based upon wet and dry seasons		
Additional Controls for Sites tributary to CWA Section 303(d) Impaired Waters RS		
Maintain vegetative cover as much as possible by developing the project in a phased approach to reduce the amount of exposed soil at any one time.		
Limit the areas of active construction to five acres at any one time.		
Provide 100 percent soil cover for all areas of inactive construction throughout the entire time of construction, on a year-round basis.		

Provide appropriate perimeter control at all appropriate locations along the site perimeter and at all inlets to the storm drain system at all times during the rainy season		
Provide vegetated buffer strips between the active construction area and any water bodies.		
Provide stabilized construction entrances and limit all vehicle and foot traffic to those entrances.		
Inspection of Construction Site		
Inspection priority determined for site and frequency noted in SWPPP		
City Standard Storm Water Pollution Prevention Notes		
Standard Storm Water Pollution Prevention Notes included on Grading Plans		
500.4 – Water Pollution Control Drawings (WPCDs)		
WPCDs included as Attachment B		
Cover sheet listing BMPs that will be used and any selected options shown on fact sheets, along with construction notes and a legend		
All BMPs that can be shown are shown where appropriate on WPCDs		
BMP details included with WPCDs and appropriate CASQA and other standard references included		
Additional details shown as necessary to describe site specific BMP applications		
Grading sheets, drainage sheets or erosion control sheets used as base sheets for WPCDs.		
Base sheet details required:		
site perimeter		
Existing and proposed buildings, lots and roadways		
Permanent post construction BMPs		
Storm water collection and discharge points		
General topography before and after construction; anticipated discharge location(s)		
Tributary areas and drainage patterns to each on-site storm water inlet		
Receiving water or discharge point; off-site tributary drainage areas; temporary on-site drainage(s) to carry concentrated flows		
Outline of areas of existing vegetation; soil cover or native vegetation that will remain undisturbed		
Areas of cut and fill		
Outlines of areas of soil disturbance		
Locations of known toxic spills and discharges or contaminated soils		
Locations of potential non-storm water discharges such as dewatering operations, concrete saw cutting or coring, pressure washing, waterline flushing, diversions, cofferdams and vehicle equipment cleaning		
Locations of direct discharge into a Section 303(d) listed water body		
Sampling locations		
Ingress and egress points		
Temporary stockpiles		

Vehicle and equipment storage, fueling, maintenance and cleaning; and, phasing and/or construction staging		
BMPs for waste management and materials pollution control		
Show all storage, staging, borrow sites, stockpile sites, access roads, lay down areas and other non-development construction areas where construction activity will occur including contractors yard if in vicinity		
All contractor phasing and/or construction staging reflected on WPCDs for full scope of project		
500.5 – Construction BMP Maintenance, Inspection and Repair		
Description of program to maintain all construction BMPs		
Complete maintenance, inspection and repair program included as Attachment G		
500.6 – Post-Construction Storm Water Management		
500.6.1 Post-Construction Control Practices		
Describe the construction BMPs employed after all construction phases have been completed including their operation and maintenance after project completion		
For projects that require a Storm Water Management Plan (SWMP), the City SWMP identification number shall be referenced		
500.6.2 – Operation/Maintenance after Project Completion		
Description of any operations and maintenance requirements of post-construction control practices		
List parties responsible for long term operation and maintenance of permanent BMPs		
500.7 - Training		
Description of storm water pollution prevention training that contractor’s inspection, maintenance and repair personnel have received		
Storm Water Pollution Prevention Manger (SWPPM) has a minimum of 24 hours training		
Document formal and informal storm water training on Trained Contractor Personnel Log Sheet included as Attachment I		
List of classes and copies of class completion documents may be submitted		
500.8 – List of Subcontractors		
List of subcontractors and individuals responsible for implementation of the SWPPP including telephone numbers and addresses included as Attachment J		
Section 600 – Monitoring Program and Reports		
600.1 – Site Inspections		
Required text included		
600.2 – Non-Compliance Reporting		
Required text included		
Sample Notice of Compliance form included as Attachment K		
Sample logging discharges form included as Attachment T		
600.3 – Record Keeping and Reports		
Required text included		

600.4 – Sampling and Analysis Plan for Sediment (for projects discharging to 303(d) waters)		
Required text included		
Describe if project discharges to 303(d) waters		
600.4.1 – Scope of Monitoring Activities		
List the impaired 303(d) water body and reason for impairment		
Describe the location(s) of direct discharge to each 303(d) listed water body		
Required text included		
600.4.2 – Monitoring Strategy		
Required text included		
Description of sampling schedule for monitoring impacts of direct discharges		
Description of sampling locations		
Description of rationale for selection of sampling location		
Identification of upstream location for sampling including GPS coordinates		
Identification of downstream location for sampling including GPS coordinates		
Include sampling location for run-on location if one exists		
Describe surrounding areas that may contribute to run-on sediment to site		
Sampling locations not located near point sources or confluences		
Sampling locations not located directly downstream from bridge or road surface run-off		
600.4.3 – Monitoring Preparation		
Identify sampling personnel including company name		
Describe training and qualifications of sampling personnel		
Identify contractors health and safety procedures for sampling personnel		
Identify alternate sampling personnel		
Identify state certified laboratory to analyze samples		
Describe strategy for ensuring adequate sample supplies are available prior to sampling		
Describe strategy for ensuring appropriate field testing equipment is available prior to sampling		
600.4.4 – Sample Collection and Handling		
Description of sample collection procedures		
Sample procedure in accordance with test procedure under 40 CFR Part 136		
Description of sample handling procedures		
Description of decontamination waste disposal requirements		
Description of sample collection documentation procedures		
Description of procedures for recording and correcting sampling data		
Chain of custody form required to be submitted to laboratory with samples		
Sampling activity log to be kept to document details of all sampling events		
Each sample bottle required to have proper and complete identification label		

600.4.5 – Sample Analysis		
Describe tests to be used on project samples using “Sample Collection, Preservation and Analysis for Monitoring Sedimentation/Siltation and/or Turbidity” form		
Appropriate answers included on form for discharges to 303(d) listed waters		
All appropriate blank fields on form filled in		
600.4.6 – Quality Assurance/Quality Control		
Required text included		
600.4.7 – Data Management and Reporting		
Required text included		
600.4.8 – Data Evaluation		
Required text included		
600.4.9 – Change of Conditions		
Required text included		
600.5 – Sampling and Analysis Plan for Non-Visible Pollutants		
Required text included		
600.5.1 – Scope of Monitoring Activities		
Required text included		
Identify general sources and locations of potential non-visible pollutants on project site for:		
Materials or wastes identified in Section 500.3.1		
Materials or wastes that are stored under watertight conditions		
Construction activities such as application of fertilizers, pesticides, herbicides etc that have occurred during a rain event of with 24 hours preceding a rain event		
Existing site features contaminated with non-visible pollutants		
Application of soil amendments and other chemicals with the potential to alter PH levels or contribute toxic pollutants to storm water runoff		
Storm water runoff from an area contaminated by historical usage of the site		
Storm water run-on to the project site with potential to contribute pollutants		
Breaches, malfunctions, leakages or spills from a BMP		
600.5.2 - Monitoring Strategy		
Required text included		
Description of sampling schedule		
Describe locations for sampling locations		
Description for rationale for selection sampling locations		
Sampling locations selected from each source of non-visible pollutants identified in Section 600.5.1		
Description of location for collecting uncontaminated background sample		
Description of location for sampling storm water run-on form each location identified in Section 600.5.1		

Description of sampling location at off-site activities related to the project		
Sampling locations in areas that are safe, out of the path of heavy traffic and have attainable access		
List and describe surrounding sites and uses that may contribute run-on or airborne constituents to the site		
600.5.3 – Monitoring Preparation		
Identify party responsible for sample collection		
Describe training and qualifications of sampling personnel		
Identify contractors health and safety procedures for sampling personnel		
Identify alternate sampling personnel		
Identify state certified laboratory to analyze samples		
Describe strategy for ensuring adequate sample supplies are available prior to sampling		
Describe strategy for ensuring appropriate field testing equipment is available prior to sampling		
600.5.4 – Analytical Constituents		
Table 600-2 to be completed and attached		
List of non-visible pollutant source, non-visible pollutant name and water quality indicator		
Construction Material and Pollutant Testing Guidance Table – Non-Visible Pollutants table completed and attached		
Visible pollutants not added to table		
Table 600-3 completed and attached		
600.5.5 – Sample Collection and Handling		
Laboratory analysis, sampling, sample preservation and analyses conducted according to test procedures under 40 CFR Part 136		
Chain of custody form required to be submitted to laboratory with samples		
Sampling activity log to be kept to document details of all sampling events		
Each sample bottle required to have proper and complete identification label		
Description of sample collection procedures		
Description of sample handling procedures		
Description of decontamination waste disposal requirements		
Description of sample collection documentation procedures		
Description of procedures for recording and correcting sampling data		
Table 600-3 to be completed		
600.5.6 – Sample analysis		
Table 600-2 to be completed and attached		
Table 600-3 to be completed and attached		
Test method included for each non-visible pollutant identified in Table 600-2		
Procedure to contact laboratory for appropriate test method(s)/specification to be used for each constituent		
Field test instruments to be used for sampling identified		
600.5.7 – Quality Assurance/Quality Control		

Required text included		
600.5.8 – Data Management and Reporting		
Required text included		
600.5.9 Data Evaluation		
Required text included		
600.5.10 – Change of Conditions		
Required text included		

Appendix F

Tier 2 Construction SWPPP Template



Tier 2 Construction SWPPP Site Assessment Form

Project ID: _____

Project Information:

Project Name: _____

Project Address/Location; _____

Responsible Parties/Contact Information:

Name of Preparer: _____

Qualification of Preparer (Registration/Certification): _____

Address: _____

City/State/Zip Code: _____

Phone Number: _____

Name of Owner/Owner's Agent: _____

Address: _____

City/State/Zip Code: _____

Phone Number: _____

Name of Emergency Contact: _____
(during construction)

Address: _____

City/State/Zip Code: _____

Phone Number: _____

Site and Construction Activity Description:

Construction Start Date: _____ End Date: _____

If work begins in rainy season or extends into rainy season, explain how project work can be scheduled can be altered to avoid rainy season impacts or to lessen exposure of site during rainy season: _____

Grading Quantities: Cut: _____CY; Fill: _____CY; Import: _____CY;

Export: _____CY

Any Stockpile Proposed? _____ If yes, then estimate quantity: _____CY

Estimated duration of stockpile: _____Months

Soils types: _____

Does site contain a preponderance of soils with USDA-NRCS erosion factor kf greater than or equal to 0.4? _____

Is a staging area proposed (yes/no)? _____

If yes, then where is it located? _____

Is concrete washout required (yes/no)? _____

Where is it located? _____

Any existing site contamination (yes/no)? _____

Where is it located? _____

Any vehicle storage, maintenance or fueling area proposed (yes/no)? _____

Where is it located? _____

Any de-watering operation proposed (yes/no)? _____

Where is it located? _____

Any other special operations proposed that may impair water quality (yes/no)? _____

What and where? _____

Watershed Basin project drains to: Buena Vista Lagoon Agua Hedionda Lagoon
 Encinas Creek Batiquitos Lagoon Pacific Ocean

Is project drainage tributary to a CWA section 303(d) listed water body impaired for sediment (includes Buena Vista and Agua Hedionda Lagoons) (yes/no): _____

If yes, describe additional controls that will be used on project site to mitigate for sediment impairments (if any): _____

Is project inside or within 200 feet of an Environmentally Sensitive Area (yes/no): _____

If yes, describe additional controls that will be used on project site to mitigate for potential storm water impacts (if any): _____

Are any agency permits required (yes/no)? _____

Check off permit types required: Army Corps 404 permit

Regional Board Water Quality 401 Certification Coastal Commission Certification

U.S. Fish and Wildlife Section 7 Fish and Game Stream Alteration Agreement

Other list: _____

List materials that will be used on construction site and their handling and storage requirements

Material	Characteristics/Toxicity	Handling requirements

If any toxic or hazardous materials are proposed, then a spill prevention plan is required. Is a spill prevention plan required (yes/no)? _____.

If yes, attach spill prevention plan.

Perceived Threat to Storm Water Quality rating:

Using the Construction Threat Assessment Worksheet (attached as Appendix C to Section 3 (Construction SWPPP Standards and Requirements) of the City Storm Water Standards Manual, determine the projects Perceived Threat to Storm Water Quality rating.

The Construction Threat to Storm Water Quality rating for this project is: High Medium

Signature of Plan Preparer:

Signature: _____ Date: _____

Print Name: _____ Title: _____

Attachments:

- Storm Water Compliance Form – Tier 2
- Spill Prevention Plan
- Hydrology and/or hydraulic study
- Solis and/or geotechnical report(s)
- Other. List: _____

BMP Selection:

The following tables are provided to help identify and select appropriate site specific BMPs for the proposed project. Review the list of potential site construction activities and site conditions described along the left hand column of each sheet. Then, for each activity or site condition that is included in the proposed project, pick one or more of the BMPs described at the top of the form and place an X(s) in the box(es) that form(s) an intersection between the activity/site condition row and BMP column(s).

All structural (physical facility) BMP's should be shown on the site plan in the Construction SWPPP drawing set. Any proposed no-structural BMP should be noted in the Special Notes on the Construction SWPPP drawing set.

BMP Description →	Erosion Control BMPs													Wind Erosion BMPs
	Scheduling	Preservation of Existing Vegetation	Hydraulic Mulch	Hydroseeding	Soil Binders	Straw Mulch	Geotextiles & Mats	Wood Mulching	Earth Dikes and Drainage Swales	Velocity Dissipation	Slope Drains	Streambank Stabilization	Polyacrylamide	Wind Erosion Control
CASQA Designation →	EC-1	EC-2	EC-3	EC-4	EC-5	EC-6	EC-7	EC-8	EC-9	EC-10	EC-11	EC-12	EC-13	WE-1
Construction Activity or Site Condition														
Cleared Areas														
Flat pad graded areas														
Graded slope areas														
Trenching/Excavation														
Stockpiling														
Drilling/Boring														
Conduit/Pipe Installation														
Substructure/Pad Installation														
Staging Area														
Existing onsite vegetated areas														
Drainage flow onto site														
Drainage flows off of site														
Drainage at top of slope														
Other (list):														

BMP Description →	Tracking Control BMPs		
	Stabilized Construction Ingress/Egress	Stabilized Construction Roadway	Ingress/Egress Tire Wash
CASQA Designation → Construction Activity v	TR-1	TR-2	TR-3
Site Access point(s)			
Staging area access point(s)			
Maintenance access roads to BMPs			
Other (list):			

Non-Storm Water Management BMPs

BMP Description →	Water Conservation Practices	Dewatering Operations	Paving and Grinding Operations	Temporary Stream Crossing	Clear Water Diversion	Illicit Connection/Discharge	Potable Water/Irrigation	Vehicle and Equipment Cleaning	Vehicle and Equipment Fueling	Vehicle and Equipment Maintenance	Pile Driving Operations	Concrete Curing	Concrete Finishing	Material and Equipment Use	Demolition Adjacent to Water	Temporary Batch Plants
CASQA Designation →	NS-1	NS-2	NS-3	NS-4	NS-5	NS-6	NS-7	NS-8	NS-9	NS-10	NS-11	NS-12	NS-13	NS-14	NS-15	NS-16
Construction Activity & Site Conditions																
Landscaping & Irrigation																
Drilling/Boring																
Concrete/Asphalt Sawcutting																
Concrete flatwork																
Paving																
Wire, Cable & Connector Installation																
Site Housekeeping																
Staging Area																
Equipment Maintenance and Fueling																
Hazardous Substance Management																
Dewatering																
Steam crossing																
Material delivery																
Solid waste handling including trash and debris removal																
Concrete or stucco work																
Other (list):																



Tier 2 Construction SWPPP Preparation Template

This document has been prepared to identify the various components that make up a Tier 2 Construction Storm Water Pollution Prevention Plan (SWPPP). A complete Tier 2 Construction SWPPP is composed of the following components:

1. A set of storm water pollution plan drawings meeting all the requirements of the Construction SWPPP Checklist items as contained in the Tier 2 Construction SWPPP Review Checklist attached as Appendix G to Section 3 (Construction SWPPP Standards and Requirements) in the City Storm Water Standards Manual.
2. A completed and signed Storm Water Compliance Form for a Tier 2 Construction SWPPP as contained in Appendix B to Section 3 (Construction SWPPP Standards and Requirements) in the City Storm Water Standards Manual.
3. A completed and signed Tier 2 Construction SWPPP Site Assessment Form (attached)
4. All supporting documentation, studies and reports as required to comply with the Municipal Permit and City Standards including any needed hydrology and hydraulic calculations, soils and geotechnical reports, spill prevention plan and manufacturers information and other data needed to clarify and support of the proposed storm water pollution prevention plan.

Included with this template is a Tier 2 Construction SWPPP Required Elements Checklist that should be used by the qualified Construction SWPPP preparer during the preparation of the plan to ensure that all required elements are included into the plan.



Tier 2 Construction SWPPP Required Elements Checklist

Required Elements	Required for Project	Preparer Verification
Construction SWPPP Drawing Set		
1. Standard Storm Water Pollution Prevention Notes		
A. General Site Management Requirements Notes		
B. Rainy Season Site Management Requirements Notes		
C. Erosion Control Hydroseeding, Planting and Irrigation Notes		
D. Special site specific notes		
2. City SWMP identification number affixed for high priority projects		
3. Construction Threat to Storm Water Quality rating (high or medium inspection frequency required?)		
4. Regional Water Board WDID Number shall be affixed for small linear utility projects as appropriate		
5. Project Location		
6. Legend		
7. Description of work		
A. Quantities (cut, fill, import, export)		
B. Area of disturbance		
C. Site conditions description		
1) Soils type		
8. Benchmark Information		
9. Preparer's signature and seal as appropriate		
10. City title block		
11. Emergency contact name, company and phone number		
12. Water shed project drains to listed		
13. Site Plan		
A. Existing topographic and cultural features of site and immediate vicinity as appropriate		
B. Scale and north arrow		
C. Project boundary and property lines		
D. Proposed grading contours and slopes clearly shown		

E. Staging areas, equipment storage, refueling, stockpiling and maintenance areas identified		
F. Storm drain inlets, open channels and natural drainages and watercourses that flow onto or drain off of the project site clearly delineated		
G. Potential source points of pollutants (fueling locations, waste container areas, wash racks, hazardous materials storage, etc)		
H. Site access locations		
I. Proposed BMPs – location and description		
1) Perimeter controls		
2) Erosion controls		
3) Sediment controls		
4) Tracking controls		
5) Non-storm water management controls		
6) Waste management and materials pollution controls		
7) Additional controls (as needed)		
8) Advanced treatment methods (as needed)		
J. Toxic or hazardous material contamination or spill areas		
K. Existing site BMP installations		
14. BMP detail drawings as needed		
Construction SWPPP Supplemental Documentation		
1. Storm Water Compliance Form for a Tier 2 Construction SWPPP completed and signed		
2. Tier 2 Site Assessment Form completed and signed		
3. Hydrology and hydraulic calculations (as needed for sediment basins and sizing of drainage swales to handle drainage during construction)		
4. Soils report (as needed when proposed BMP installation may affect ground water, slope stability or other geotechnical site condition)		

Appendix G

Tier 2 Construction SWPPP Plan Review Checklist



Tier 2 Construction SWPPP Review Checklist

PROJECT ID NO. _____ PROJECT NAME _____
 PLANCHECKER _____ DRAWING NO. _____ DATE _____

	1st Chk	2nd Chk	3rd Chk	Mylar	Comments
I. CONSTRUCTION SWPPP DRAWING					
1. ALL SHEETS					
A. Medium (to be reviewed at time of submission of final plan check)					
1) 24"x36" mylar film with title block (Alternative medium may be approved by Deputy City Engineer or designee)					
2) No "sticky-back", glued or taped on or together sections					
3) Drawing with waterproof ink or photographically reproduced					
B. Drafting					
1) Signed by the Qualified SWPPP Preparer					
2) Marked with the name, address & telephone number of the Qualified SWPPP Preparer preparing the plan & date of preparation					
3) Consecutively numbered & the total number of sheets shown					
4) Lettered in a neat & legible style no lettering smaller than 1/8"					
5) Title with the name & discretionary permit number of the City approval					
6) Prepared to appropriate Scale(s)					
7) Drawn as separate plans from Grading Plans, Building Plans or Improvement Plans					
8) Use standard plans & details to maximum extent					
9) Clearly designate between existing conditions & work proposed					
10) Scale noted, north arrow & bar scale provided					
11) No duplication of any section or detail letter designation.					
2. TITLE SHEET					
A. Erosion Control Notes Provided					
1) Standard Notes					
2) Supplemental special notes					
B. Project Location					
1) Legal description					
2) Assessor's parcel number					
3) Vicinity map (may be waived by Deputy City Engineer or designee)					
C. Legend					
1) Symbols per County Standards					

√ = Acceptable ? = Unclear, Provide More Data N/A = Not Applicable X = Not Acceptable (provide reason for unacceptability in comment section)

	1st Chk	2nd Chk	3rd Chk	Mylar	Comments
2) Every symbol used on the plans is shown in the legend					
3) Every symbol description clear & unequivocal					
D. Description & Quantities of Work					
1) Quantities for each item constructed or installed per these plans					
2) Erosion control Structural BMPs					
3) Standard references listed					
E. Site Plan - (certain site plan requirements may be waived for projects not requiring a grading plan per the approval of the Deputy City Engineer or designee)					
1) Full project site area shown (on one sheet if possible)					
2) Adequate adjacent site area shown to clearly indicate drainage courses that flow onto or off of the site					
3) Topography extends minimum 15' beyond limits of work & over entire property					
4) Existing contours and cultural features (screened back – 60% matte)					
5) Proposed contours and cultural features					
6) Existing & proposed contours clearly differentiated					
7) Slope symbols used only on slopes 2:1 or steeper					
8) Degree of slope shown for all slopes					
9) Fill slopes shaded					
10) Proposed lot lines shown					
11) Existing lot lines shown & dimensioned					
12) Street name or designations					
F. Drainage Facilities and Water Courses					
1) Storm drains and inlets existing and proposed					
2) Water courses and natural drainages shown with arrows indicating direction of flow					
3) Down drains					
4) Paved swales & terrace drains shown with arrows indicating direction of flow					
5) Existing and proposed basins					
G. Detail Drawings (Only when necessary. Generally refer to CASQA reference drawings)					
1) Modifications to standard drawings (CASQA or others) should be detailed					
H. Proposed Storm Water BMPs					
1) BMPs shown in bold ink and clearly visible					
2) BMP notes and identifiers bolded and clearly shown					

√ = Acceptable ? = Unclear, Provide More Data N/A = Not Applicable X = Not Acceptable (provide reason for unacceptability in comment section)

	1st Chk	2nd Chk	3rd Chk	Mylar	Comments
3) Proper CASQA (or other standard) designations used					
4) Perimeter control shown					
a. Flows onto site contained or diverted around construction area					
b. Flows off-site mitigated through retention, dissipation or other means					
c. Perimeter silt fencing, fiber rolls or other sediment control BMP for sloped areas or areas of sheet flow					
5) Erosion control shown					
a. Existing vegetation preserved where possible					
b. BMP specified for all sloped areas 3:1 or steeper					
c. Minimize area and duration of exposed soils					
6) Sediment control shown					
a. Basin or other appropriate BMP shown for flat areas less than 3:1					
b. Onsite and offsite inlets protected with storm drain inlet protection, gravel bags or other appropriate BMP					
c. Onsite earth swales and water courses protected with check dams, gravel bags, fiber rolls or other appropriate BMP					
d. Additional controls proposed for sites draining directly to receiving waters					
7) Tracking control shown					
a. Limit vehicle and equipment access points onto site					
b. Stabilized construction entrance called out on plan					
8) Non-Storm Water Management BMP indicated on plan					
a. Vehicle and equipment fueling and maintenance areas identified and protected					
b. Concrete Finishing and curing protections					
9) Waste Management and Materials Control BMPs					
a. Material Delivery and Storage BMPs indicated					
b. Stockpile management BMPs indicated					
c. Concrete mixer wash out BMP indicated					
I. General Site Management					
1) All weather access provide to basins and other BMPs that require cleaning or maintenance during rainy season					
2) 24 hour telephone number for emergency					

√ = Acceptable ? = Unclear, Provide More Data N/A = Not Applicable X = Not Acceptable (provide reason for unacceptability in comment section)

	1st Chk	2nd Chk	3rd Chk	Mylar	Comments
erosion control person and name of specific individual with authority and responsibility for erosion control					
3) Schedule for completion of installation of erosion control facilities					
4) Erosion control planting & method of starting & maintaining growth (irrigation)					
5) "Weather triggered" action plan for deploying BMPs with 48 hours of a predicted rain					
6) Description of standby BMP materials plan					
J. Project Conditions of Approval (list if applicable.)					
1)					
2)					
3. ADDITIONAL PLAN SHEETS (Additional plan sheets as required to adequately depict required BMP details or depict the site plan with an appropriate scale to clearly show all existing and proposed features)					
II. SUPPLEMENTAL DOCUMENTATION					
1. STORM WATER COMPLIANCE FORM (properly filled out and signed by Owner or Owner's Agent including appropriate City approval initial)					
2. COMPLETED SITE ASSESSMENT FORM					
3. SPILL PREVENTION PLAN (as required)					
5. SOILS/GEOTECHNICAL INVESTIGATION REPORT (As needed for geotechnical safety. Follow format indicated on Grading Plan Checklist when required)					
6. CALCULATIONS (As needed for projects with sedimentation basins or significant on-site/off-site drainage flows to determine sizing of swales and potential for erosive velocities)					
A. All					
1) All pages numbered					
2) Total number of pages on each page					
3) Each page labeled with the name address & telephone number of the preparing firm					
4) Neat & legible					
5) Indexed					
6) In logical order					
7) Cross-referenced to plans					
8) Bound					
9) Sturdy cover					
10) Signed, sealed & dates of preparation and expiration of registration applied on report cover or on bound-in cover letter					
11) Cover prominently labeled with subject, name & number of the discretionary permit for the project.					
B. Hydrology Per San Diego County Standards					

√ = Acceptable ? = Unclear, Provide More Data N/A = Not Applicable X = Not Acceptable (provide reason for unacceptability in comment section)

	1st Chk	2nd Chk	3rd Chk	Mylar	Comments
1) 1984 rainfall intensity curves					
2) Appropriate value of C					
3) Appropriate design method					
a. U.S. Army Corps of Engineers HEC series					
b. Soil Conservation Service Unit Hydrography					
c. Rational Method (Q=CIA) (0.5 sq. mile max)					
4) Tl correctly completed					
5) If correctly completed					
6) Tc correct					
7) Six hour/24 intensities correctly balanced					
8) Documentation provided or "plain english" output for computer generated reports					
C. Hydraulic					
1) Documentation provided or "plain english" output for computer generated reports					
2) Clear copies provided or all charts, maps, nomographs or other graphic used					
3) Cite general formula before inserting specific values (i.e. $Q=AV$; $Q=2.5 \times 18 = 4.75$ cfs)					
7. ENGINEER'S ESTIMATE (Needed only for projects with grading plans. Follow grading plan checklist requirements)					

Additional Comments: _____

Appendix H

Tier 1 Construction SWPPP Standard Template

CITY OF CARLSBAD
STANDARD FORM - TIER 1 STORM WATER POLLUTION PREVENTION PLAN

STORM WATER COMPLIANCE CERTIFICATE

- ✓ My project is not in a category of permit types exempt from the Construction SWPPP requirements
- ✓ My project is not located inside or within 200 feet of an environmentally sensitive area with a significant potential for contributing pollutants to nearby receiving waters by way of storm water runoff or non-storm water discharge(s).
- ✓ My project does not require a grading plan pursuant to the Carlsbad Grading Ordinance (Chapter 15.16 of the Carlsbad Municipal Code)
- ✓ My project will not result in 2,500 square feet or more of soils disturbance including any associated construction staging, stockpiling, pavement removal, equipment storage, refueling and maintenance areas that meets one or more of the additional following criteria:
 - located within 200 feet of an environmentally sensitive area or the Pacific Ocean; and/or,
 - disturbed area is located on a slope with a grade at or exceeding 5 horizontal to 1 vertical; and/or
 - disturbed area is located along or within 30 feet of a storm drain inlet, an open drainage channel or watercourse; and/or
 - construction will be initiated during the rainy season or will extend into the rainy season (Oct. 1 through April 30).

I CERTIFY TO THE BEST OF MY KNOWLEDGE THAT ALL OF THE ABOVE CHECKED STATEMENTS ARE TRUE AND CORRECT. I AM SUBMITTING FOR CITY APPROVAL A TIER 1 CONSTRUCTION SWPPP PREPARED IN ACCORDANCE WITH THE REQUIREMENTS OF CITY STANDARDS.

I UNDERSTAND AND ACKNOWLEDGE THAT I MUST: (1) IMPLEMENT BEST MANAGEMENT PRACTICES (BMPS) DURING CONSTRUCTION ACTIVITIES TO THE MAXIMUM EXTENT PRACTICABLE TO MINIMIZE THE MOBILIZATION OF POLLUTANTS SUCH AS SEDIMENT AND TO MINIMIZE THE EXPOSURE OF STORM WATER TO CONSTRUCTION RELATED POLLUTANTS; AND, (2) ADHERE TO, AND AT ALL TIMES, COMPLY WITH THIS CITY APPROVED TIER 1 CONSTRUCTION SWPPP THROUGHOUT THE DURATION OF THE CONSTRUCTION ACTIVITIES UNTIL THE CONSTRUCTION WORK IS COMPLETE AND APPROVED BY THE CITY OF CARLSBAD.

 OWNER(S)/OWNER'S AGENT NAME (PRINT)

 OWNER(S)/OWNER'S AGENT NAME (SIGNATURE)

 DATE

STORM WATER POLLUTION PREVENTION NOTES

1. ALL NECESSARY EQUIPMENT AND MATERIALS SHALL BE AVAILABLE ON SITE TO FACILITATE RAPID INSTALLATION OF EROSION AND SEDIMENT CONTROL BMPS WHEN RAIN IS EMINENT.
2. THE OWNER/CONTRACTOR SHALL RESTORE ALL EROSION CONTROL DEVICES TO WORKING ORDER TO THE SATISFACTION OF THE CITY ENGINEER AFTER EACH RUN-OFF PRODUCING RAINFALL.
3. THE OWNER/CONTRACTOR SHALL INSTALL ADDITIONAL EROSION CONTROL MEASURES AS MAY BE REQUIRED BY THE CITY ENGINEERING OR BUILDING INSPECTOR DUE TO UNCOMPLETED GRADING OPERATIONS OR UNFORESEEN CIRCUMSTANCES WHICH MAY ARISE.
4. ALL REMOVABLE PROTECTIVE DEVICES SHALL BE IN PLACE AT THE END OF EACH WORKING DAY WHEN THE FIVE (5) DAY RAIN PROBABILITY FORECAST EXCEEDS FORTY PERCENT (40%). SILT AND OTHER DEBRIS SHALL BE REMOVED AFTER EACH RAINFALL.
5. ALL GRAVEL BAGS SHALL BE BURLAP TYPE WITH 3/4 INCH MINIMUM AGGREGATE.
6. ADEQUATE EROSION AND SEDIMENT CONTROL AND PERIMETER PROTECTION BEST MANAGEMENT PRACTICE MEASURES MUST BE INSTALLED AND MAINTAINED.

SPECIAL NOTES

PROJECT INFORMATION

Site Address: _____

Assessor's Parcel Number: _____

Project ID: _____

Construction Permit No.: _____

Estimated Construction Start Date _____

Project Duration _____ Months

Emergency Contact:

Name: _____

24 hour Phone: _____

Perceived Threat to Storm Water Quality
 Medium Low

If medium box is checked, must attach a site plan sheet showing proposed work area and location of proposed structural BMPs

For City Use Only

CITY OF CARLSBAD
 STANDARD TIER 1 SWPPP

Approved By: _____

Date: _____



Scale of map

Legend

Site Map

Features displayed on the map must include:

- An outline of the entire property
- Location and brief description of construction activity areas (e.g. grading, building, trenching, fueling areas, waste container area, wash racks, hazardous material storage areas, etc.)
- Location and flow direction arrows for existing drainage facilities (ditches, channels, inlets, storm drains, etc.)
- Location of existing storm water BMP controls (sediment basins, oil/water separators, sumps, etc.)
- Location of proposed storm water BMP controls with brief description or legend reference

Page 3 of ____

Appendix I

City Standard Storm Water Pollution Prevention Notes

STORM WATER POLLUTION PREVENTION

GENERAL SITE MANAGEMENT REQUIREMENTS

THE FOLLOWING GENERAL SITE MANAGEMENT REQUIREMENTS SHALL BE ADHERED TO THROUGHOUT THE DURATION OF THE CONSTRUCTION WORK (YEAR ROUND):

1. IN CASE EMERGENCY WORK IS REQUIRED, CONTACT _____ FROM _____ AT _____.
2. DEVICES SHOWN ON CITY APPROVED PLANS SHALL NOT BE MOVED OR MODIFIED WITHOUT THE APPROVAL OF THE ENGINEERING INSPECTOR.
3. THE CONTRACTOR SHALL RESTORE ALL EROSION CONTROL DEVICES TO WORKING ORDER TO THE SATISFACTION OF THE CITY ENGINEER AFTER EACH RUN-OFF PRODUCING RAINFALL.
4. THE CONTRACTOR SHALL INSTALL ADDITIONAL EROSION CONTROL MEASURES AS MAY BE REQUIRED BY THE CITY ENGINEER DUE TO UNCOMPLETED GRADING OPERATIONS OR UNFORESEEN CIRCUMSTANCES WHICH MAY ARISE.
5. THE CONTRACTOR SHALL BE RESPONSIBLE AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT PUBLIC TRESPASS ONTO AREAS WHERE IMPOUNDED WATERS CREATE A HAZARDOUS CONDITION.
6. GRADED AREAS AROUND THE PROJECT PERIMETER MUST DRAIN AWAY FROM THE FACE OF SLOPE AT THE CONCLUSION OF EACH WORKING DAY.
7. ALL REMOVABLE PROTECTIVE DEVICES SHALL BE IN PLACE AT THE END OF EACH WORKING DAY WHEN THE FIVE (5) DAY RAIN PROBABILITY FORECAST EXCEEDS FORTY PERCENT (40%). SILT AND OTHER DEBRIS SHALL BE REMOVED AFTER EACH RAINFALL.
8. ALL GRAVEL BAGS SHALL BE BURLAP TYPE WITH 3/4 INCH MINIMUM AGGREGATE.
9. ALL GRADED AREAS MUST HAVE EROSION CONTROL PROTECTION BEST MANAGEMENT PRACTICE MEASURES PROPERLY INSTALLED.
10. ADEQUATE PERIMETER PROTECTION BEST MANAGEMENT PRACTICE MEASURES MUST BE INSTALLED AND MAINTAINED.
11. ADEQUATE SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MEASURES MUST BE INSTALLED AND MAINTAINED.
12. ADEQUATE MEASURES TO CONTROL OFFSITE SEDIMENT TRACKING MUST BE INSTALLED AND MAINTAINED.
13. A MINIMUM OF 125% OF THE MATERIAL NEEDED TO INSTALL STANDBY BEST MANAGEMENT PRACTICE MEASURES TO PROTECT THE EXPOSED AREAS FROM EROSION AND PREVENT SEDIMENT DISCHARGES, MUST BE STORED ONSITE. AREAS ALREADY PROTECTED FROM EROSION USING PHYSICAL STABILIZATION OR ESTABLISHED VEGETATION STABILIZATION MEASURES ARE NOT CONSIDERED TO BE "EXPOSED" FOR PURPOSES OF THIS REQUIREMENT.

14. THE OWNER/DEVELOPER/CONTRACTOR MUST HAVE AN APPROVED "WEATHER TRIGGERED" ACTION PLAN AND BE ABLE TO DEPLOY STANDBY BEST MANAGEMENT PRACTICE MEASURES TO COMPLETELY PROTECT THE EXPOSED PORTIONS OF THE SITE WITHIN 48 HOURS OF A PREDICTED STORM EVENT (A PREDICTED STORM EVENT IS DEFINED AS A FORECASTED, 40% CHANCE OF RAIN BY THE NATIONAL WEATHER SERVICE). ON REQUEST, THE OWNER/CONTRACTOR MUST PROVIDE PROOF OF THIS CAPABILITY THAT IS ACCEPTABLE TO THE CITY.
15. DEPLOYMENT OF PHYSICAL OR VEGETATION EROSION CONTROL MEASURES MUST COMMENCE AS SOON AS SLOPES ARE COMPLETED. THE OWNER/CONTRACTOR MAY NOT CONTINUE TO RELY ON THE ABILITY TO DEPLOY STANDBY BEST MANAGEMENT PRACTICE MATERIALS TO PREVENT EROSION OF SLOPES THAT HAVE BEEN COMPLETED.
16. UNLESS OTHERWISE SPECIFIED ON THE GRADING PLANS OR THE CONSTRUCTION STORM WATER POLLUTION PREVENTION PLAN DOCUMENTS, THE AREA THAT CAN BE CLEARED, GRADED, AND LEFT EXPOSED AT ONE TIME IS LIMITED TO THE AMOUNT OF ACREAGE THAT THE CONTRACTOR CAN ADEQUATELY PROTECT PRIOR TO A PREDICTED RAINSTORM. IT MAY BE NECESSARY TO DEPLOY EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MEASURES IN AREAS THAT ARE NOT COMPLETED AND ARE NOT ACTIVELY BEING WORKED BEFORE ADDITIONAL GRADING IS ALLOWED TO PROCEED, AT THE DISCRETION OF THE PUBLIC WORKS INSPECTOR.

RAINY SEASON SITE MANAGEMENT REQUIREMENTS (OCTOBER 1 – APRIL 30)

THE FOLLOWING RAINY SEASON SITE MANAGEMENT REQUIREMENTS SHALL BE ADHERED TO THROUGHOUT THE RAINY SEASON DEFINED AS BEGINNING ON OCTOBER 1 OF ANY YEAR AND EXTENDING THROUGH APRIL 30TH OF THE FOLLOWING YEAR:

1. EROSION CONTROL, PERIMETER PROTECTION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MEASURES MUST BE UPGRADED IF NECESSARY TO PROVIDE SUFFICIENT PROTECTION FOR STORMS LIKELY TO OCCUR DURING THE RAINY SEASON.
2. EQUIPMENT AND WORKERS FOR EMERGENCY WORK SHALL BE MADE AVAILABLE AT ALL TIMES DURING THE RAINY SEASON. ALL NECESSARY MATERIALS SHALL BE STOCKPILED ON SITE AT CONVENIENT LOCATIONS TO FACILITATE RAPID CONSTRUCTION OF TEMPORARY DEVICES WHEN RAIN IS EMINENT.
3. ADEQUATE PHYSICAL OR VEGETATION EROSION CONTROL BEST MANAGEMENT PRACTICE MEASURES MUST BE INSTALLED AND ESTABLISHED FOR ALL COMPLETED SLOPES PRIOR TO THE START OF THE RAINY SEASON. THESE BEST MANAGEMENT PRACTICE MEASURES MUST BE MAINTAINED THROUGHOUT THE RAINY SEASON. IF A SELECTED BEST MANAGEMENT PRACTICE MEASURE FAILS, IT MUST BE REPAIRED AND IMPROVED, OR REPLACED WITH AN ACCEPTABLE ALTERNATE AS SOON AS IT IS SAFE TO DO SO. THE FAILURE OF A BEST MANAGEMENT PRACTICE MEASURE INDICATES IT WAS NOT ADEQUATE FOR THE CIRCUMSTANCES IN WHICH IT WAS USED. REPAIRS OR REPLACEMENTS MUST THEREFORE PUT A MORE ROBUST BEST MANAGEMENT PRACTICE MEASURE IN PLACE.

4. ALL VEGETATION EROSION CONTROL MUST BE ESTABLISHED PRIOR TO THE RAINY SEASON TO BE CONSIDERED AS A BEST MANAGEMENT PRACTICE MEASURE.
5. THE AMOUNT OF EXPOSED SOIL ALLOWED AT ONE TIME SHALL NOT EXCEED THAT WHICH CAN BE ADEQUATELY PROTECTED BY DEPLOYING STANDBY EROSION CONTROL AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MEASURES PRIOR TO A PREDICTED RAINSTORM.
6. A DISTURBED AREA THAT IS NOT COMPLETED BUT THAT IS NOT BEING ACTIVELY GRADED MUST BE FULLY PROTECTED FROM EROSION IF LEFT FOR 10 OR MORE DAYS. THE ABILITY TO DEPLOY STANDBY BEST MANAGEMENT PRACTICE MEASURE MATERIALS IS NOT SUFFICIENT FOR THESE AREAS. BEST MANAGEMENT PRACTICE MEASURES MUST ACTUALLY BE DEPLOYED.

EROSION CONTROL HYDROSEEDING, PLANTING AND IRRIGATION

1. ALL PERMANENT AND TEMPORARY EROSION CONTROL PLANTING AND IRRIGATION SHALL BE INSTALLED AND MAINTAINED AS REQUIRED IN SECTION 212 OF THE STANDARD SPECIFICATIONS AND THE FOLLOWING:

A HYDROSEEDING SHALL BE APPLIED TO:

- 1 ALL SLOPES THAT ARE GRADED 6:1 (HORIZONTAL TO VERTICAL) OR STEEPER WHEN THEY ARE:
 - a. THREE FEET OR MORE IN HEIGHT AND ADJACENT TO A PUBLIC WALL OR STREET.
 - b. ALL SLOPES 4 FEET OR MORE IN HEIGHT.
- 2 AREAS GRADED FLATTER THAN 6:1 WHEN ANY OF THE FOLLOWING CONDITIONS EXIST:
 - a. NOT SCHEDULED FOR IMPROVEMENTS (CONSTRUCTION OR GENERAL LANDSCAPING) WITHIN 60 DAYS OF ROUGH GRADING.
 - b. IDENTIFIED BY THE PARKS AND RECREATION DIRECTOR AS HIGHLY VISIBLE TO THE PUBLIC.
 - c. HAVE ANY SPECIAL CONDITION IDENTIFIED BY THE CITY ENGINEER THAT WARRANTS IMMEDIATE TREATMENT.

B HYDROSEEDING AREAS SHALL BE IRRIGATED IN ACCORDANCE WITH THE FOLLOWING CRITERIA:

- 1 ALL SLOPES THAT ARE GRADED 6:1 OR STEEPER AND THAT ARE:
 - a. THREE TO EIGHT FEET IN HEIGHT SHALL BE IRRIGATED BY HAND WATERING FROM QUICK COUPLERS/HOSE BIBS OR A CONVENTIONAL SYSTEM OF LOW PRECIPITATION SPRINKLER HEADS PROVIDING 100% COVERAGE.
 - b. GREATER THAN 8 FEET IN HEIGHT SHALL BE WATERED BY A CONVENTIONAL SYSTEM OF LOW PRECIPITATION SPRINKLER HEADS PROVIDING 100% COVERAGE.
- 2 AREAS SLOPED LESS THAN 6:1 SHALL BE IRRIGATED AS APPROVED BY THE CITY ENGINEER, PRIOR TO HYDROSEEDING. THE DEVELOPER SHALL SUBMIT A PROPOSED SCHEME TO PROVIDE IRRIGATION TO THE CITY ENGINEER. THE PROPOSAL SHALL BE SPECIFIC REGARDING THE NUMBERS, TYPES, AND COSTS OF THE ELEMENTS OF THE PROPOSED SYSTEM.
- 3 IRRIGATION SHALL MAINTAIN THE MOISTURE LEVEL OF THE SOIL AT THE OPTIMUM LEVEL FOR THE GROWTH OF THE HYDROSEEDING GROWTH.

C HYDROSEEDING MIX SHALL CONSIST OF ALL OF THE FOLLOWING:

- 1 SEED MIX SHALL CONSIST OF NO LESS THAN:
 - a. 20 lbs. PER ACRE OF ROSE CLOVER
 - b. 20 lbs. PER ACRE OF ZORRO FESCUE
 - c. 3 lbs. PER ACRE OF E SCHOOL CIA CALIFORNICA
 - d. 4 lbs. PER ACRE OF ACHILLEA MILLEFOLIA
 - e. 3 lbs. PER ACRE OF ALYSSUM (CARPET OF SNOW)
 - f. 1/2 lb. PER ACRE OF DIMORPHOLECA
 - g. ITEMS c,d,e, AND f OF THIS SUBSECTION MAY BE OMITTED ON LOCATIONS WHERE THE AREA BEING HYDROSEEDED IS NOT VISIBLE FROM EITHER A PUBLIC STREET OR RESIDENTIAL STRUCTURES.
 - h. ITEM a OF THIS SUBSECTION MUST BE INOCULATED WITH A NITROGEN FIXING BACTERIA AND APPLIED DRY EITHER BY DRILLING OR BROADCASTING BEFORE HYDROSEEDING.
 - i. ALL SEED MATERIALS SHALL BE TRANSPORTED TO THE JOBSITE IN UNOPENED CONTAINERS WITH THE CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE CERTIFICATION TAG ATTACHED TO, OR PRINTED ON SAID CONTAINERS.
 - j. NON-PHYTO-TOXIC WETTING AGENTS MAY BE ADDED TO THE HYDROSEED SLURRY AT THE DISCRETION OF THE CONTRACTOR.
- 2 TYPE 1 MULCH APPLIED AT THE RATE OF NO LESS THAN 2000 lbs PER ACRE. TYPE 6 MULCH (STRAW) MAY BE SUBSTITUTED, ALL OR PART, FOR HYDRAULICALLY APPLIED FIBER MATERIAL. WHEN STRAW IS USED, IT MUST BE ANCHORED TO THE SLOPE BY MECHANICALLY PUNCHING NO LESS THAN 50% OF THE STRAW INTO THE SOIL.
- 3 FERTILIZER CONSISTING OF AMMONIUM PHOSPHATE SULFATE, 16-20-0, WITH 15% SULPHUR APPLIED AT THE RATE OF 500 lbs. PER ACRE.

D AREAS TO BE HYDROSEEDED SHALL BE PREPARED PRIOR TO HYDROSEEDING BY:

- 1 ROUGHENING THE SURFACE TO BE PLANTED BY ANY OR A COMBINATION OF:
 - a. TRACK WALKING SLOPES STEEPER THAN 6:1
 - b. HARROWING AREAS 6:1 OR FLATTER THAT ARE SUFFICIENTLY FRIABLE.
 - c. RIPPING AREAS THAT WILL NOT BREAK UP USING ITEMS a OR b ABOVE.
- 2 CONDITIONING THE SOILS SO THAT IT IS SUITABLE FOR PLANTING BY:
 - a. ADJUSTING THE SURFACE SOIL MOISTURE TO PROVIDE A DAMP BUT NOT SATURATED SEED BED.
 - b. THE ADDITION OF SOIL AMENDMENTS, PH ADJUSTMENT, LEACHING COVERING SALINE SOILS TO PROVIDED VIABLE CONDITIONS FOR GROWTH.

E HYDROSEEDED AREAS SHALL BE MAINTAINED TO PROVIDE A VIGOROUS GROWTH UNTIL THE PROJECT IS PERMANENTLY LANDSCAPED OR, FOR AREAS WHERE HYDROSEEDING IS THE PERMANENT LANDSCAPING, UNTIL THE PROJECT IS COMPLETED AND ALL BONDS RELEASED.

2. ALL SLOPES SHALL HAVE IRRIGATION INSTALLED AND BE STABILIZED, PLANTED AND/OR HYDROSEEDED WITHIN TEN (10) DAYS OF THE TIME WHEN EACH SLOPE IS BROUGHT TO GRADE AS SHOWN ON THE APPROVED GRADING PLANS.
3. SHOULD GERMINATION OF HYDROSEEDED SLOPES FAIL TO PROVIDE EFFICIENT COVERAGE OF GRADED SLOPES (90% COVERAGE) PRIOR TO OCTOBER 1, THE SLOPES SHALL BE STABILIZED BY AN APPROPRIATE EROSION CONTROL MATTING MATERIAL APPROVED BY THE PUBLIC WORKS INSPECTOR.
4. LANDSCAPING SHALL BE ACCOMPLISHED ON ALL SLOPES AND PADS AS REQUIRED BY THE CITY OF CARLSBAD LANDSCAPE MANUAL, THE LANDSCAPING PLANS FOR THIS PROJECT, DRAWING NO. _____, AND/OR AS DIRECTED BY THE CITY ENGINEER OR PLANNING DIRECTOR.
5. THE OWNER/APPLICANT SHALL ENSURE THAT ALL CONTRACTORS SHALL COORDINATE THE WORK OF THIS CONSTRUCTION SWPPP WITH THAT SHOWN ON ANY GRADING PLANS, LANDSCAPE AND IRRIGATION PLANS AND IMPROVEMENT PLANS AS REQUIRED FOR THIS PROJECT WORK.

Appendix J

Excerpts from EPA Guidelines for Selecting Construction BMPs

Chapter 4: SWPPP Development—Selecting Erosion and Sediment Control BMPs

► This chapter presents a brief discussion of erosion and sediment control principles and a discussion of some commonly used BMPs.

This document is not intended as an engineering or design manual on BMPs. The engineer or other qualified person that develops the details of your sediment and erosion control plan should be using the appropriate state or local specifications. The descriptions below provide a kind of checklist of the things to look for and some helpful installation and maintenance hints.

Erosion and sediment controls are the structural and non-structural practices used during the construction process to keep sediment in place (erosion control) and to capture any sediment that is moved by stormwater before it leaves the site (sediment control). Erosion controls—keeping soil where it is—are the heart of any effective SWPPP. Your SWPPP should rely on erosion controls as the primary means of preventing stormwater pollution. Sediment controls provide a necessary second line of defense to properly designed and installed erosion controls.

The suite of BMPs that you include in your SWPPP should reflect the specific conditions at the site. The information that you collected in the previous steps should help you select the appropriate BMPs for your site. An effective SWPPP includes a combination or suite of BMPs that are designed to work together.

Ten Keys to Effective Erosion and Sediment Control (ESC)

The ultimate goal of any SWPPP is to protect rivers, lakes, wetlands, and coastal waters that could be affected by your construction project. The following principles and tips should help you build an effective SWPPP. **Keep in mind that there are many BMP options available to you. We have selected a few common BMPs to help illustrate the principles discussed in this chapter.**

Erosion Control (keeping the dirt in place) and Minimizing the Impact of Construction

1. Minimize disturbed area and protect natural features and soil
2. Phase construction activity
3. Control stormwater flowing onto and through the project
4. Stabilize soils promptly
5. Protect slopes

Sediment Controls (the second line of defense)

6. Protect storm drain inlets
7. Establish perimeter controls
8. Retain sediment on-site and control dewatering practices
9. Establish stabilized construction exits
10. Inspect and maintain controls

Take a Closer Look...

BMPs in Combination

BMPs work much better when they are used in combination. For instance, a silt fence should not be used alone to address a bare slope. An erosion control BMP should be used to stabilize the slope, and the silt fence should serve as the backup BMP.

What does this mean to me?

Wherever possible, rely on erosion controls to keep sediment in place. Back up those erosion controls with sediment controls to ensure that sediment doesn't leave your site. Continually evaluate your BMPs. Are they performing well? Could the addition of a supplemental BMP improve performance? Should you replace a BMP with another one that might work better? Using BMPs in series also gives you some protection in case one BMP should fail.

Erosion Control and Minimizing the Impact of Construction

ESC Principle 1: Minimize disturbed area and protect natural features and soil. As you put together your SWPPP, carefully consider the natural features of the site that you assessed in Chapter 3. By carefully delineating and controlling the area that will be disturbed by grading or construction activities, you can greatly reduce the potential for soil erosion and stormwater pollution problems. Limit disturbed areas to only those necessary for the construction of your project. Natural vegetation is your best and cheapest erosion control BMP.

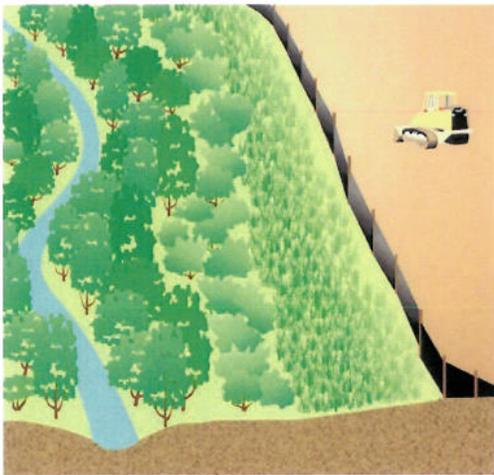


Figure 7. Protect vegetated buffers by using silt fence or other sediment controls.

Protecting and preserving topsoil is also a good BMP. Removing topsoil exposes underlying layers that are often more prone to erosion and have less infiltration capacity. Keeping topsoil in place preserves the natural structure of the soils and aids the infiltration of stormwater.

ESC Principle 2: Phase construction activity. Another technique for minimizing the duration of exposed soil is phasing. By scheduling or sequencing your construction work and concentrating it in certain areas, you can minimize the amount of soil that is exposed to the elements at any given time. Limiting the area of disturbance to places where construction activities are underway and stabilizing them as quickly as possible can be one of your most effective BMPs.

ESC Principle 3: Control stormwater flowing onto and through your project. Plan for any potential stormwater flows coming onto the project area from upstream locations, and divert (and slow) flows to prevent erosion. Likewise, the volume and velocity of on-site stormwater runoff should be controlled to minimize soil erosion.

Example BMP: Diversion Ditches or Berms

Description: Diversion ditches or berms direct runoff away from unprotected slopes and may also direct sediment-laden runoff to a sediment-trapping structure. A diversion ditch can be located at the upslope side of a construction site to prevent surface runoff from entering the disturbed area. Ditches or berms on slopes need to be designed for erosive velocities. Also, ensure that the diverted water is released through a stable outlet and does not cause downslope or downstream erosion or flooding.

Installation Tips:

- Divert run-on and runoff away from disturbed areas
- Ensure that the diversion is protected from erosion, using vegetation, geotextiles, or other appropriate BMPs
- Divert sediment-laden water to a sediment-trapping structure
- Use practices that encourage infiltration of stormwater runoff wherever possible

Maintenance:

- Inspect diversions and berms, including any outlets, regularly and after each rainfall
- Remove any accumulated sediment

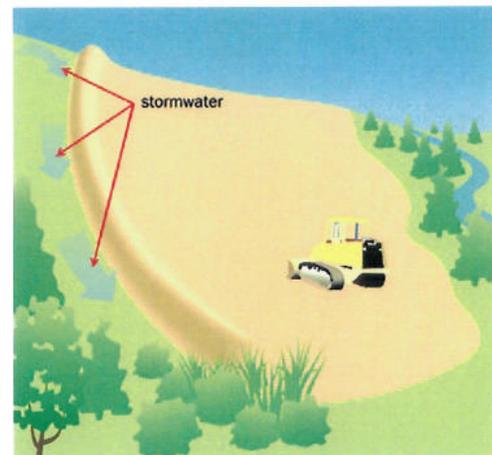


Figure 8. Illustration of a construction berm to divert stormwater away from the disturbed construction area.

ESC Principle 4: Stabilize soils promptly.

Where construction activities have temporarily or permanently ceased, you should stabilize exposed soils to minimize erosion. You should have stabilization measures in place after grading activities have ceased (many permits require stabilization within a specified time frame). You can provide either temporary or permanent cover to protect exposed soils. Temporary measures are necessary when an area of a site is disturbed but where activities in that area are not completed or until permanent BMPs are established. Topsoil stockpiles should also be protected to minimize any erosion from these areas. Temporary-cover BMPs include temporary seeding, mulches, matrices, blankets and mats, and the use of soil binders (there may be additional state and local requirements for the use of chemical-based soil binders). Permanent-cover BMPs include permanent seeding and planting, sodding, channel stabilization, and vegetative buffer strips. Silt fence and other sediment control measures are not stabilization measures.

SWPPP Tip!

Final Stabilization

Once construction activity in an area is completed and the area is stabilized (typically by achieving 70 percent permanent vegetative cover), you can mark this area on your SWPPP and discontinue inspections in that area. By bringing areas of your site to final stabilization, you can reduce your workload associated with maintaining and inspecting BMPs. For more information on final stabilization, see Chapter 9.

Example BMP: Temporary Seeding

Description: Temporarily seeding an area to establish vegetative cover is one of the most effective, and least expensive, methods of reducing erosion. This approach, as a single BMP, might not be appropriate on steep slopes, when vegetation cannot be established quickly enough to control erosion during a storm event, or when additional activities might occur soon in the area.

Installation Tips:

- Seed and mulch area (the mulch provides temporary erosion protection by protecting the soil surface, moderating temperature, and retaining moisture while seeds germinate and grow)

- Water regularly, if needed, to ensure quick growth
- Maintain backup BMPs, such as silt fence or settling ponds

SWPPP Tip!

Wind Control BMPs

In areas where dust control is an issue, your SWPPP should include BMPs for wind-erosion control. These consist of mulching, wet suppression (watering), and other practices.

ESC Principle 5: Protect slopes. Protect all slopes with appropriate erosion controls. Steeper slopes, slopes with highly erodible soils, or long slopes require a more complex combination of controls. Erosion control blankets, bonded fiber matrices, or turf reinforcement mats are very effective options. Silt fence or fiber rolls may also be used to help control erosion on moderate slopes and should be installed on level contours spaced at 10- to 20-foot intervals. You can also use diversion channels and berms to keep stormwater off slopes.

Example BMP: Rolled erosion control products

Description: Erosion control products include mats, geotextiles, and erosion control blankets and products that provide temporary stabilization and help to establish vegetation on disturbed soils. Such products help control erosion and help establish vegetation and are often used on slopes, channels, or stream banks.

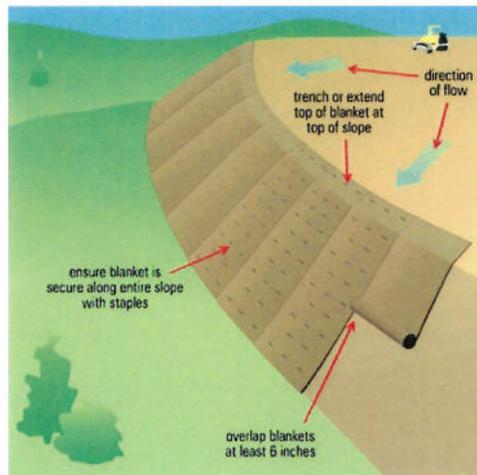


Figure 9. Illustration of erosion control blankets installed on slope.

Installation Tips:

- Use rolled erosion-control products on slopes steeper than 3 to 1 (horizontal to vertical) and in swales or long channels

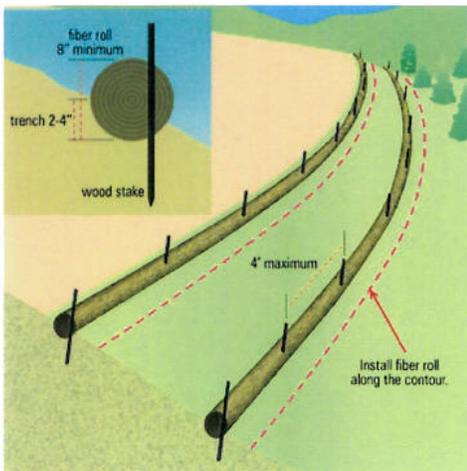


Figure 10. Illustration of a fiber roll installation along a slope.

- Trench the top of the blanket into the ground to prevent runoff from flowing under the blanket
- Overlap the lower end of the top mat over the top of the downslope mat to ensure that runoff stays on top of the blankets and mats
- Staple blankets and mats according to specifications

Maintenance:

- Periodically inspect for signs of erosion or failure
- Repair the blanket or mat if necessary
- Continue inspections until vegetation is established at the level required to qualify as final *stabilization*

ESC Principle 6: Protect storm drain inlets.

Protect all inlets that could receive stormwater from the project until final stabilization of the site has been achieved. Install inlet protection before soil-disturbing activities begin. Maintenance throughout the construction process is important. Upon completion of the project, storm drain inlet protection is one of the temporary BMPs that should be removed. Storm drain inlet protection should be used not only for storm drains within the active construction project, but also for storm drains outside the project area that might receive stormwater discharges from the project. If there are storm drains on private property that could receive stormwater runoff from your project, coordinate with the owners of that property to ensure proper inlet protection.

Example BMP: Storm Drain Inlet Protection

Description: Storm drain inlet protection prevents sediment from entering a storm drain by surrounding or covering the inlet with a filtering material. Several types of filters are commonly used for inlet protection: silt fence, rock-filled bags, or block and gravel. The type of filter used depends on the inlet type (for example, curb inlet, drop inlet), slope, and volume of flow. Many different commercial inlet filters are also available. Some commercial inlet filters are placed in front of or on top of an inlet, while others are placed inside the inlet under the grate.

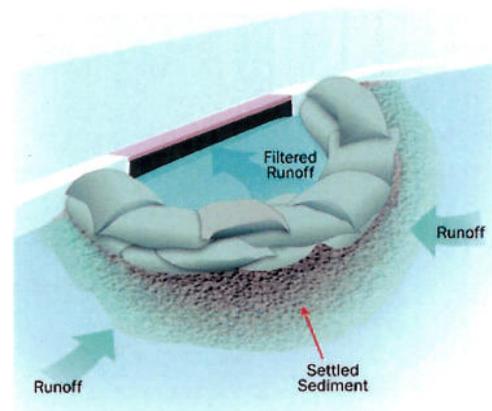


Figure 11. Illustration of a storm drain inlet with rock-filled bags filtering stormwater.

Installation Tips:

- Install inlet protection as soon as storm drain inlets are installed and before land-disturbance activities begin in areas with existing storm drain systems
- Protect all inlets that could receive stormwater from your construction project
- Use in conjunction with other erosion prevention and sediment control BMPs—remember, inlet protection is a secondary BMP!
- Design your inlet protection to handle the volume of water from the area being drained. Ensure that the design is sized appropriately.

Maintenance:

- Inspect inlets frequently and after each rainfall

- Remove accumulated sediment from around the device and check and remove any sediment that might have entered the inlet
- Replace or repair the inlet protection if it becomes damaged
- Sweep streets, sidewalks, and other paved areas regularly

SWPPP Tip!

Storm drain inlet protection should never be used as a primary BMP! Use erosion control techniques such as hydromulching or erosion-control blankets to prevent erosion. Use inlet protection and other sediment control BMPs as a *backup* or last line of defense.

ESC Principle 7: Establish perimeter controls. Maintain natural areas and supplement them with silt fence and fiber rolls around the perimeter of your site to help prevent soil erosion and stop sediment from leaving the site. Install controls on the downslope perimeter of your project (it is often unnecessary to surround the entire site with silt fence). Sediment barriers can be used to protect stream buffers, riparian

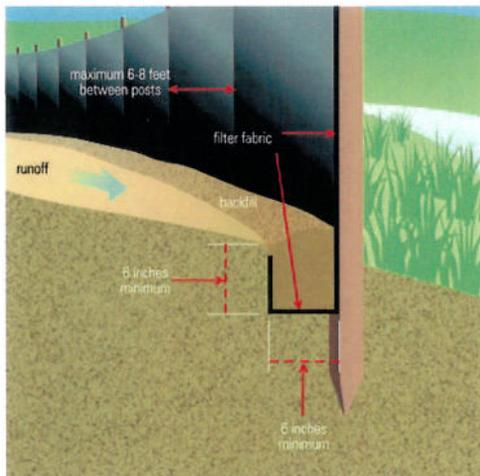


Figure 12. Illustration of proper techniques to use in installing silt fence.

areas, wetlands, or other waterways. They are effective only in small areas and should not be used in areas of concentrated flow.

Example BMP: Silt Fence and Fiber Rolls

Description: A silt fence is a temporary sediment barrier consisting of a geotextile attached to supporting posts and trenched into the ground. Silt fencing is intended to retain sediment that has been dislodged by stormwater. It is designed only for runoff from small areas and is not intended to handle flows from large slopes or in areas of concentrated flow. Fiber rolls serve the same purpose and consist of an open mesh tubular sleeve filled with a fibrous material which traps sediment. Fiber rolls are generally staked to the ground.

Installation Tips:

DO:

- Use silt fence or fiber rolls as perimeter controls, particularly at the lower or down slope edge of a disturbed area
- Leave space for maintenance between toe of slope and silt fence or roll
- Trench in the silt fence on the uphill side (6 inches deep by 6 inches wide)
- Install stakes on the downhill side of the fence or roll
- Curve the end of the silt fence or fiber roll up-gradient to help it contain runoff

DON'T:

- Install a silt fence or fiber rolls in ditches, channels, or areas of concentrated flow
- Install it running up and down a slope or hill
- Use silt fencing or fiber rolls alone in areas that drain more than a quarter-acre per 100 feet of fence

Maintenance:

- Remove sediment when it reaches one-third of the height of the fence or one-half the height of the fiber roll
- Replace the silt fence or roll where it is worn, torn, or otherwise damaged
- Retrench or replace any silt fence or roll that is not properly anchored to the ground

ESC Principle 8: Retain sediment on-site and control dewatering practices. Sediment barriers described in ESC Principle 7 can trap sediment from small areas, but when sediment retention from a larger area is required, consider using a temporary sediment trap or sediment basin. These practices detain sediment-laden runoff for a period of time, allowing sediment to settle before the runoff is discharged. Proper design and maintenance are essential to ensure that these practices are effective.

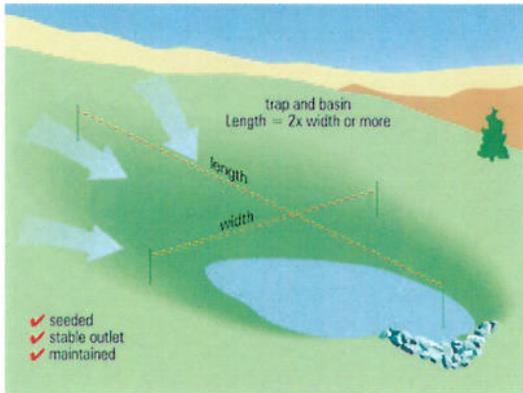


Figure 13. Illustration of a sediment basin.

You should use a sediment basin for common drainage locations that serve an area with 10 or more acres disturbed at any one time. The basin should be designed to provide storage for

the volume of runoff from the drainage area for at least a 2-year, 24-hour storm (or 3,600 cubic feet of storage per acre drained, which is enough to contain 1 inch of runoff, if the 2-year, 24-hour calculation has not been performed). Check your permit for exact basin sizing requirements. Sediment basins should be located at low-lying areas of the site and on the down-gradient side of bare soil areas where flows converge. Do not put sediment traps or basins in or immediately adjacent to flowing streams or other waterways.

Where a large sediment basin is not practical, use smaller sediment basins or sediment traps (or both) where feasible. At a minimum, use silt fences, vegetative buffer strips, or equivalent sediment controls for all down-gradient boundaries (and for those side-slope boundaries deemed appropriate for individual site conditions).

Dewatering practices are used to remove ground water or accumulated rain water from excavated areas. Pump muddy water from these areas to a temporary or permanent sedimentation basin or to an area completely enclosed by silt fence in a flat vegetated area where discharges can infiltrate into the ground.

Never discharge muddy water into storm drains, streams, lakes, or wetlands unless the sediment has been removed before discharge.

Keep in mind that some states and local jurisdictions require a separate permit for dewatering activities at a site.

ESC Principle 9: Establish stabilized construction exits. Vehicles entering and leaving the site have the potential to track significant amounts of sediment onto streets. Identify and clearly mark one or two locations where vehicles will enter and exit the site and focus stabilizing measures at those locations. Construction entrances are commonly made from large crushed rock. They can be further stabilized using stone pads or concrete. Also, steel wash racks and a hose-down system will remove even more mud and debris from vehicle tires. Divert runoff from wash areas to a sediment trap or basin. No system is perfect, so sweeping the street regularly completes this BMP.

Example BMP: Stabilized Construction Exit

Description: A rock construction exit can reduce the amount of mud transported onto paved roads by vehicles. The construction exit does this by removing mud from vehicle tires before the vehicle enters a public road.

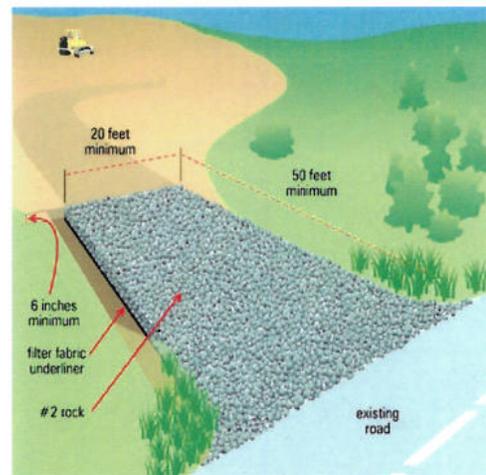


Figure 14. Illustration of a stabilized construction exit.

You might also want to install a wheel wash when mud is especially difficult to remove or space doesn't allow sufficient tire revolutions (four or five are needed) before exiting the site. Direct wash water to a suitable settling area—do not discharge wash water to a stream or storm drain!

Installation tips:

- Ensure that the exit is at least 50 feet long (generally, the length of two dump trucks) and graded so runoff does not enter the adjacent street
- Place a geotextile fabric under a layer of aggregate at least 6–12 inches thick. The stones or aggregate should be 3–6 inches in diameter
- Train employees and subcontractors to use the designated construction exits. Empower your employees to provide directions to subcontractors and others that are not on the site every day

Maintenance:

- Replenish or replace aggregate if it becomes clogged with sediment
- Sweep the street regularly

ESC Principle 10: Inspect and maintain controls. Inspection and maintenance is just as important as proper planning, design, and installation of controls. Without adequate maintenance, erosion and sediment controls will quickly fail, sometimes after just one rainfall, and cause significant water quality problems and potential violations of the NPDES construction general permit. Your permit likely requires you to maintain your BMPs at all times. To do this effectively, you should establish an inspection and maintenance approach or strategy that includes both regular and spot inspections. Inspecting both prior to predicted storm events and after will help ensure that controls are working effectively. Perform maintenance or corrective action as soon as problems are noted. **Inspection and maintenance of BMPs are addressed in more detail in Chapter 6.**

Other Sediment and Erosion Control Techniques

As mentioned at the beginning of this chapter, there are many other erosion and sediment control techniques that can be used effectively. The BMPs highlighted in this chapter are among those more commonly used and highlight many general erosion and sediment control principles for which other BMPs may be used effectively. Check to see if your state or local government has developed a BMP design manual for detailed information on any BMP you are considering. Appendix D lists several good BMP design manuals. You can also find out more about various BMPs by visiting EPA's Menu of BMPs at www.epa.gov/npdes/menuofbmps

The following BMPs are also commonly used at construction sites.

Erosion control measures:

- Surface roughening, trackwalking, scarifying, sheepsfoot rolling, imprinting
- Soil bioengineering techniques (e.g., live staking, fascines, brush wattles)
- Composting
- Sodding

Sediment control and runoff management measures:

- Gravel bag barrier
- Compost berm
- Rock or brush filters
- Baffles or skimmers in sediment basins to increase effectiveness
- Lowering soil levels near streets and sidewalks to prevent runoff
- Level spreaders
- Energy dissipaters
- Check dams

Chapter 5: SWPPP Development—Selecting Good Housekeeping BMPs

Six Key Pollution Prevention Principles for Good Housekeeping

Construction projects generate large amounts of building-related waste, which can end up polluting stormwater runoff if not properly managed. The suite of BMPs that are described in your SWPPP must include pollution prevention (P2) or good housekeeping practices that are designed to prevent contamination of stormwater from a wide range of materials and wastes at your site. The six principles described below are designed to help you identify the pollution prevention practices that should be described in your SWPPP and implemented at your site.

1. Provide for waste management
2. Establish proper building material staging areas
3. Designate paint and concrete washout areas
4. Establish proper equipment/vehicle fueling and maintenance practices
5. Control equipment/vehicle washing and allowable non-stormwater discharges
6. Develop a spill prevention and response plan

P2 Principle 1: Provide for waste management. Design proper management procedures and practices to prevent or reduce the discharge of pollutants to stormwater from solid or liquid wastes that will be generated at your site. Practices such as trash disposal, recycling, proper material handling, and cleanup measures can reduce the potential for stormwater runoff to pick up construction site wastes and discharge them to surface waters.

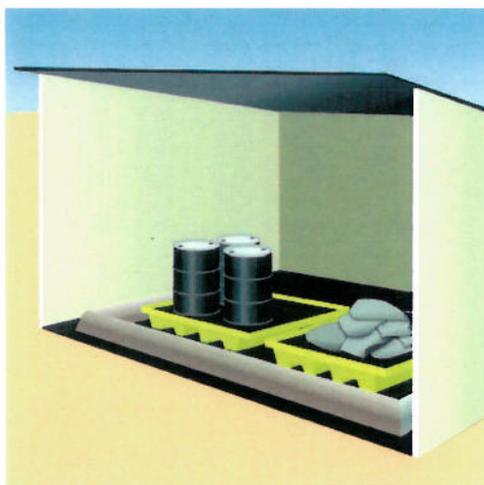


Figure 15. Illustration showing construction materials with secondary containment and overhead cover to prevent stormwater contamination.

Provide convenient, well-maintained, and properly located toilet facilities. Provide for regular inspections, service, and disposal. Locate toilet facilities away from storm drain inlets and waterways to prevent accidental spills and contamination of stormwater. Treat or dispose of sanitary and septic waste in accordance with state or local regulations.

Proper material use, storage, waste disposal, and training of employees and subcontractors can prevent or reduce the discharge of hazardous and toxic wastes to stormwater. Implement a comprehensive set of waste-management practices for hazardous or toxic materials, such as paints, solvents, petroleum products, pesticides, wood preservatives, acids, roofing tar, and other materials. Practices should include storage, handling, inventory, and cleanup procedures, in case of spills (see the following P2 principles).

► This chapter presents a brief discussion of good housekeeping principles to consider to ensure your construction site does not contaminate stormwater runoff.

As noted in Chapter 3, sediment is the principal pollutant of concern in stormwater discharges from construction sites. But, EPA's CGP and many state construction general permits require that the SWPPP describe good housekeeping measures for other pollutants that might be found on construction sites. This chapter discusses these measures.

Waste Management Checklist

Solid or Construction Waste

- ✓ Designate trash and bulk waste-collection areas on-site
- ✓ Recycle materials whenever possible (e.g., paper, wood, concrete, oil)
- ✓ Segregate and provide proper disposal options for hazardous material wastes
- ✓ Clean up litter and debris from the construction site daily
- ✓ Locate waste-collection areas away from streets, gutters, watercourses, and storm drains. Waste-collection areas (dumpsters, and such) are often best located near construction site entrances to minimize traffic on disturbed soils. Consider secondary containment around waste collection areas to further minimize the likelihood of contaminated discharges.

Sanitary and Septic Waste

- ✓ Provide restroom facilities on-site
- ✓ Maintain clean restroom facilities and empty porta-johns regularly
- ✓ Provide secondary containment pans under porta-johns, where possible
- ✓ Provide tie-downs or stake downs for porta-johns in areas of high winds
- ✓ Educate employees, subcontractors, and suppliers on locations of facilities
- ✓ Do not discharge or bury wastewater at the construction site
- ✓ Inspect facilities for leaks, repair or replace immediately

Hazardous Materials and Wastes

- ✓ Develop and implement employee and subcontractor education, as needed, on hazardous and toxic waste handling, storage, disposal, and cleanup
- ✓ Designate hazardous waste-collection areas on-site
- ✓ Place all hazardous and toxic material wastes in secondary containment
- ✓ Hazardous waste containers should be inspected to ensure that all containers are labeled properly and that no leaks are present

P2 Principle 2: Establish proper building material handling and staging areas.

Your SWPPP should include comprehensive handling and management procedures for building materials, especially those that are hazardous or toxic. Paints, solvents, pesticides, fuels and oils, other hazardous materials or any building materials that have the potential to contaminate stormwater should be stored indoors or under cover whenever possible or in areas with secondary containment. Secondary containment prevents a spill from spreading across the site and include dikes, berms, curbing, or other containment methods. Secondary containment techniques should also ensure the protection of ground water. Designate staging areas for activities such as fueling vehicles, mixing paints, plaster, mortar, and so on. Designated staging areas will help you to monitor the use of materials and to clean up any spills. Training employees and subcontractors is essential to the success of this pollution prevention principle.

SWPPP Tip!

Material Staging Area Measures

Your SWPPP should include procedures for storing materials that can contribute pollutants to stormwater. Consider the following:

- Train employees and subcontractors in proper handling and storage practices
- Designate site areas for storage. Provide storage in accordance with secondary containment regulations and provide cover for hazardous materials when necessary. Ensure that storage containers are regularly inspected for leaks, corrosion, support or foundation failure, or any other signs of deterioration and tested for soundness
- Reuse and recycle construction materials when possible

P2 Principle 3: Designate washout areas.

Concrete contractors should be encouraged, where possible, to use the washout facilities at their own plants or dispatch facilities. If it is necessary to provide for concrete washout areas on-site, designate specific washout areas and design facilities to handle anticipated washout water. Washout areas should also be provided for paint and stucco operations. Because washout areas can be a source of pollutants from leaks or spills,

EPA recommends that you locate them at least 50 yards away from storm drains and watercourses whenever possible.

Several companies rent or sell prefabricated washout containers, and some provide disposal of waste solids and liquids along with the containers. These prefabricated containers are sturdy and provide a more reliable option for preventing leaks and spills of wash water than self-constructed washouts. Alternatively, you can construct your own washout area, either by digging a pit and lining it with 10 mil plastic sheeting or creating an aboveground structure from straw bales or sandbags with a plastic liner. If you create your own structure, you should inspect it daily for leaks or tears in the plastic because these structures are prone to failure.

Regular inspection and maintenance are important for the success of this BMP. Both self-constructed and prefabricated washout containers can fill up quickly when concrete, paint, and stucco work are occurring on large portions of the site. You should also inspect for evidence that contractors are using the washout areas and not dumping materials onto the ground or into drainage facilities. If the washout areas are not being used regularly, consider posting additional signage, relocating the facilities to more convenient locations, or providing training to workers and contractors.

SWPPP Tip!

Washout Area Measures

When concrete, paint, or stucco is part of the construction process, consider these practices which will help prevent contamination of stormwater. Include the locations of these areas and your maintenance and inspection procedures in your SWPPP.

- Do not washout concrete trucks or equipment into storm drains, streets, gutters, uncontained areas, or streams
- Establish washout areas and advertise their locations with signs
- Provide adequate containment for the amount of wash water that will be used
- Inspect washout structures daily to detect leaks or tears and to identify when materials need to be removed
- Dispose of materials properly. The preferred method is to allow the water to evaporate and to recycle the hardened concrete. Full service companies may provide dewatering services and should dispose of wastewater properly. Concrete wash water can be highly polluted. It should not be discharged to any surface water, storm sewer system, or allowed to infiltrate into the ground. It should not be discharged to a sanitary sewer system without first receiving written permission from the system operator

P2 Principle 4: Establish proper equipment/vehicle fueling and maintenance practices.

Performing equipment/vehicle fueling and maintenance at an off-site facility is preferred over performing these activities on the site, particularly for road vehicles (e.g., trucks, vans). For grading and excavating equipment, this is usually not possible or desirable. Create an on-site fueling and maintenance area that is clean and dry. The on-site fueling area should have a spill kit, and staff should know how to use it. If possible, conduct vehicle fueling and maintenance activities in a covered area; outdoor vehicle fueling and maintenance is a potentially significant source of stormwater pollution. Significant maintenance on vehicles and equipment should be conducted off-site.

SWPPP Tip!

Equipment/Vehicle Fueling and Maintenance Measures

Consider the following practices to help prevent the discharge of pollutants to stormwater from equipment/vehicle fueling and maintenance. Include the locations of these areas and your inspection and maintenance procedures in your SWPPP.

- Train employees and subcontractors in proper fueling procedures (stay with vehicles during fueling, proper use of pumps, emergency shut-off valves, and such)
- Inspect on-site vehicles and equipment daily for leaks, equipment damage, and other service problems
- Clearly designate vehicle/equipment service areas away from drainage facilities and watercourses to prevent stormwater run-on and runoff
- Use drip pans, drip cloths, or absorbent pads when replacing spent fluids
- Collect all spent fluids, store in appropriate labeled containers in the proper storage areas, and recycle fluids whenever possible

P2 Principle 5: Control equipment/vehicle washing and allowable non-stormwater discharges.

Environmentally friendly washing practices can be practiced at every construction site to prevent contamination of surface and ground water from wash water. Procedures and practices include using off-site facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water or routing to the sanitary sewer; and training employees and subcontractors in proper cleaning procedures.

Take a Closer Look...

Non-Stormwater Runoff

A construction site might have sources of runoff that are not generated by stormwater. These non-stormwater discharges include fire hydrant flushing, vehicle or equipment wash water (no detergents!), water used to control dust, and landscape irrigation.

What does this mean to me?

Take steps to infiltrate these sources of uncontaminated water into the ground. You can also route these sources of water to sediment ponds or detention basins or otherwise treat them with appropriate BMPs.

SWPPP Tip!

Equipment/Vehicle Washing Measures

The following equipment/vehicle washing measures will help prevent stormwater pollution. Include the location of your washing facilities and your inspection and maintenance procedures in your SWPPP.

- Educate employees and subcontractors on proper washing procedures
- Clearly mark the washing areas and inform workers that all washing must occur in this area
- Contain wash water and treat and infiltrate it whenever possible
- Use high-pressure water spray at vehicle washing facilities without any detergents because water can remove most dirt adequately
- Do not conduct any other activities, such as vehicle repairs, in the wash area

requirements and ensure that clear and concise spill cleanup procedures are provided and posted for areas in which spills may potentially occur. When developing a spill prevention plan, include, at a minimum, the following:

- Note the locations of chemical storage areas, storm drains, tributary drainage areas, surface waterbodies on or near the site, and measures to stop spills from leaving the site
- Specify how to notify appropriate authorities, such as police and fire departments, hospitals, or municipal sewage treatment facilities to request assistance
- Describe the procedures for immediate cleanup of spills and proper disposal
- Identify personnel responsible for implementing the plan in the event of a spill

P2 Principle 6: Develop a spill prevention and response plan. Most state and EPA construction general permits require the preparation of spill prevention and response plans. Generally, these plans can be included or incorporated into your SWPPP. The plan should clearly identify ways to reduce the chance of spills, stop the source of spills, contain and clean up spills, dispose of materials contaminated by spills, and train personnel responsible for spill prevention and response. The plan should also specify material handling procedures and storage

SWPPP Tip!

Spill Prevention Measures

Additional spill prevention measures that will help prevent spills and leaks include the following:

- Describe and list all types of equipment to be used to adequately clean up the spill
- Provide proper handling and safety procedures for each type of waste
- Establish an education program for employees and subcontractors on the potential hazards to humans and the environment from spills and leaks
- Update the spill prevention plan and clean up materials as changes occur to the types of chemicals stored and used at the facility

Take a Closer Look...

Spill Prevention, Control and Countermeasure (SPCC) Plan

Construction sites may be subject to 40 CFR Part 112 regulations that require the preparation and implementation of a SPCC Plan to prevent oil spills from aboveground and underground storage tanks. Your facility is subject to this rule if you are a nontransportation-related facility that:

- Has a total storage capacity greater than 1,320 gallons or a completely buried storage capacity greater than 42,000 gallons and
- Could reasonably be expected to discharge oil in quantities that may be harmful to navigable waters of the United States and adjoining shorelines

Furthermore, if your facility is subject to 40 CFR Part 112, your SWPPP should reference the SPCC Plan. To find out more about SPCC Plans, see EPA's website on SPCC at www.epa.gov/oilspill/spcc.htm

What does this mean to me?

Reporting Oil Spills

In the event of an oil spill, you should contact the National Response Center toll free at 1-800-424-8802 for assistance, or for more details, visit their website: www.nrc.uscg.mil/nrchp.html

Appendix K

Reference Documents

Construction SWPPP Reference Documents

Document	Title	Website/Update Information
General Construction Permit	National Pollution Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity (Water Quality Order No. 99-08-DWQ, NPDES No. CAS000002) issued by the State Water Resources Control Board	http://www.swrcb.ca.gov/stormwtr/construction.html Once at the site click on the highlighted link titled "Construction General Permit, 99-08-DWQ". An update to the 99-08 Order is under consideration
General Linear Utility Permit	NPDES General Permit for Storm Water Discharges Associated with Construction Activity from Small Linear Underground/Overhead Projects, Water Quality Order No. 2003-0007 issued by the State Water Resources Control Board	http://www.swrcb.ca.gov/stormwtr/construction.html Once at the site click on the highlighted link titled "Small LUP General Permit".
EPA Guide for Construction Sites	Environmental Protection Agency (EPA) Developing Your Stormwater Pollution Prevention Plan – A Guide for Construction Sites EPA 833-R-060-04 May 2007	http://www.epa.gov/npdes/swpppguide
CASQA Construction Handbook	California Stormwater Quality Association (CASQA) Stormwater Best Management Practice Handbook Construction January 2003	http://www.cabmphandbooks.com Click on Construction. Also check for Errata Sheets
Caltrans Construction Site BMP Manual	California Department of Transportation (Caltrans) Stormwater Quality Handbook - Construction Site Best Management Practices March 1, 2003	http://www.dot.ca.gov/hq/construc/stormwater/stormwater1.htm
Caltrans SWPPP/WPCP Preparation Manual	California Department of Transportation (Caltrans) Stormwater Quality Handbook - Stormwater Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual – Construction Site Best Management Practices (BMPs) Reference Manual March 2007	http://www.dot.ca.gov/hq/construc/stormwater/stormwater1.htm

For a more complete listing of additional references and suggested resources on storm water pollution prevention planning, see the Suggested Resources List attached as Appendix D to Section 2 (Standard Urban Storm Water Mitigation Plan) included in the City of Carlsbad Storm Water Standards Manual.

APPENDIX 13

CONSTRUCTION ACTIVITY STANDARDS QUESTIONNAIRE

STORMWATER STANDARDS QUESTIONNAIRE

SECTION 2

SIGNIFICANT REDEVELOPMENT:	YES	NO
1. Is the project an addition to an existing priority project type? (Priority projects are defined in Section 1)	X	
<p>If you answered YES, please proceed to question 2.</p> <p>If you answered NO, then you ARE NOT a significant redevelopment and you ARE NOT subject to PRIORITY project requirements, only STANDARD requirements. Please check the "DOES NOT MEET PRIORITY Requirements" box in Section 3 below.</p>		
2. Is the project one of the following:		
a. Trenching and resurfacing associated with utility work?		X
b. Resurfacing and reconfiguring surface parking lots?		X
c. New sidewalk construction, pedestrian ramps, or bike land on public and/or private existing roads?		X
d. Replacement of damaged pavement?		X
<p>If you answered NO to ALL of the questions, then proceed to Question 3.</p> <p>If you answered YES to ONE OR MORE of the questions then you ARE NOT a significant redevelopment and you ARE NOT subject to PRIORITY project requirements, only STANDARD requirements. Please check the "DOES NOT MEET PRIORITY Requirements" box in Section 3 below.</p>		
3. Will the development create or add at least 5,000 square feet of impervious surfaces on an existing development or, be located within 200 feet of the Pacific Ocean and (1) create more than 2500 square feet of impermeable surface or (2) increases impermeable surface on property by more than 10%?	X	
<p>If you answered YES, you ARE a significant redevelopment, and you ARE subject to PRIORITY project requirements. Please check the "MEETS PRIORITY REQUIREMENTS" box in Section 3 below.</p> <p>If you answered NO, you ARE NOT a significant redevelopment, and you ARE NOT subject to PRIORITY project requirements, only STANDARD requirements. Please check the "DOES NOT MEET PRIORITY Requirements" box in Section 3 below.</p>		

SECTION 3

Questionnaire Results:

- MY PROJECT **MEETS PRIORITY REQUIREMENTS**, MUST COMPLY WITH PRIORITY PROJECT STANDARDS AND MUST PREPARE A STORM WATER MANAGEMENT PLAN FOR SUBMITTAL AT TIME OF APPLICATION.
- MY PROJECT **DOES NOT MEET PRIORITY REQUIREMENTS** AND MUST ONLY COMPLY WITH STANDARD STORM WATER REQUIREMENTS.

Applicant Information and Signature Box

Address:		Assessor Parcel Number(s):	
4600 CARLSBAD BLVD, CARLSBAD CA 92008		2100141/2100143	
Applicant Name:		Applicant Title:	
Applicant Signature:		Date:	

This Box for City Use Only

City Concurrence:	Yes	No
By:		
Date:		
Project ID:		

APPENDIX 14

Permanent Stormwater BMP Maintenance Agreement

**TO BE PROVIDED PRIOR TO
OPERATIONS OF CECF FACILITY**

APPENDIX 15

INDUSTRIAL STORMWATER POLLUTION PREVENTION PLAN

**TO BE PROVIDED WITHIN 90 DAYS
PRIOR TO CECP POWER PLANT
STARTUP**

APPENDIX 16

THREAT TO WATER QUALITY WORKSHEETS



Project Threat Assessment Worksheet for Determination of Construction SWPPP Tier Level

Project Storm Water Threat Assessment Criteria*	Construction SWPPP Tier Level
<p><u>Significant Threat Assessment Criteria</u></p> <p><input checked="" type="checkbox"/> My project includes clearing, grading or other disturbances to the ground resulting in soil disturbance totaling one or more acres including any associated construction staging, equipment storage, stockpiling, pavement removal, refueling and maintenance areas; or,</p> <p><input type="checkbox"/> My project is part of a phased development plan that will cumulatively result in soil disturbance totaling one or more acres including any associated construction staging, equipment storage, refueling and maintenance areas; or,</p> <p><input checked="" type="checkbox"/> My project is located inside or within 200 feet of an environmentally sensitive area (see City ESA Proximity map) and has a significant potential for contributing pollutants to nearby receiving waters by way of storm water runoff or non-storm water discharge(s).</p>	Tier 3
<p><u>Moderate Threat Assessment Criteria</u></p> <p>My project does not meet any of the Significant Threat Assessment Criteria described above and meets one or more of the following criteria:</p> <p><input type="checkbox"/> Project requires a grading plan pursuant to the Carlsbad Grading Ordinance (Chapter 15.16 of the Carlsbad Municipal Code); or,</p> <p><input type="checkbox"/> Project will result in 2,500 square feet or more of soils disturbance including any associated construction staging, stockpiling, pavement removal, equipment storage, refueling and maintenance areas and project meets one or more of the additional following criteria:</p> <ul style="list-style-type: none"> • located within 200 feet of an environmentally sensitive area or the Pacific Ocean; and/or, • disturbed area is located on a slope with a grade at or exceeding 5 horizontal to 1 vertical; and/or • disturbed area is located along or within 30 feet of a storm drain inlet, an open drainage channel or watercourse; and/or • construction will be initiated during the rainy season or will extend into the rainy season (Oct. 1 through April 30). 	Tier 2
<p><u>Low Threat Assessment Criteria</u></p> <p><input type="checkbox"/> My project does not meet any of the Significant or Moderate Threat criteria, is not an exempt permit type (see City's list of Permit Types Exempt from Construction SWPPP requirements) and project meets one or more of the following criteria:</p> <ul style="list-style-type: none"> • results in some soil disturbance; and/or • includes outdoor construction activities (such as roofing, saw cutting, equipment washing, material stockpiling, vehicle fueling, waste stockpiling) 	Tier 1
<p><u>No Threat Project Assessment Criteria</u></p> <p><input type="checkbox"/> My project is in a category of permit types exempt from City Construction SWPPP requirements (see City's list of Permit Types Exempt from Construction SWPPP requirements) and/or does not meet any of the High, Moderate or Low Threat criteria described above.</p>	Exempt

* The City Engineer may authorize minor variances from the Storm Water Threat Assessment Criteria in special circumstances where it can be shown that a lesser or higher Construction SWPPP Tier Level is warranted in the opinion of the City Engineer



Construction Threat Assessment Worksheet for Determination of a Project's Perceived Threat to Storm Water Quality

Construction SWPPP Tier Level	Construction Threat Assessment Criteria*	Perceived Threat to Storm Water Quality
Tier 3	<u>Tier 3 – High Construction Threat Assessment Criteria</u> <input type="checkbox"/> Project site is 50 acres or more and grading will occur during the rainy season <input checked="" type="checkbox"/> Project site is 1 acre or more in size and is located within the Buena Vista or Agua Hedionda Lagoon watershed, inside or within 200 feet of an environmentally sensitive area (ESA) or discharges directly to an ESA <input type="checkbox"/> Soil at site is moderately to highly erosive (defined as having a predominance of soils with USDA-NRCS Erosion factors k_f greater than or equal to 0.4) <input checked="" type="checkbox"/> Site slope is 5 to 1 or steeper <input checked="" type="checkbox"/> Construction is initiated during the rainy season or will extend into the rainy season (Oct. 1 through April 30). <input type="checkbox"/> Owner/contractor received a Storm Water Notice of Violation within past two years	High
	<u>Tier 3 – Medium Construction Threat Assessment Criteria</u> All projects not meeting Tier 3 High Construction Threat Assessment Criteria	Medium
Tier 2	<u>Tier 2 High Construction Threat Assessment Criteria</u> <input type="checkbox"/> Project is located within the Buena Vista or Agua Hedionda Lagoon watershed, inside or within 200 feet of an environmentally sensitive area (ESA) or discharges directly to an ESA <input type="checkbox"/> Soil at site is moderately to highly erosive (defined as having a predominance of soils with USDA-NRCS Erosion factors k_f greater than or equal to 0.4) <input type="checkbox"/> Site slope is 5 to 1 or steeper <input type="checkbox"/> Construction is initiated during the rainy season or will extend into the rainy season (Oct. 1 through April 30). <input type="checkbox"/> Owner/contractor received a Storm Water Notice of Violation within past two years <input type="checkbox"/> Site results in one half acre or more of soil disturbance	High
	<u>Tier 2 – Medium Construction Threat Assessment Criteria</u> <input type="checkbox"/> All projects not meeting Tier 2 High Construction Threat Assessment Criteria	Medium
Tier 1	<u>Tier 1 - Medium Inspection Threat Assessment Criteria</u> <input type="checkbox"/> Project is located within the Buena Vista or Agua Hedionda Lagoon watershed, within or directly adjacent to an environmentally sensitive area (ESA) or discharges directly to an ESA <input type="checkbox"/> Soil at site is moderately to highly erosive (defined as having a predominance of soils with USDA-NRCS Erosion factors k_f greater than or equal to 0.4) <input type="checkbox"/> Site slope is 5 to 1 or steeper <input type="checkbox"/> Construction is initiated during the rainy season or will extend into the rainy season (Oct. 1 through April 30). <input type="checkbox"/> Owner/contractor received a Storm Water Notice of Violation within past two years <input type="checkbox"/> Site results in one half acre or more of soil disturbance	Medium
	<u>Tier 1 - Low Inspection Threat Assessment Criteria</u> <input type="checkbox"/> All projects not meeting Tier 1 Medium Construction Threat Assessment Criteria	Low
Exempt	- Not Applicable -	Exempt

* The City Engineer may authorize minor variances from the Construction Threat Assessment Criteria in special circumstances where it can be shown that a lesser or higher amount of storm water compliance inspection is warranted in the opinion of the City Engineer

APPENDIX 17

Tier 3 Construction SWPPP Compliance Form



Storm Water Compliance Form For a Tier 3 Construction SWPPP

I am applying to the City of Carlsbad for the following type of construction permit(s):

Grading Permit

Building Permit

Right-of-Way Permit

My project requires preparation and approval of a Tier 3 Construction Storm Water Pollution Prevention Plan (SWPPP) because my project meets one or more of the following criteria demonstrating that the project potentially poses a significant threat to storm water quality:

- My project includes clearing, grading or other disturbances to the ground resulting in soil disturbance totaling one or more acres including any associated construction staging, equipment storage, stockpiling, pavement removal, refueling and maintenance areas; or,
- My project is part of a phased development plan that will cumulatively result in soil disturbance totaling one or more acres including any associated construction staging, equipment storage, stockpiling, pavement removal, refueling and maintenance areas; or,
- My project is located inside or within 200 feet of an environmentally sensitive area and has a significant potential for contributing pollutants to nearby receiving waters by way of storm water runoff or non-storm water discharge(s).

I CERTIFY TO THE BEST OF MY KNOWLEDGE THAT THE ABOVE CHECKED STATEMENTS ARE TRUE AND CORRECT.

I AM SUBMITTING FOR CITY APPROVAL A TIER 3 CONSTRUCTION SWPPP PREPARED IN ACCORDANCE WITH CITY STANDARDS AND THE REQUIREMENTS OF THE STATE WATER RESOURCES CONTROL BOARD GENERAL PERMIT FOR CONSTRUCTION ACTIVITIES - WATER QUALITY ORDER NO 99-08-DWQ (GENERAL CONSTRUCTION PERMIT) AND ANY AMENDMENT, REVISION OR RE-ISSUANCE THEREOF.

I UNDERSTAND AND ACKNOWLEDGE THAT I MUST SUBMIT THE CITY APPROVED TIER 3 CONSTRUCTION SWPPP TO THE SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD TOGETHER WITH A NOTICE OF INTENTION (NOI), AN APPROPRIATE FILING FEE AND OTHER REQUIRED DOCUMENTATION AND RECEIVE A STATE WASTE DISCHARGER'S IDENTIFICATION (WDID) NUMBER PRIOR TO CITY ISSUANCE OF THE ABOVE REQUESTED CONSTRUCTION PERMIT(S).

I ALSO UNDERSTAND AND ACKNOWLEDGE THAT I MUST ADHERE TO, AND AT ALL TIMES, COMPLY WITH THE CITY APPROVED TIER 3 CONSTRUCTION SWPPP THROUGHOUT THE DURATION OF THE CONSTRUCTION ACTIVITIES UNTIL THE CONSTRUCTION WORK IS COMPLETE AND APPROVED BY THE CITY OF CARLSBAD.

Owner/Owner's Authorized Agent Information and Signature Box

This Box for City Use Only

Address/Location: 4600 Carlsbad Blvd, Carlsbad CA 92008		Assessor Parcel Number(s): 2100141/2100143	
Owner/Owner's Authorized Agent Name:		Title:	
Owner/Owner's Authorized Agent Signature:		Date:	

City Concurrence:	Yes	No
By:		
Date:		
Project ID:		

