



STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

FOR

WILDWOOD

MANTECA, SAN JOAQUIN COUNTY, CA

RISK LEVEL 1

OWNER/DEVELOPER:

DR HORTON

5050 HOPYARD ROAD, SUITE 180

PLEASANTON, CA 94588

LRP CONTACT: DENNIS HUDSPETH

(925) 575-4228

PREPARED FOR:

DR HORTON

5050 HOPYARD ROAD, SUITE 180

PLEASANTON, CA 94588

SWPPP PREPARED BY:

KAZ & ASSOCIATES, LLC

538 STONE ROAD, SUITE I

BENICIA, CA 94510

(707) 747-1126

PREPARATION DATE: JULY 18, 2013

START OF CONSTRUCTION: JULY 24, 2013

ESTIMATED COMPLETION DATE: NOVEMBER 30, 2015

WDID #: _____

CONTACT NAME AND PHONE NUMBERS

The following DR Horton personnel and contracted consultant will be responsible for implementation of the Wildwood Construction Project; Storm Water Pollution Prevention Plan Program. These personnel will be contacted if any questions arise:

NAME	TITLE	PHONE
DENNIS HUDSPETH	LEGALLY RESPONSIBLE PERSON (LRP) VICE PRESIDENT OF LAND DEVELOPMENT DR HORTON	(925) 575-4228
TIM COLLITY	VICE PRESIDENT OF OPERATIONS DR HORTON	(925) 225- 7456
DARYL BAUMAN	LAND DEVELOPMENT PROJECT MANAGER DR HORTON	(209) 992-0396
LARRY COOMBS	SITE SUPERINTENDENT DR HORTON	(925) 580-7583
SEAN KAZEMI	QSD & CONSULTANT* KAZ & ASSOCIATES, LLC	(707) 816-2748
PAT MURPHY	QSP & CONSULTANT* KAZ & ASSOCIATES, LLC	(707) 816-2595

DR Horton Construction Managers and Superintendents are responsible for the following:

- Under the guidance of the site Qualified SWPPP Practitioner (QSP), site managers will conduct routine inspections and documentation of the site to ensure compliance with the General State Construction NPDES Permit including, pre-storm, post –storm and during extended storms
- Elimination of unauthorized discharges
- Implementation of SWPPP, and updating site plan as needed to reflect site conditions and BMPs implemented
- Non-storm water management
- Signing of inspection report prepared by contracted consultant

* Contracted to prepare updated SWPPP & site plan, conduct training, inspect the site and sample run off as requested by **DR Horton**, Report site inspection observations of areas of concerns that need immediate attention to **DR Horton** Construction Managers and Project Managers.

** Additional site contact information is located in Section 6.

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SWPPP Certification by Qualified SWPPP Developer (QSD)

Kaz & Associates, LLC certifies that this Storm Water Pollution Prevention Plan (SWPPP) Amendment and all attachments were prepared by a Qualified SWPPP Developer (QSD) to meet the requirements of the California Construction NPDES General Permit, Order No. 2009-0009-DWQ.

QSD Signature: _____

QSD Name: _____ Sean Kazemi _____

Telephone Number: _____ (707) 816-2748 _____

QSD Professional Registration: _____ QSD # 01036 _____

SECTION 1.0 SWPPP REQUIREMENTS

1.1 Introduction

The Wildwood project will disturb more than one (1) acre of land and is required to apply for coverage under California's General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit) Order No. 2009 0009 DWQ as amended by Order No. 2010 0014 DWQ (NPDES No. CAS000002) issued by the State Water Resources Control Board (State Water Board). This Storm Water Pollution Prevention Plan (SWPPP) for construction activities at the Wildwood project was developed in accordance with Title 40, Code of Federal Regulations (CFR), Parts 122, 123, and 124 under the NPDES Program administered by the California Environmental Protection Agency (CAL EPA) and the SWRCB. This plan was prepared to conform to the requirements outlined in the General Permit (also referred as the Construction General Permit) for a Risk Level 1 project.

This SWPPP identifies potential pollutant sources from construction activities at the project that may impact storm water quality and provides effective tools for pollutant prevention and reduction both during construction phases and post construction storm water discharges.

The objective of this site specific SWPPP are the following:

1. To describe the project construction activities
2. To identify the project Risk Classification to comply with General Permit
3. To identify potential construction related sources of storm water pollution associated with all phases of construction activity
4. To identify, eliminate, control or treat all authorized and unauthorized non-storm water discharges.
5. To describe, implement and maintain effective Best Management Practices (BMPs) through the use of Best Available Technology/Best Control Technology (BAT/BCT) standards to reduce or eliminate storm water pollution during all phases of construction
6. Calculations and design details, as well as BMP controls for site run-on
7. Identify post-construction BMPs which will be used to reduce or eliminate pollutants after construction is completed

8. Identify and provide methods to implement the project Inspection and Monitoring (I & M) program, which includes visual monitoring, Rain Event Action Plan (REAP) and Construction Site Monitoring Program (CSMP) requirements to comply with the General Permit

All Permit Registration Documents (PRDs) will be submitted to the SWRCB via the Stormwater Multi Application and Report Tracking System (SMARTS) by the DR Horton Legally Responsible Person (LRP) or their Approved Signatory prior to the start of construction. As of July 18, 2013 all PRD's are in the process of being uploaded to the SMARTS system in order to gain coverage under the Construction General Permit. PRDs include the following:

- Project's Notice of Intent (NOI)
- Risk Assessment Calculations
- Site Map(s)
- Annual Fee, and
- Electronic Certification Statement from the owner LRP
- QSD/QSP certifications

*Hard copies of the above referenced documents are located in **Appendix A.**

1.2 SWPPP Availability, Implementation, Amendments

The Construction General Permit (Section XIV.C) requires the SWPPP be available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone. The SWPPP shall be implemented concurrently with the start of ground disturbing activities and throughout all phases of construction. Hard copies of the site specific SWPPP will be located at the on-site construction trailer/office. This site specific SWPPP was developed under the supervision of the following Qualified SWPPP Developer (QSD) listed below:

Name: Sean Kazemi

Professional Registration: QSD #01036

SWPPP Amendments:

Per the General Permit requirements (Section XIV.A), all SWPPP amendments or revisions will be conducted by the QSD or another designated professional who is a QSD. The Amendments must be signed by a QSD (Section VII.B.6) and will be noted in the ***Amendment Log*** located in **Appendix D**.

1.3 Retention of Records

The Construction General Permit (*Sections I.J.69 and IV.G*) requires that all dischargers maintain a paper or electronic copy of all required records for three years from the date generated or date submitted, whichever is last. These records must be available at the construction site until construction is completed. The discharger shall furnish to the Local State Regional Water Quality Control Board (RWQCB), or US Environmental Protection Agency (EPA), within a reasonable time, any requested information to determine compliance with this General Permit. RWQCB's may require records to be retained for longer periods as they deem necessary. The project construction manager will maintain these records as required by the General Permit in the construction trailer.

During active construction, copies of the SWPPP, site inspections, corrective actions, photo documentation, annual reports, sampling data/results and any other storm water related documents will be maintained on-site in the construction trailer and or on-site electronic database. After construction is completed, all documents will be stored at the permit holder's offices until 3 years of the date the document(s) were generated/submitted.

1.4 Non-Compliance Reporting

The Construction General Permit identifies several areas of non-compliance reporting. It is the responsibility of the permittee to properly document reportable discharges or other violations of the General Permit. The Wildwood Project risk calculation determined that the project is a Risk Level 1 project per the Construction General Permit guidelines (**see Section 2.3 for summary**). Due to this risk level classification certain storm water quality requirements are outlined in the General Permit. In the event that a discharge occurs outside of these requirements where pollutants are discharged into storm water that may contribute to a

violation of the permit the discharger is responsible to report the discharge(s). Exceedances and violations should be reported using the Water Board SMARTS system and Non Compliance Reports will include the following:

- For all Sites, Self-reporting of any other discharge violation(s) are to comply with RWQCB enforcement actions, including local Basin Plans; and
- Discharges which contain a hazardous substance in excess of reportable quantities established in 40 CFR §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

The Wildwood Project risk calculation indicated that the project is a Risk Level 1 site (Section 2.3) and all construction activities will comply with all Risk Level 1 requirements located in Attachment C of the General Permit.

1.5 Annual Reports

The Construction General Permit requires that all permittees prepare, certify, and electronically submit an Annual Report no later than September 1 of each year. The first annual report will be due by September 2013. Reporting requirements are identified in Section XVI of the General Permit and include (but are not limited to) providing a summary of:

1. Summary of the construction activities during the year;
2. Sampling and analysis results including laboratory reports, analytical methods and reporting limits and chain of custody forms (Risk Levels 2 and 3);
3. Corrective actions and compliance activities, including those not implemented;
4. Violations of the General Permit;
5. Date, time, place, and name(s) of the inspector(s) for all sampling, inspections, and field measurement activities;
6. Visual observation and sample collection exception records; and
7. Training documentation of all personnel responsible for General Permit compliance activities.

1.6 Changes to Permit Coverage

The Construction General Permit is not transferable, however when changes in construction occur the Construction General Permit allows the discharger to change/alter the permit acreage in certain situations. Per Section II. C of the General Permit, the permittee is allowed to reduce or increase the total acreage covered under the General Permit under the following:

1. When a portion of the project is complete and/or conditions for termination of coverage have been met;
2. When ownership of a portion of the project is sold to a different entity; or
3. When new acreage is added to the project.

In order to change the acreage covered, the permittee must electronically file modifications to PRDs that include the revision of the project NOI, site map, SWPPP as appropriate, and provide a certification that new landowners have been notified of applicable requirements to obtain permit coverage (including name, address, phone number, and e-mail address of new landowner) in accordance with requirements of the General Permit within 30 days of a reduction or increase in total disturbed area. All changes to the project PRDs will be submitted via SMARTS and noted in the SWPPP Amendment Log in **Appendix D**.

1.7 Notice of Termination

To terminate coverage under the General Permit, a Notice of Termination (NOT) must be submitted electronically via SMARTS. A “final site map” and photos are required to be submitted with the NOT. Filing a NOT certifies that all General Permit requirements have been met. The NOT is submitted when the construction project is complete and within 90 days of meeting all General Permit requirements for termination and final stabilization (Section II.D) including:

- The site will not pose any additional sediment discharge risk than it did prior to construction activity.
- All elements of the SWPPP have been completed.
- All construction related equipment, materials and any temporary BMPs no longer needed are removed from the site.

- The site is in compliance with all local stormwater management requirements.
- The LRP has submitted a NOT and has received approval for termination from the local RWQCB.

The discharger shall ensure that all disturbed areas of the construction site are stabilized prior to the termination of coverage under this General Permit. Final Stabilization for the purposes of submitting an NOT is satisfied when all soil disturbed activities are completed and on of the following criteria is met.

- Disturbed areas that were vegetated prior to construction must be re-established to a uniform vegetative cover equivalent to 70% coverage of the preconstruction cover.
- Where no vegetation is present prior to construction, the site is returned to its original line and grade and/or compacted to achieve stabilization.
- Equivalent stabilization measures have been employed. These measures include, but are not limited to the use of such BMPs as blankets, reinforced channel liners, fiber matrices, geotextiles, hyrdoseeding, etc.

*The project LRP or Authorized Signatory will file an NOT through the State Water Board's SMARTS system.

SECTION 2.0 PROJECT INFORMATION

2.1 Project and Site Description

The DR Horton Wildwood project is located at south of the intersection of Woodward Ave and Oleander Avenue in the City of Manteca, San Joaquin County, CA. The property consists of two (2) areas within flat agricultural land for the construction of 118 single family detached homes and a post construction detention basin. The home development area is bound to the north by Woodward Ave, to the east by Oleander Ave and farmland on all other sides. The post construction detention pond is located within farmland to the east of the home development area. The site vicinity map is located in **Appendix B**. The project acreage is 32.5 acres of which approximately 32 acres will be disturbed during construction.

The project will be developed into residential subdivisions. The project's topography is relatively flat. Construction activities at the site will include the construction of future homes, as well as all land development activities that include the installation of underground utilities, post construction detention basin, landscape corridors, sound walls, landscaping, and asphalt concrete paved residential streets. The project site, including the recommended BMPs and general drainage areas are included in the Erosion and Sediment Control Maps in **Appendix C**. The purpose of this Storm Water Pollution Prevention Plan (SWPPP) is to ensure the construction activities by DR Horton comply with the Construction General Permit, (Order 2009-0009-DWQ) requirements for all phases of construction outlined below:

- Project Land Development, including, but not limited to:
 - Existing Site Demolition, Clearing & Grubbing Operations
 - Grading, Excavation and Backfilling
 - Underground Utility Installation
 - Street and other Hardscape Paving (AC & PCC Concrete)
 - Common area and park landscaping
- Home Construction, including, but not limited to:
 - Pad certification and slab installation
 - Utility installation and tie into main lines
 - Vertical construction of new homes

- o Home Landscaping
- Implementation of all other common area landscaping
 - o Post Construction BMPs per local Municipal Requirements

2.1.1 Existing Site Features, Watercourses and Soil Conditions

Existing Site Features

Per the project's geotechnical investigation dated May 10, 2013, the site was approximately rectangular in shape, generally level located within agricultural land. The project site was vacant and surface vegetation generally consisted of a moderate growth of grasses and weeds. A drainage ditch bisected the middle of the site in a north-south direction. The ditch was unlined, about 4 feet deep, and about 20 feet wide. No water was observed within the ditch. An abandoned water well casing was observed near the northeastern corner of the site. Some fill stockpiles were located near the southeastern corner of the site. Based on our review of historical aerial photographs of the site, it is our understanding that a residence and associated facilities and trees used to exist at the northeastern corner of site and were probably demolished in 2009 or 2010.

Watercourses:

Upon completion of the site improvements, all runoff from the project will discharge to detention basin that will be constructed during construction to the east of Oleander Ave. The project is not located within a "High Risk" receiving watershed per the State Water Board's SMARTs database.

Soil Conditions:

Per the project's Geotechnical Investigation the near-surface soil materials encountered in our exploratory borings generally consisted of loose to medium dense sands with little fines content that extended to the maximum depth explored of about 8 feet. The upper two feet of soils have been disturbed by cultivation. It was also estimated that the loose to medium dense sands may extend to depths varying from 10 to 20 feet.

Ground water was encountered in our borings at depths of about 5-1/2 to 7-1/2 feet. Ground water was also reportedly encountered by previous borings at depths of about 6 to 7-1/2 feet. In addition, fluctuations in the ground water level could occur due to change in seasons, variations in rainfall, and other factors. DR Horton will incorporate the appropriate actions to address all geotechnical concerns outlined in the geotechnical report.

2.1.2 Construction Site Drainage Estimates

The following are estimates for the construction site:

Construction site area:	34.5 acres
Percentage impervious area before construction:	5%
Estimated runoff coefficient before construction:	0.30
Percentage impervious area after construction:	65%
Calculated runoff coefficient after construction:	0.72

2.2 Stormwater Run-On From Offsite Areas

Potential run-on to the project is low with the majority of the surrounding areas developed and or rural land. Per the General Permit requirements, management of storm water run-on from adjacent areas is required. In the event that run-on causes a nuisance problem, appropriate temporary BMPs will be used to redirect the run-on away from the active construction areas as described in Section 3 of this SWPPP.

2.3 Construction Site Sediment and Receiving Water Risk Determination

The General Permit requires assessment of the risk level of a site based on both sediment transport and receiving water risk during periods of soil exposure. The following information describes how the site risk level was calculated.

Sediment Risk:

Sediment Risk was manually calculated using the RUSLE soil loss equation located in **Appendix A** for the Risk Determination Documents. An R value of **45.32** was manually calculated using the Construction Rainfall Erosivity Waiver Fact Sheet due to the EPA website being unavailable at

the time of SWPPP preparation. The standard State Water Board SMARTS system value was used for the site's K factor **(0.28)** and LS factor **(0.19)**. The RUSLE generated estimated sediment yield calculation was **2.411024** tons/acre per year, which is considered **Low** sediment risk.

Receiving Water Risk:

The project runoff will discharge to post construction basin that will be installed during construction to the east of Oleander Ave. Per the SMARTs database the project is located within an area with a "Low" Receiving Water Risk. Receiving Water Risk Level is **Low**.

Combined Risk Level

Project Sediment Risk: 2.411024 tons/per/year = Low Risk

Project Receiving Water Risk: Low Risk

Project Combined Risk: **Level 1**

The permit requirements specific to a Risk Level 1 determination can be found in **Appendix A** and Attachment C of the Construction General Permit. Risk Level 1 dischargers shall comply with the following effluent standards:

- Risk level 1 dischargers are not subject to numeric effluent standards.
- Storm water discharges and authorized non-storm water discharges shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.
- Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2.4 Project Construction Activities

The construction activities will occur on land owned and managed by DR Horton. A **General Site Vicinity Map** of the project is shown in **Appendix B**. The Erosion and Sediment Control Site

Map(s) showing the site, active and inactive areas, and a description of the recommended Best Management Practices (BMPs) for construction are included in **Appendix C**.

The construction activities will occur on land owned and developed by DR Horton. Construction activities will include, but are not limited to the following:

- Mobilization of construction materials and equipment
- Demolition Activities
- Clearing and grubbing activities of existing vegetation on building pads
- Land Development Activities
 - Delineation of Project Limits
 - Grading, Excavation, Utility Installation and Street Paving
 - Soil Import/Export
 - Other associated site improvements (walkways, landscape, etc.)
- Home Production Phases
 - Utility installation and tie-in to main lines
 - Home Slab Installation
 - Various phases of Vertical Construction of single family homes
 - Landscaping

The Erosion and Sediment Control Site Maps showing the general drainage pattern and a description of the recommended Best Management Practices (BMPs) for the land development and vertical construction phases are included in **Appendix C**.

2.5 Construction Schedule

The Wildwood construction activities will begin in early July 2013 with the estimated completion date of late August 2016. A more detailed estimated construction schedule is located in **Appendix K**.

Land Disturbing Commencement: July 24, 2013

Estimated Completion: November 30, 2015

2.6 Potential Construction Site Pollutant Sources

Construction activities that have the potential to contribute sediment to storm water discharges include but are not limited to; clearing and grubbing operations, grading operations, soil import operations, vertical construction, utility excavations operations, asphaltic and concrete paving, and restoration/landscaping operations. The following is a list of construction materials that will be used and will have the potential to contribute pollutants, other than sediment, to storm water runoff.

Materials:

- Vehicle fluids, including oil, grease, petroleum, and coolants
- Asphaltic emulsions
- Cement materials
- Base and subbase material
- Joint and curing compounds
- Concrete and curing compounds
- Paints
- Mortar mix
- Solvents, thinners, acids
- Raw landscaping materials and wastes
- BMP materials
- Treated lumber (materials and waste)
- PCC, masonry rubble
- General litter
- Previous agricultural pesticides, fertilizers and herbicides

Activities:

- Demolition operations
- Clear and grub operations
- Grading operations
- Trenching operations
- Paving operations

- Delivery/transportation operations
- Utility excavation and installation operations
- Foundation/structure construction operations
- Vehicle and equipment cleaning, fueling, and maintenance
- Landscaping operations
- Painting

Locations of recommended and or installed Best Management Practices (BMPs) of this project are shown on the project Erosion and Sediment Control maps in **Appendix C**. A detailed list of construction materials and potential pollutant sources is located in **Appendix H**.

2.7 Potential Soil and/or Groundwater Contamination Locations

There was no data within the Geotechnical Investigation that indicated that the site contained soil or groundwater contamination. In the event that Contaminated Soil is encountered during construction, the City will be contacted immediately and activities will be shut down until the materials are removed.

2.8 Identification of Non-Stormwater Discharges

Discharge of material other than storm water to the storm water collection system is prohibited. Per General Permit Order No. 2009-0009-DWQ certain non-storm water discharges are approved and/or authorized if they are related to construction activity and are necessary for the completion of a construction project. Authorized non-storm water discharges are: dechlorinated potable water sources such as: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, dewatering, uncontaminated ground water from dewatering, and other discharges not subject to a separate general NPDES permit adopted by a Regional Water Board. The General Permit requires (Section XIV.A.2"SWPPP Requirements") that dischargers identify all non-stormwater discharges (where not otherwise required to be under a Regional Water Quality permit) and that discharges be eliminated, controlled, or treated.

The City of Manteca does NOT allow the discharge of non storm water to active storm drains other than water to control dust if uncontaminated and irrigation water.

The discharge of non-storm water is authorized under the following conditions:

1. The discharge does not cause or contribute to a violation of any water quality standard;
2. The discharge does not violate any other provision of the General Permit;
3. The discharge is not prohibited by the applicable Basin Plan;
4. The discharger has included and implemented specific BMPs required by this General Permit to prevent or reduce the contact of the nonstorm water discharge with construction materials or equipment;
5. The discharge does not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants; and
6. The discharge is monitored and meets the applicable local requirements.

SECTION 3.0 BEST MANAGEMENT PRACTICES

Best Management Practices (BMPs) are those practices, procedures and controls implemented onsite that best achieve the reduction of pollutants in the storm water and protection of water quality. Appropriate BMPs are good housekeeping practices, using Best Available Technology practices to minimize the contact of storm water run-off with potential pollutants and reduce or abate non-storm water discharges. Locations of the recommended BMPs to minimize soil exposure and potential pollutant discharges are located on the project Site Map in **Appendix C**. CASQA BMP fact sheets are located in **Appendix M** for all of the selected BMPs in Section 3.

3.1 Schedule for BMP Implementation

Implementation of appropriate erosion and sediment control BMPs in a timely manner is paramount to minimize potential discharges and for compliance with the general permit. Prior to the rainy season, (generally accepted as October 15 through April 30th) of each construction year, the site construction manager will install an appropriate combination of erosion and sediment control measures on the disturbed areas. Depending on the construction activities to take place additional measures will be installed prior to the start of land disturbance in order to delineate the active lots boundaries, control/contain runoff and to minimize soil exposure. During the dry season rain events are more unlikely, pre storm maintenance will be conducted as required by the General Permit to ensure effectiveness of erosion and sediment control plan.

Prior to predicted rain during the wet or dry months appropriate actions will be taken to minimize the potential of rain water contamination from disturbed areas and construction materials. It is recommended that sediment control measures remain installed year around and an effective combination of erosion and sediment control BMPs be used during the rainy season and prior to rain during the throughout all phases of construction.

Prior to the start of construction the following actions and BMPs will be deployed:

EC-1 Scheduling

Construction activities will be phased and scheduled to minimize the area of exposed soil. Mass grading and land development activities are scheduled to commence in late July 2013. Appropriate erosion and sediment control BMPs will be implemented prior to the start of land

disturbing activities, upon completion of specific areas and throughout all phases of construction. Weather forecasts will be monitored daily and schedule modified accordingly during inclement weather is forecasted. Site conditions will be assessed prior to each rainy season and appropriate BMPs deployed under the direction of the site's designated Qualified SWPPP Practitioner (QSP).

Diversion of Run-on:

- Run-on from surrounding areas may cause nuisance run-on into the construction site. BMPs will be installed (as necessary) to divert run-on water away from the construction area to existing inlets or vegetated areas. Under the direction of the site Qualified SWPPP Practitioner (QSP) the following BMPs will be deployed if run-on is causing a nuisance.
 - Silt fencing,
 - Gravel Bag Barriers
 - Stabilized Earthen Berms

3.2 Erosion and Sediment Control

Erosion Control (EC): Soil Stabilization

Completed disturbed areas will be stabilized with effective erosion control measures prior to the rainy season, (October through April of each year), to minimize exposure of the disturbed areas and sediment laden runoff. During the dry months, (May through September of every year), maintaining erosion control measures is recommended, however if stabilized areas are disturbed from construction activities these areas will be addressed prior to un-seasonal rain events and monitored daily for wind erosion/dust. Sediment control or secondary containment BMPs will remain installed throughout the year.

Under the discretion of the site Qualified SWPPP Practitioner (QSP), the following temporary Erosion Control (EC) Practices may be implemented on-site.

EC-2 Preservation of Existing Vegetation

Only areas designated to have vegetation removed will be disturbed. All other existing

vegetated areas, trees to be preserved and other site features will be preserved to the maximum extent feasible until removal is necessary.

EC-9 Earth Dike and Drainage Swales

If necessary, earth dikes and drainage swales will be used to divert off site runoff around the construction site, divert runoff from stabilized areas and disturbed areas, and direct runoff into a desired location. Earth Dike and Drainage Swale implementation will be based on the site conditions and mainly used to intercept runoff from paved surfaces and or divert/direction runoff to a desired location.

EC-10 Velocity Dissipation Devices

Velocity Dissipation Devices will be used at the outlets of drainage ditches and or other temporary conveyances (as needed under direction of QSP) to prevent scour of the soil caused by concentrated, high velocity flows. Velocity Dissipation Devices may also be used to divert run-on during construction (if present).

EC-15 Soil Preparation-Roughening

Soil Preparation/Roughening involves assessment and preparation of surface soils for BMP installation. Appropriate preparation (top soil, nutrients, compost, etc) and roughening (track walking, scarifying, stair stepping, and imprinting) will be conducted to enhance vegetative establishment, as well as minimize potential erosion prior to final stabilization application.

EC-16 Non-Vegetative Stabilization

Non-Vegetative Stabilization practices will be used for inactive lots and within the active production areas to minimize exposed soil areas to raindrop impacts and potential wind erosion. The CGP requires disturbed areas that will be inactive for greater than 14 days to be stabilized. Below outlines the BMPs that are incorporated into EC-16 Non-Vegetative Stabilization BMP and will be deployed to protect the soil surface, minimize erosion and potential sediment laden discharges.

EC-5 Soil Binders

Based on the site conditions, environmentally benign, non-toxic soil stabilizers will be applied to exposed soil surfaces, (inactive areas, stockpiles, etc) to temporarily stabilize soil surface to minimize or prevent erosion from rain and wind, as needed.

EC-6 Straw Mulch:

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or crimper, or anchoring it with a tackifier or stabilizing emulsion. Straw mulch is used to provide temporary cover until permanent stabilization is conducted. Straw mulch protects the soil surface from the impact of raindrops, preventing soil particles from becoming dislodged. Straw mulch may be used around building foundations to minimize soil exposure and potential for sediment laden run-off during rain events.

EC-7 Geotextiles and Mats

Geotextile covers and mats will be used to cover exposed soil and other earthen material stockpiles to minimize exposure to rain based on the site conditions under the direction of the QSP or trained staff. Matting of natural materials will be 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. Geotextile covers and mats may be used around building foundations to minimize soil exposure and potential for sediment laden run-off during rain events.

Erosion Control Blankets will be used in areas where potential concentrated flows of run-on or runoff for soil stabilization per the manufacturer's specifications for flow strength (as needed).

****Other temporary Spray on Erosion Control BMPs may be used based on the construction activities and exposed areas. These other Spray on Erosion Control include, but are not limited to the following; Straw mulch with tackifier, hydrostraw, Bonded Fiber Matrix, Temporary Gravel Base underlined with geotextile fabric and other equivalent measures in regard to temporary stabilization.***

Per the General Permit Requirements, areas that are left inactive for more than 14 days are to be stabilized with appropriate temporary or permanent erosion control BMPs.

WE-1 Wind Erosion Control

Wind erosion control will consist of applying water and/or other dust palliatives as necessary to prevent or alleviate erosion by the forces of wind. Dust control will be applied in accordance with CASQA standard practices. Covering of small stockpiles or areas will be an alternative to applying water or other dust palliatives. Water will be applied by a means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution. Materials applied as temporary soil stabilizers and soil binders will also provide wind erosion control benefits and access to these stabilized areas will be minimized.

- All stabilized disturbed areas will be assessed frequently to ensure that the installed BMPs are in good condition and have not been damaged. Corrective actions will be implemented to address any damaged BMPs, the exposed soil areas and construction materials as described in the Rain Event Action Plan (REAP) in Section 4.3.

Sediment Control (SC): **Secondary Containment**

Sediment Control measures are used for secondary containment to trap dislodged sediment particles due to erosion and/or from exposed soil areas. Sediment controls are intended to complement and enhance the selected erosion control measures and reduce sediment discharges from active construction areas. The project will incorporate sediment control measures required by regulatory agency permits, contract documents, and other measures selected by the QSD. Effective sediment perimeter controls will be established and maintained. Installation specifications and maintenance requirements of the BMPs will be according to the measures outlined in the applicable CASQA Handbook BMP fact sheets contained in **Appendix M**. The Following are Sediment Control (SC) BMPs that will be used at the project:

SE-1 Silt Fence

Silt fencing or equivalent will be used to provide a temporary barrier of permeable fabric designed to intercept and slow the flow of sediment laden runoff. Silt fence will potentially be installed behind sidewalks of active or inactive lots to minimize potential sediment discharge in run-off water. Silt fence or equivalent sediment control BMP will be installed along the west

property line that borders Wrigley Creek. Additional locations for silt fence will be field determined as deemed necessary by the QSP.

SE-3 Sediment Trap

A sediment trap is a containment area where sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out or before the runoff is discharged. Sediment traps are formed by excavating or constructing an earthen embankment across a waterway or low drainage area. Temporary Sediment Trap(s) may be used during land development operations to contain runoff. Locations of sediment traps will be field determined based on the site conditions and phase of construction.

**Post construction detention pond will be installed during grading and excavation activities. This basin will be used during construction as a detention/percolation pond. All excavation, grading and drainage structures to the pond will be conducted per the project engineered approved documents. Appropriate actions will be taken to stabilize the pond prior to the winter season.*

SE-4 Check Dams

Small barriers constructed of rock, gravel bags, sandbags, fiber rolls, or reusable products will be placed in gutters on paved roads, thereby reducing the velocity of flowing water, allowing sediment to settle and reducing erosion or sediment laden run-off.

SE-5 Fiber Rolls

Straw, flax, or other similar materials bound into a tight tubular roll will be staked and trenched in behind the curb of active and inactive lots to intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff. Fiber roll or equivalent sediment control rolls will be installed behind curbs and sidewalks of active and inactive lots (where necessary is soil is disturbed), as well as in locations deemed necessary by the QSP.

SE-6 Gravel Bag Berm

A series of gravel-filled bags will be placed on level contours to intercept sheet flows, allowing sediment to settle out. (Only to be installed if needed)

SE-10 Storm Drain Inlet Protection

BMPs consist of a sediment filter or an impoundment around or upstream of a storm drain, drop inlet, or curb inlet. Storm drains inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Storm drain inlet protection will be implemented and maintained at all nearby municipal storm drain inlets and to be installed storm drains during all phases of construction.

TC-1 Tracking Controls

Stabilized Construction Entrance/Exits – A stabilized construction entrance/exits will be maintained by DR Horton between areas of ingress/egress locations from paved streets to the unpaved areas of the project. Stabilized entrance/exit and rock aggregate base is recommended for the main material storage yard and construction trailer. Stabilization material is recommended to be the following for entrance/exits.

- Stabilization material will consist of 3 to 6-inch diameter aggregate (soil cut down 6-12 inches and rock aggregate underlain with geo-textile fabric), steel rumble plates and or equivalent BMPs to minimize track out onto paved roads. It is recommended that the entrances are flared where it meets the existing road to provide an adequate turning radius (mainly used at Storage Yard).
- Access to lots will be deterred and or designated areas will be delineated. Street sweeping will be performed frequently and as necessary to address track out from construction activities.

****Additional Erosion and Sediment Control BMPs will be implemented as needed at the project site depending on the status of construction and the forecasted weather to ensure compliance with the General Construction NPDES Permit and local regulations.***

3.3 Good Site Management “Housekeeping” - Non-Stormwater and Materials Management

Dischargers shall implement good site management (i.e., "housekeeping") measures for

construction materials that could potentially be a threat to water quality if discharged. At a minimum, dischargers shall implement the following good housekeeping measures:

- Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).
- Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).
- Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).
- Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).
- Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.

As described in Section 2.6 of this SWPPP, non-stormwater discharges other than storm water are prohibited, with the exceptions described in Section 2.6 of this SWPPP. The General Permit (Section XIV. A.2) requires the SWPPP to identify non-stormwater BMPs that will effectively reduce pollutants associated with Material Storage, Material Use, Waste Management, and reduce/properly manage “non-stormwater” that is generated on-site. The following are the BMPs that will be used on-site that meet requirements for Risk Level 1 projects.

3.3.1 Non-Stormwater Management BMPs

NS-1 Water Conservation Practices

Water application rates will be monitored to prevent over watering and possible ponding of water. Irrigation lines will be tested to ensure effective watering and water times will be

adjusted to ensure that the appropriate amount of water is being used and to prevent runoff and erosion formation.

NS-2 Dewatering Operations

Dewatering operations are practices that manage the discharge of contained runoff precipitation and non-storm water that must be removed from a work location so that construction work may be accomplished. Non-storm water includes, but is not limited to groundwater, waters used during construction activities for dust control and contained precipitation. Various methods are acceptable for containing the water and treatment before release. Dewatering activities are possible during excavation and utility installation activities.

- For contained precipitation or encountered groundwater, the main BMP will be to recycle runoff on inactive lots and/or other areas within the project (or adjacent agricultural land if approved by landowner) if feasible to promote percolation and evaporation.

NS-3 Paving, Saw Cutting and Grinding Operations

The Contractor will prevent or reduce the discharge of pollutants from paving operations, by using measures to prevent run-on and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

When Paving, Saw Cutting and Grinding activities are to be conducted in the rainy season, activities will be completed when there is a window of clear weather with appropriate BMPs installed to minimize potential discharges.

- All nearby storm drain inlets will be temporarily blocked off or covered to prevent wash water from entering the storm drains.
- Following the completion of all Grinding and Sawcutting operations, the streets will be swept, inlet covers removed and inlets inspected for the presence of any paving debris that needs to be removed.
- No paving, saw cutting or grinding waste water will be washed into nearby inlets. All wash water will be vacuummed and or recycled on vegetated land if feasible.

NS-6 Illicit Connection/Illegal Discharge Detection and Reporting

DR Horton and all on-site subcontractor staff will implement the illegal connection/illegal discharge report BMP during all phases of construction if anytime an illicit connection or discharge is discovered or illegally dumped material is found on the construction site.

NS-8 Vehicle and Equipment Cleaning

Several types of construction vehicles will be on site during construction. All vehicles will be monitored and inspected frequently to prevent any fuel or oil leaks and to assess the overall condition of equipment. Vehicle and equipment cleaning will be avoided to the maximum extent feasible.

If onsite vehicle and equipment cleaning will only occur if unavoidable, these actions will be conducted in a temporary washing station within any of the project limits away from any storm drain inlets or other sensitive areas. The washing station will be properly contained (e.g., dirt berms) to prevent any offsite runoff. Vehicles will be washed in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

NS-9/NS-10 Vehicle and Equipment Fueling and Maintenance

If fueling or maintenance is to be conducted on site, a dedicated fueling, maintenance and vehicle storage area will be protected with berms and/or dikes to prevent run-on, runoff, and to contain spills.

Main source of fueling will be mobile fuel trucks.

- The fuel trucks will be used for on site fueling and all trucks will use drip pans and or have spill cleanup materials available during mobile fueling. Drip pans or absorbent pads will be used for vehicle and equipment maintenance activities that involve grease, oil, solvents, or other vehicle fluids. A worker education program will include information on proper fueling procedures.

Vehicles and equipment will be inspected daily and before coming on site for signs of leaks and

be on a regular maintenance schedule. Maintenance of construction equipment and machinery will occur offsite, unless unavoidable.

- If on-site maintenance is required at the project site, all activities will be conducted within the project's temporary storage-laydown yard. Equipment maintenance areas will be protected from storm water run-on and runoff and will be located at least 50 feet away from storm drain facilities and watercourses on level ground. Drip pans or absorbent pads will 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. A worker education program will include information on proper vehicle and equipment maintenance procedures.

NS-12/NS13 Concrete Curing & Finishing

All concrete pouring and finishing activities will be monitored and excess material will be disposed of at designated locations. Perimeter control measures will be installed to allow concrete ample time to cure.

- Any residue from concrete finishing work shall be removed and swept from paved areas.
- Nearby storm drain inlets will be protected prior to the application of any concrete additives and excess cure water will be disposed of appropriately. All cure water will be directed away from storm drains and gutters to temporary collection areas for proper removal.
- Designated washout pits appropriately built and lined will be used on-site or all concrete trucks will self washout and remove waste water from the project site for proper disposal.
- No waste water will be washed onto the pervious or impervious surfaces per the General Permit requirements.

3.3.2 Waste Management: Materials Storage and Materials Use

The following sources also may be present in varying quantities at the project during construction activities. Table 1 in **Appendix H** shows a list of potential pollutants. All materials

will be stored within the construction area and/or designated storage areas. Typical control measures that will be implemented at the construction sites for controlling the potential sources of pollution are discussed below, as well as in the CASQA BMP Fact Sheets located in **Appendix M**.

Material Delivery, Storage and Use:

WM-1 Material Delivery and Storage

Material delivery and storage BMP will be implemented during all phases of construction to prevent and minimize the discharges of construction materials during delivery and storage. The general material storage and laydown area will be located in the designated areas to be filed determined. These areas are recommended to be protected with appropriate sediment control BMPs at the limits and the storage area will be kept clean, well organized and equipped with cleanup supplies appropriate for the materials being stored. Full enclosed metal bins will be used to store the majority of materials. Fuel, petroleum, waste oil drums and/or equivalents if present at the site, will be stored on secondary containment pallets with a capacity of 10 percent or greater than the amount of stored material.

WM-2 Material Use

When materials are used that could potentially be exposed to rain and discharge into existing drainage conveyances, proper procedures will be utilized to minimize or eliminate exposure of these materials. This applies to potential construction related pollutants, such as limes, acids, concrete products, fertilizers, pesticides, herbicides and other related hazardous chemicals.

WM-3 Stockpile Management

Stockpile Management will be implemented within the designated areas of the site, as well as within the active areas. All active and inactive stockpiles will be monitored and watered appropriately to prevent dust. In addition, plastic covers, tarps or other erosion control BMPs will be used to cover material and dirt stockpiles prior to un-seasonal or seasonal rain events. It is recommended that soil stockpiles not exceed 500 cubic yards each, with a total volume of less than 2,000 cubic yards, and should not be greater than 10 feet in height.

WM-4 Spill Prevention and Control

Spill Prevention and Control shall be implemented to contain and clean-up spills and prevent material discharges to the storm drain system. All leaks or spills will be cleaned and disposed of immediately. Appropriate equipment and materials (Spill Kits) will be stored on-site in order to immediately address any spill or leak that may occur during construction. On-site personnel will be trained in spill prevention/clean up to implement appropriate correction actions when there is a spill or leak by the site QSP and or trained staff.

Spills and Leaks:

All leaks or spills will be cleaned and disposed of immediately. No leaks will be washed into the storm drain. Per the General Permit the following BMPs and actions will be taken if a spill or leak occurs on-site due to construction.

1. Appropriate equipment and materials will be stored on-site in order to immediately address any spill or leak that may occur during construction.
2. On-site personnel will be trained in spill prevention/clean up and will be assigned to implement appropriate correction actions when there is a spill or leak.
 - a. DR Horton will implement their Emergency Response Plan and Notify the City of Manteca in the event that a spill has occurred.

***For any hazardous spills that enter storm water drainage ways or sensitive areas the Fire Department will be notified immediately. For significant or hazardous spills that cannot be completely controlled by on-site personnel the procedure will be as follows:

1. Notify the local emergency response agency by dialing 911. Also, notify the Regional Board and other appropriate state and local officials.
2. The Governor's **Office of Emergency Services** Warning Center will be notified at (800) 852-7550. **Central Valley Regional Water Quality Control Board** (Region 5), Sacramento office at (916) 464-3291. **City of Manteca Public Works** at (209) 456-8400.

3. Notification will be first made by telephone and followed with a written report within seven working days or sooner.
4. A spill cleanup contractor will be contacted immediately to address the spill.
5. The Emergency telephone number of the project manager will be posted at the construction office for notification in case of a spill.

***No Toxic Materials spills are anticipated to be encountered during construction, however if Toxic Materials are encountered during construction the City and County will be contacted immediately and activities will be shut down until the materials are removed.**

WM-5 Solid Waste Management

Solid Waste Management shall be implemented to minimize storm water contact with waste materials and prevent waste discharges. Where feasible, solid wastes will be loaded directly onto trucks for offsite disposal, however when onsite storage is necessary, solid wastes shall be stored in watertight dumpsters. Solid waste, including rubble stockpiles, will be covered appropriately until material is removed and disposed offsite.

WM-6 & 7 Hazardous Waste and Contaminated Soil Management

None are anticipated at the project site. In the event that Hazardous Waste or Contaminated Soil is encountered that is not outlined in the existing project documents, DR Horton will ensure appropriate actions are taken to ensure that proper disposal actions are taken. Appropriate temporary controls will be deployed to contain material within the work area and prevent off-site discharges until disposal.

WM-9 Sanitary-Septic Waste Management

Portable toilets will be located and maintained designated locations within the main storage yard and within active areas away from equipment. The portable toilets will be stored on level surfaces and away from drainage ditches. Secondary containment will be provided beneath all portable toilets. All portable toilets will be inspected frequently for leaks and spills. Weekly maintenance will be provided by an approved subcontractor and all wastes will be disposed offsite.

WM-10 Liquid Waste Management

Liquid wastes generated as part of an operational procedure will be contained on-site and not allowed to flow into drainage channels, or other surface waters prior to treatment. Liquid wastes will be contained in a controlled area such as a holding pit or portable tank. All containment devices will be structurally sound, leak free and inspected frequently. Containment devices will be of sufficient quantity or volume to completely contain the liquid wastes generated.

3.4 Post-Construction Stormwater Management Measures

Per the General Permit Order No. 2009-0009-DWQ, all dischargers shall comply with the runoff reduction requirements unless they are located within city or county jurisdiction subject to post construction standards of an active Phase I or II municipal separate storm sewer system (MS4) permit (City of Manteca) that has an approved Storm Water Management Plan (SWMP). The Wildwood project is located in a city with an approved Storm Water Management Plan and the site will incorporate appropriate drainage designs to meet all State and Local requirements for Post Construction conditions. Furthermore, upon the completion of the project, the Wildwood project will meet the CGP 70% coverage requirement, as well as all local requirements.

Post Construction BMPs to be implemented at the site include the following:

- Post construction detention/retention basin

SECTION 4 BMP INSPECTION, MAINTENANCE AND RAIN EVEN ACTION PLAN

4.1 BMP Inspection and Maintenance

To maintain compliance with the General Permit, BMP Inspection and Maintenance (I & M) program has been established for the construction site. To ensure compliance, a designated ***Qualified SWPPP Practitioner (QSP)*** has been assigned to the project to oversee the installation of BMPs, maintenance of BMPs and to train site personnel to conduct the routine inspections and maintenance. The QSP listed below will train the site construction managers that will be in charge of routine inspections of the active/inactive disturbed construction areas, areas used for storage of hazardous or non-hazardous material, structural control BMPs, and points of vehicular ingress and egress.

Qualified SWPPP Practitioner (QSP):

Name: Pat Murphy
Company: Kaz & Associates, LLC
Certification(s): Qualified SWPPP Practitioner (QSP), Certified Erosion, Sediment and Stormwater Inspector (CESSWI)
Certification Number: QSP #00057, CESSWI #447

Other trained Kaz & Associates Staff to perform QSP Duties:

Name: Alex Kazemi
Contact: (707) 771-0242
Position: Field Inspector/QSP-IT

DR Horton Staff to be trained by QSP: To Be Determined

Name: Larry Coombs
Contact: (925) 580-7583
Title: Site Superintendent

A copy of the QSP Certification is located with all PRDs in **Appendix A**. The QSP will monitor

and inspect the project's construction activities and the installation of appropriate BMPs. In addition, the QSP will train the following DR Horton staff to conduct the routine site inspections and maintenance requirements.

4.2 Inspection Frequencies and Documentation

Risk Level 1 dischargers will ensure that all inspection, maintenance, repair and sampling activities at the project will be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee trained to do the task(s) appropriately, but shall ensure adequate deployment. The QSP or designated representative will monitor the weather daily using National Weather Service (<http://www.srh.noaa.gov/forecast>) reports to track conditions and alert crews to the onset of rainfall events. Within two business days (48 hours) prior to each qualifying rain event, all storm water drainage areas shall be inspected to identify any spills, leaks, or uncontrolled pollutant sources. If needed, appropriate corrective actions shall be implemented. Site inspections conducted for monitoring purposes Inspection frequencies for Risk Level 1 dischargers are the following (Outlined in Attachment C of General Permit):

- QSP or trained staff by QSP will perform inspections and observations throughout all phases of construction at the following frequencies during daylight business hours.
 - Weekly
 - 48 hours prior to a predicted rain event of 50% or more
 - Daily during rain events
 - 48 hours after a Qualifying Rain Event of 0.50 inches or more
 - Quarterly Non-Storm Water Discharge Monitor for areas that will store construction materials.

All BMPs shall be inspected to identify whether they have been properly implemented in accordance with the SWPPP. Upon identifying failures or other shortcomings, as directed by the QSP, repairs or design changes to BMPs will begin within 72 hours of identification and completed as soon as possible. As indicated in this SWPPP, all amendments will be prepared

by the QSD if warranted by the problem encountered and corrective action required. All corrective measures will be implemented during day light hours and safe working conditions.

For each inspection conducted, dischargers shall complete a written or electronic inspection form using the form located in **Appendix G** or another equivalent inspection form. The inspection document will include the following information.

1. Inspection date and date the inspection report was written.
2. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.
3. Site information, including stage of construction, activities completed, and approximate area of the site exposed. A description of any BMPs evaluated and any deficiencies noted.
4. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.
5. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.
6. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.
7. Photographs taken during the inspection, if any.
8. Inspector's name, title, and signature.

All inspection reports will be stored in the construction trailer. These inspection reports will either be placed in the SWPPP binder or another binder labeled for SWPPP site inspections or inspections will be saved in an electronic folder within the on-site computer. Electronic copies of completed inspections by contracted third party inspectors (QSP) will also be saved in an

appropriate data file of the on-site computer and/or be printed and placed with all other inspection reports. Further detail in regard to Site Monitoring and Inspection is located in the **Construction Site Monitoring Program** in **Appendix F**

4.2.1 Water Quality Sampling and Analysis

Per the General Permit requirements, Risk Level 1 sites are NOT required to comply with the **Numeric Action Levels (NAL)** for **Turbidity and pH**. For more detail in regard to Sampling and Analysis conditions reference the Construction Site Monitoring Program in **Appendix F**, including Non Visible Pollutant Sampling conditions.

4.3 Rain Event Action Plans (REAP)

Per the General Permit, a REAP is not required for Risk Level 1 sites, however a simple REAP has been described below. REAPs are designed to ensure site compliance by the implementation or maintenance of the appropriate BMPs prior to anticipated rain events that are 50% or greater per the National Oceanic and Atmospheric Administration (NOAA) weather service (www.noaa.gov/). All weekly weather reports will be from the NOAA weather service listed above. In general, a simple REAP includes the following activities that will be conducted prior to each rain event regardless of the site Risk Classification.

Simple Rain Event Action Plan (REAP) for Risk Level 1 sites:

At a minimum, 24 to 48 hours before a predicted storm event, defined as a forecasted 50% chance of rain by the NOAA, the REAP or Pre Storm Inspection implemented to assure the site is effectively protected from potential pollutants that may discharge into the storm drains.

The Plan consists of two key elements: ***Inspection and Maintenance***

Inspection: During the rainy season, appointed personnel will inspect the project site 24 to 48 hours before a predicted storm event. The inspector will use the form located in **Appendix G** or an equivalent inspection form.

Maintenance: Any necessary maintenance and repairs of existing erosion control, sediment control and pollutant abatement measures discovered during the inspection will be carried

out during day light and safe working conditions.

The following actions will be taken:

- Installed erosion and sediment control BMPs will be assessed and damaged measures replaced. Exposed soil areas on active and inactive areas will be covered with temporary measures to prevent exposure to rain.
- Material and dirt stockpiles will be covered with plastic liner and/or stored under cover in designated locations.
- Paved areas will be swept to abate any track out of dirt and minimize sediment laden runoff.
- Any debris or dirt will be removed from storm drain inlets. BMPs will be assessed and damaged BMPs replaced.
- All washout pits will be emptied and/or covered to prevent exposure and potential discharge.
- All storage areas will be assessed to ensure that there are no spills, leaks and that all materials that could potentially contaminate runoff are stored appropriately and securely to prevent exposure.
- Additional BMPs will be deployed and implemented as needed.
- All inspections and repairs will be performed during daylight hours, each 24-hour period, assuming it is safe to do so.
- Report to the Regional Water Board and the local authorities' in the event of any significant BMP failure or discharge, followed by a corrective action report within 14 calendar days.

*For more detail regarding construction site monitoring and sampling protocols, refer to the site specific **Construction Site Monitoring Program (CSMP)** located in **Appendix F**.

SECTION 5.0 CONSTRUCTION SITE TRAINING

Per the General Permit (Section VII) all elements of the SWPPP will be developed by the Qualified SWPPP Developer (QSD) and will be implemented by a Qualified SWPPP Practitioner (QSP). The QSP may delegate tasks to trained employees provided adequate supervision and oversight is provided.

The QSP will train site personnel pertaining to individual roles and responsibilities on the project. The appropriate personnel will receive training on SWPPP implementation, BMP inspection and maintenance, sampling protocols and record keeping. A record of all training activities (formal and informal) will be retained in the SWPPP in **Appendix I**. This training record will also be submitted as part of the site Annual Report. Certification of the QSD and QSP will also be located with the PRDs in **Appendix A**.

SECTION 6 RESPONSIBLE PARTIES AND OPERATORS

6.1 Responsible Parties

The General Permit requires (Section VII.B.4) that the name of any “Approved Signatory” be listed in the SWPPP, and a copy of the written agreement or other mechanism that provides this authority from the Legally Responsible Person (LRP) be provided in the SWPPP. The following personnel will responsible for SWPPP activities for the construction project by the LRP.

Legally Responsible Person or Authorized Signatory (DR Horton)

Name: Dennis Hudspeth Contact: (925) 575-4228

Vice President of Operations DR Horton:

Name: Tim Collity Contact: (925) 225- 7456

Vice President of Operations DR Horton:

Name: Daryl Bauman Contact: (209) 992-0396

Construction Superintendent DR Horton:

Name: Larry Coombs Contact: (925) 580-7583

Kaz & Associates, LLC:

Qualified SWPPP Developer (QSD):

Name: Sean Kazemi Title: Associate Principal/QSD
Contact: (707) 816-2894

Qualified SWPPP Practitioner (QSP):

Name: Pat Murphy Title: Associate Principal/QSP
Contact: (707) 747-1126

Name: Alex Kazemi Title: QSP-IT/Field Inspector
Contact: (707) 771-0242

*QSD/P certifications documents are located in **Appendix A.**

6.2 Contractor List

The General Permit requires (Section VII.B.5) that the SWPPP include a list of names of all contractors, subcontractors, and individuals who will be directed by the QSP. The Contractor List is located in **Appendix J**.

The list is required to include telephone numbers and work addresses and the specific areas of responsibility of each subcontractor and emergency contact numbers.

SECTION 7 REFERENCES

The following documents are made a part of this SWPPP by reference:

- State Water Resources Control Board (SWRCB) Order No. 2009-0009-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance
- Stormwater Multi-Application Reporting and Tracking System, SWRCB
- California Stormwater Quality Association, Stormwater Best Management Practice Handbook Portal: Construction, November 2009
- Caltrans Storm Water Quality Handbooks, July 2007
- California Regional Water Quality Control Board, San Francisco Region, Erosion and Sediment Control Field Manual, 2002
- Updated Geotechnical Investigation Report – Wildwood, Stevens, Ferrone & Bailey Engineering Company, Inc., May 10, 2013
- Mitigation Monitoring and Reporting Program for the Oleander, Sundance, and Sundance 2 Development Projects, EDAW, January 2007

SECTION 8**LIST OF APPENDICES**

APPENDIX A	HARD COPY OF PERMIT REGISTRATION DOCUMENTS (PRDs) – NOI, RISK DETERMINATION, QSD/P CERTIFICATIONS
APPENDIX B	SITE VICINITY MAP
APPENDIX C	EROSION AND SEDIMENT CONTROL MAPS WITH RECOMMENDED BMPS
APPENDIX D	SWPPP AMENDMENT LOG
APPENDIX E	HARD COPY OF ATTACHMENT C – RISK LEVEL REQUIREMENTS
APPENDIX F	CONSTRUCTION SITE MONITORING PROGRAM (CSMP)
APPENDIX G	STORM WATER INSPECTION REPORT FORM
APPENDIX H	POTENTIAL POLLUTANT SOURCE LIST
APPENDIX I	TRAINING CERTIFICATION DOCUMENTATION
APPENDIX J	LIST OF SUB-CONTRACTORS
APPENDIX K	CONSTRUCTION SCHEDULE
APPENDIX L	INTENTIONALLY LEFT BLANK
APPENDIX M	CASQA BMP HANDBOOK FACT SHEETS

	A	B	C
1	Sediment Risk Factor Worksheet		Entry
2	A) R Factor		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	R Factor Value		45.32
6	B) K Factor (weighted average, by area, for all site soils)		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	K Factor Value		0.28
10	C) LS Factor (weighted average, by area, for all slopes)		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	LS Factor Value		0.19
14			
15	Watershed Erosion Estimate (=R_xK_xLS) in tons/acre		2.411024
16	Site Sediment Risk Factor		Low
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	yes/no	
A.1. Does the disturbed area discharge (either directly or indirectly) to a 303(d)-listed waterbody impaired by sediment? For help with impaired waterbodies please check the attached worksheet or visit the link below: 2006 Approved Sediment-impaired WBs Worksheet http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_ists2006_epa.shtml	No	Low
<u>OR</u>		
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp		

Combined Risk Level Matrix				
		<u>Sediment Risk</u>		
		Low	Medium	High
<u>Receiving Water Risk</u>	Low	Level 1	Level 2	
	High	Level 2		Level 3

Project Sediment Risk: Low

Project RW Risk: Low

Project Combined Risk: Level 1

Risk Determination – R Factor Manual Calculation Document
For
DR Horton
Wildwood Construction Project
Manteca, CA

Reason: Project start date is July 24, 2013 and at the time of SWPPP preparation the EPA Erosivity Calculator was not available. Below is the note that was posted on the EPA Website:

EPA's online rainfall erosivity factor calculator is currently under construction. In the meantime, please use the [Construction Rainfall Erosivity Waiver Fact Sheet \(PDF\)](#) (13 pp, 1.81MB) to assist in determining the R Factor for a particular small construction site. [Appendix C \(PDF\)](#) (4 pp, 99K) of the 2012 CGP also provides information on small construction waivers.

Per the website's direction, as well as the State Water Board the R Factor for the project was calculated using the Construction Rainfall Erosivity Waiver Fact Sheet. The calculation is outlined below:

Manual Calculation Per the Fact Sheet

Steps 1-2: Estimated Construction Start and End Date

Project Start Date: July 24, 2013; nearest value is July 29 (50.7)

Project End Date: November 30, 2015; nearest value is November 26 (77.3)

Estimated Duration: ~28 Months

Step 3: Erosivity Index (EI) Zone based on Geographic Location

Project Location: Manteca, CA

Project Location within Figure 1: Erosivity Index Zone Map 23

Step 4: Erosivity Index (EI) Table

Erosivity Index (EI) Table based on project duration

1 year value is 100. Construction Schedule

$EI = 100 (\text{year 1}) + 100 (\text{year 2}) + (77.3 - 50.7) = 226.6$ or 226.6%

Step 5: Isoerodent Map for Project Location

Nearest Value for Project Location is 20.

Step 6: R Factor Calculation

Multiply percent value from Step 4 by the Isoerodent Map in Step 5

$$R = 20 \times 226.6\% = 20 \times 2.266 = 45.32$$

Project's R Factor = 45.32

RUSLE Equation for Project Risk Determination

$$A = 60.94 \times 0.28 \text{ (SMARTS K)} \times 0.19 \text{ (SMARTS LS)} = 2.411024 \text{ tons/acre/year}$$

Project's Sediment Risk = Low

Combined Risk Determination

Sediment Risk = Low

Receiving Water Risk = Low

Project Risk Level = Traditional Level 1

Combined Risk Level Matrix			
<u>Receiving Water Risk</u>		<u>Sediment Risk</u>	
		Low	Medium High
Low	Level 1	Level 2	
High	Level 2	Level 3	
Project Sediment Risk:		Low	
Project RW Risk:		Low	
Project Combined Risk:		Level 1	

CERTIFICATE OF TRAINING

CALIFORNIA CONSTRUCTION GENERAL PERMIT

QUALIFIED SWPPP DEVELOPER (QSD) AND QUALIFIED SWPPP PRACTITIONER (QSP)

Sean Kazemi

Apr 25, 2013 - Jul 22, 2015

Certificate # 01036



**California Stormwater Quality Association and
California Construction General Permit Training Team**

CERTIFICATE OF TRAINING
CALIFORNIA CONSTRUCTION GENERAL PERMIT

QUALIFIED SWPPP
PRACTITIONER (QSP)

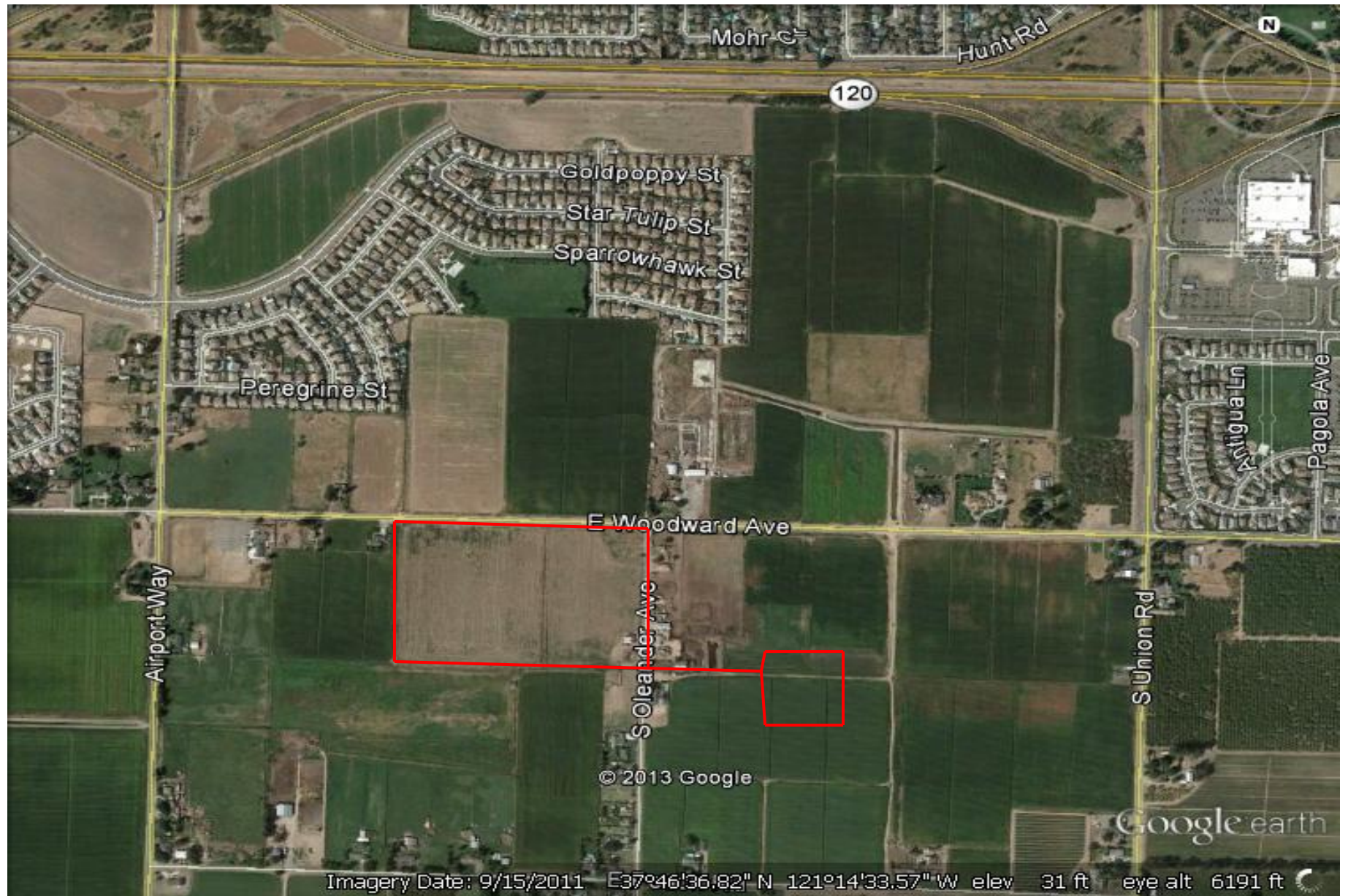
Pat Murphy

Jan 17, 2013 - Mar 29, 2015

Certificate # 00057



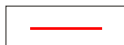
California Stormwater Quality Association and
California Construction General Permit Training Team



LEGEND



SUBJECT PROPERTY LINE



Wildwood Project

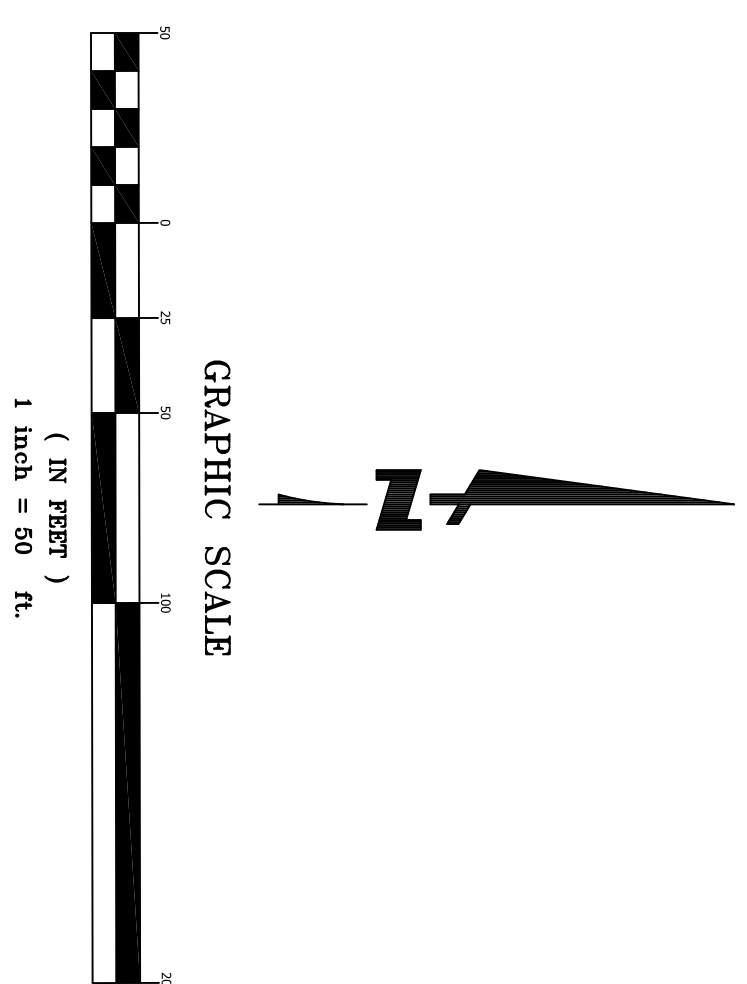
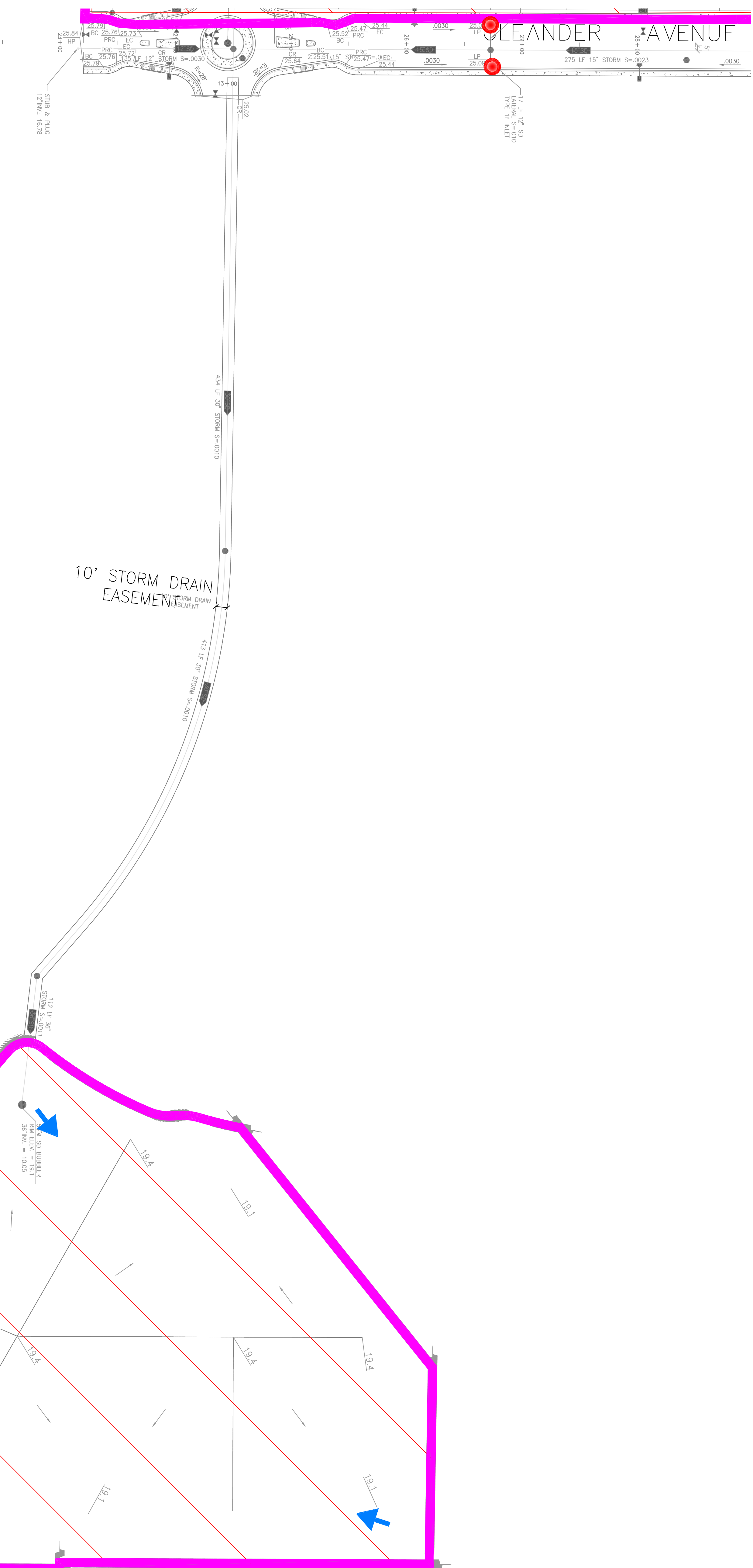
City of Manteca,
San Joaquin County, CA

VICINITY
SITE MAP

KAZ ASSOCIATES
ENVIRONMENTAL SERVICES

LEGEND

- | | | | | |
|---|---|---|---|---|
|  |  |  |  |  |
| APPROXIMATE LOCATION OF PROPOSED STORM DRAIN INLET - TO BE PROTECTED ONCE INSTALLED | RUN-OFF FLOW DIRECTION | STABILIZED CONSTRUCTION DRIVEWAYS | SEDIMENT CONTROL PERIMETER BMP (SILT FENCE OR FIBER ROLL) | ACTIVE GRADING AND LAND DEVELOPMENT AREA |



WDID #:
RISK LEVEL 1 PROJECT

[illegible]

- NOTES:

- 1) THE PROJECT IS A RISK EVENTITE AND ALL ACTIVITIES WILL COMPLY WITH ATTACHMENT C OF THE CONSTRUCTION GENERAL PERMIT (CGP) AND ALL OTHER LOCAL MUNICIPAL REQUIREMENTS.
- 2) DURING GRADING ACTIVITIES, STABILIZED ENTRANCE/EXITS WILL BE INSTALLED AT SPECIFIC LOCATIONS FOR AREAS OF INGRESS/EGRESS. ENTRANCE/EXITS WILL BE STABILIZED WITH A COMBINATION OF ROCK AGGREGATE (5-6" MINUS) UNDERLINED WITH GEOTEXTILE FABRIC OR EQUIVALENT BMP TO MINIMIZE POTENTIAL TRACK OUT OF DIRT.
- 3) ALL PAVED AREAS SHOULD BE SWEEPED DAILY AND AS NEEDED, TO REMOVE ANY TRACKOUT.
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- 6) ALL EXISTING STORM DRAIN INLETS ON CITY STREETS SHALL BE PROTECTED WITH APPROPRIATE SEDIMENT CONTROL MEASURES PRIOR TO CONSTRUCTION COMMENCING.
- 7) STORM DRAIN INLETS HAVE BEEN INSTALLED ON SITE. EROSION APPROPRIATE BMPS ARE IMPLEMENTED AND MAINTENANCE CONDUCTED.
- 8) INACTIVE DIRT AND MATERIAL STOCKPILES WILL BE COVERED PRIOR TO RAIN AND OR WATERED APPROPRIATELY TO ABATE DUST DURING WINDY CONDITIONS.
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- 12) INSPECT THE SITE REGULARLY (I.E. WEEKLY) WHEN NO RAIN, PRE & POST RAIN EVENTS TO ASSESS SITE CONDITIONS AND THE EFFECTIVENESS OF THE INSTALLED BMPS. DOCUMENT ALL OBSERVATIONS AND ANY CORRECTIVE MEASURES IMPLEMENTED. KEEP ALL DOCUMENTATION IN A DESIGNATED AREA IN CONSTRUCTION OFFICE.
- 13) TRAIN ALL CONTRACTORS ON GOOD HOUSEKEEPING AND POLLUTION PREVENTION PRACTICES.
- 14) ALL BMPS SHOWN ON THE MAP ARE APPROXIMATE LOCATIONS, AND MODIFICATIONS TO EXACT LOCATIONS WILL BE BASED ON CONSTRUCTION ACTIVITIES, DISTURBED AREAS, AND THE SITE CSP'S PROFESSIONAL JUDGEMENT.

21+00

22+00

OLEANDER AVENUE

DR HORTON

5050 HOPYARD ROAD, SUITE 180

ASANTON, CA 94588

PREPARED FOR:

DESCRIPT

PREPARED BY

KAZ ASSOCIATES
ENVIRONMENTAL SERVICES

538 STONE ROAD SUITE I BENICIA CA, 94510
PHONE: (707) 747-1126 FAX: (925) 871-5172

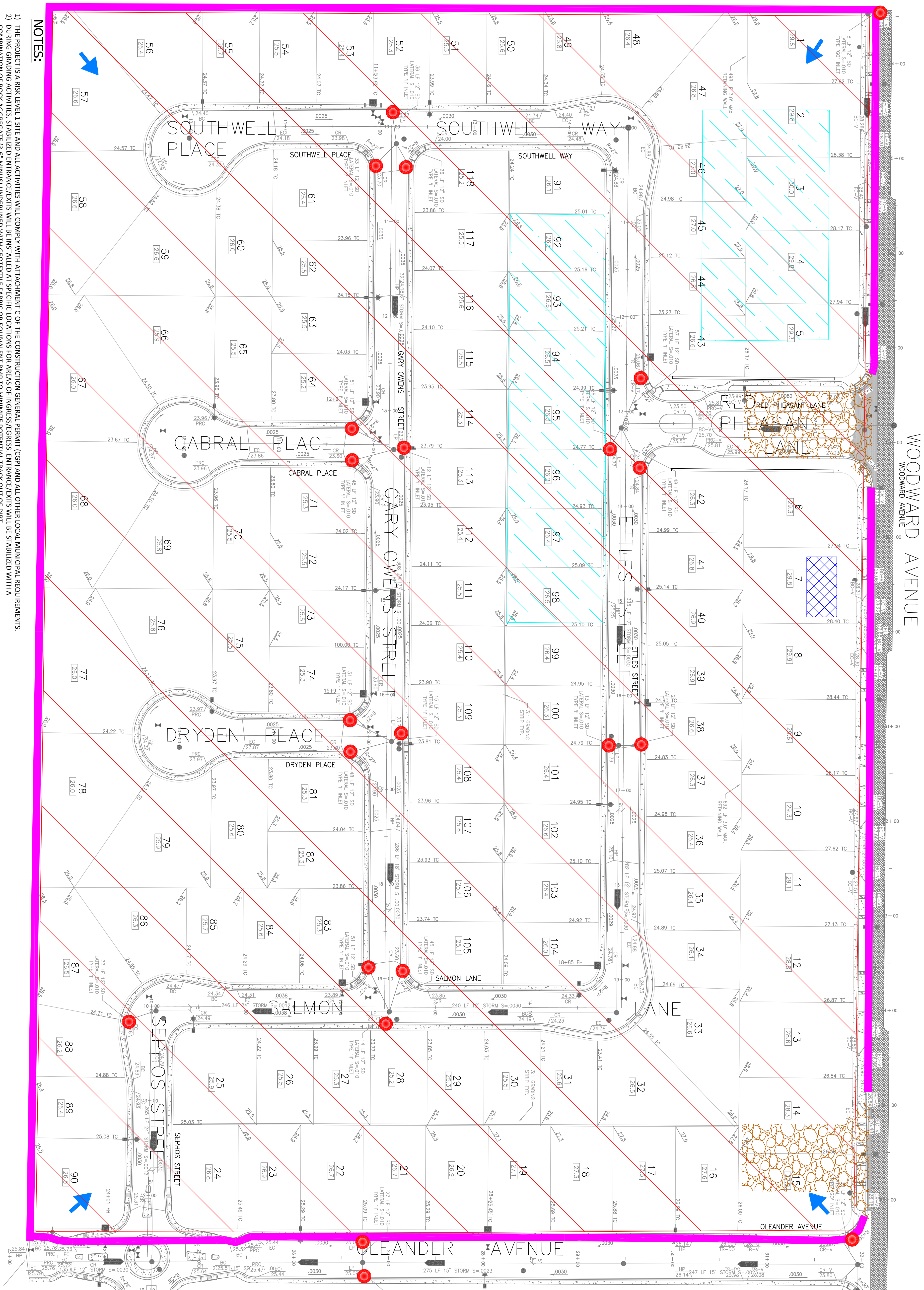
WILDWOOD

MANTECA, CALIFORNIA

EROSION AND SEDIMENT CONTROL PLAN

JULY 2013

SHEET 3 OF 3



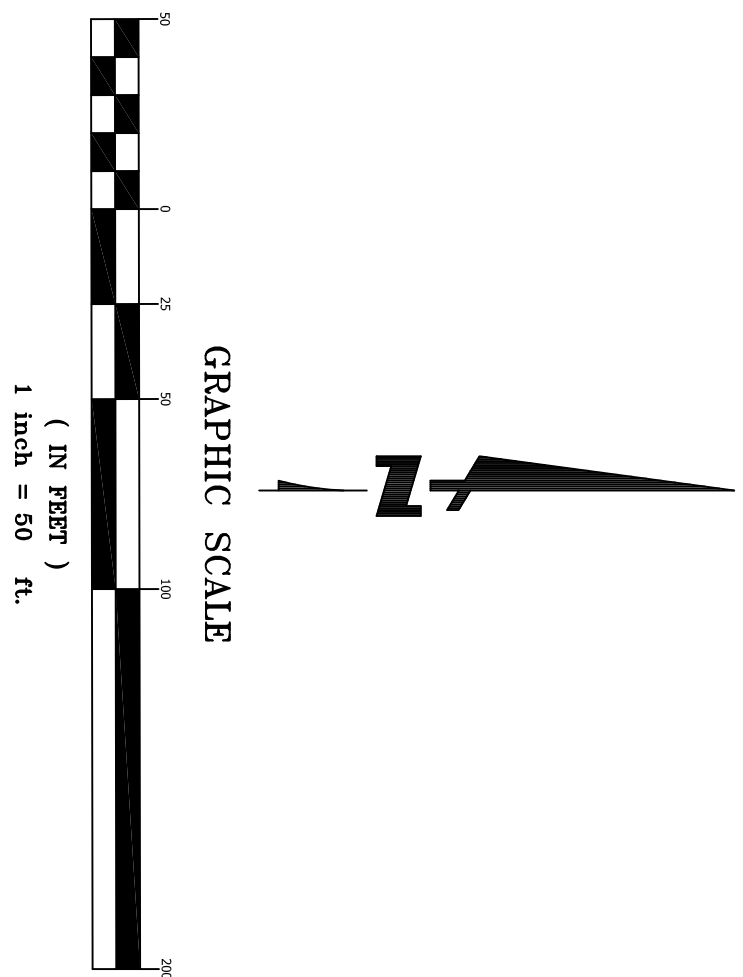
- NOTES:**

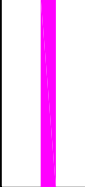
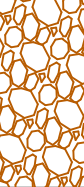
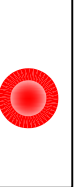
- 1) THE PROJECT IS A RISK-LEVEL-5 SITE AND ALL ACTIVITIES WILL COMPLY WITH ATTACHMENT C-5 OF THE CONSTRUCTION GENERAL PERMIT (CGP) AND ALL OTHER LOCAL MUNICIPAL REQUIREMENTS.
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REV	DESCRIPTION	DWN/CND	APPROVED	DATE			

BMP INSTALLATION LOG		
AREA	DESCRIPTION OF BMP'S	DATE COMPLETED

WDID #: _____
RISK LEVEL 1 PROJECT



- | | |
|---|---|
| ACTIVE GRADING AND LAND DEVELOPMENT AREA |  |
| SEDIMENT CONTROL PERIMETER BMP (SILT FENCE OR FIBER ROLL) |  |
| STABILIZED CONSTRUCTION DRIVEWAYS |  |
| RUN-OFF FLOW DIRECTION |  |
| APPROXIMATE LOCATION OF PROPOSED STORM DRAIN INLET - TO BE PROTECTED ONCE INSTALLED |  |
| |  |
| |  |

LEGEND

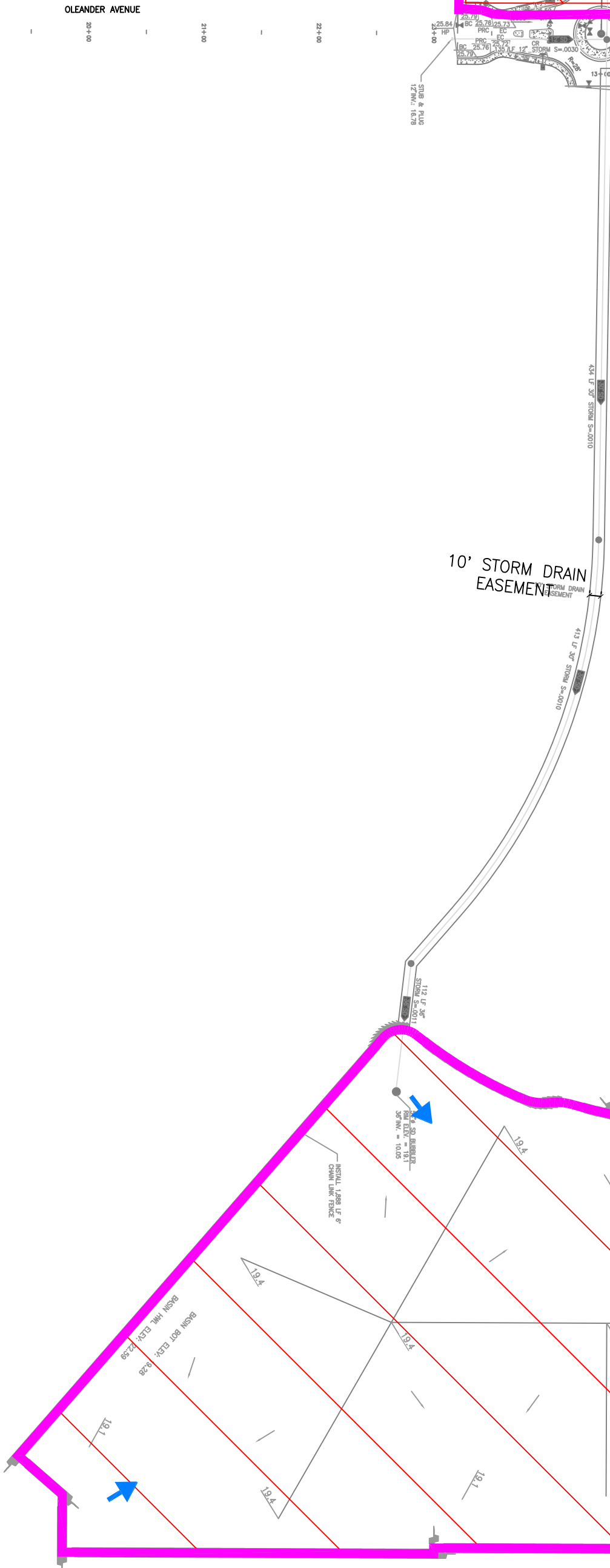
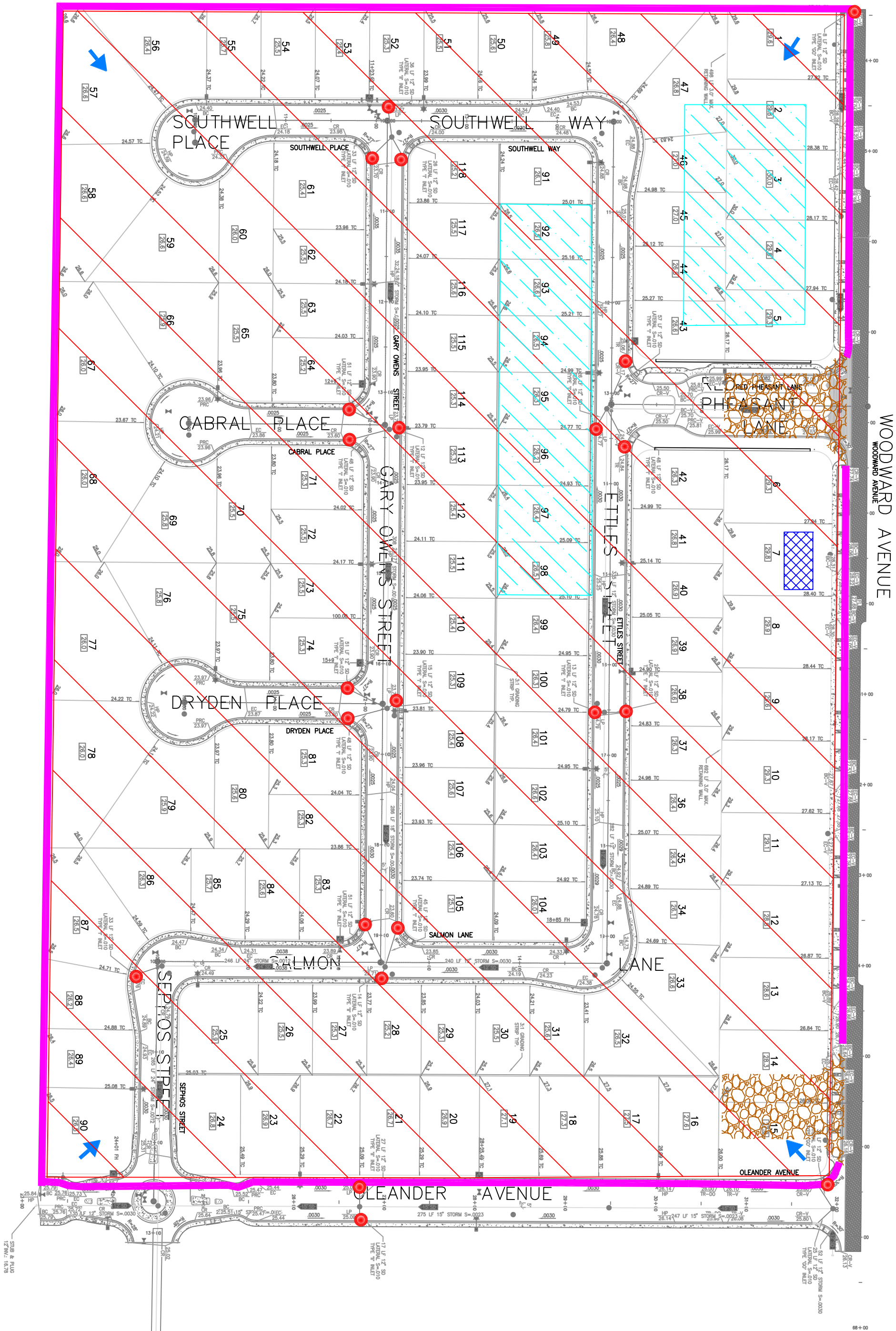
ACTIVE GRADING AND LAND DEVELOPMENT AREA

SEDIMENT CONTROL PERIMETER BMP (SILT FENCE OR FIBER ROLL)

STABILIZED CONSTRUCTION DRIVEWAYS

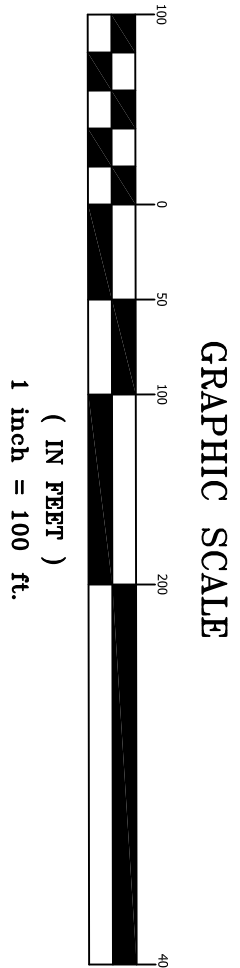
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RUN-OFF FLOW DIRECTION

APPROXIMATE LOCATION OF PROPOSED STORM DRAIN INLET - TO BE PROTECTED ONCE INSTALLED



LEGEND

- ACTIVE GRADING AND LAND DEVELOPMENT AREA
- SEDIMENT CONTROL PERIMETER BMP (SILT FENCE OR FIBER ROLL)
- STABILIZED CONSTRUCTION DRIVEWAYS
- RUN-OFF FLOW DIRECTION
- APPROXIMATE LOCATION OF PROPOSED STORM DRAIN INLET - TO BE PROTECTED ONCE INSTALLED
- POTENTIAL EQUIPMENT STORAGE & MATERIAL LAYDOWN AREA
- APPROXIMATE LOCATION OF WATER TOWER/TANK



NOTES:

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WDID #:
RISK LEVEL 1 PROJECT

BMP INSTALLATION LOG

AREA	DESCRIPTION OF BMP'S	DATE COMPLETED

REV	DESCRIPTION	DWG/CD	APPROVED	DATE
-----	-------------	--------	----------	------

PREPARED FOR:
DR HORTON
5050 HOPKIN ROAD, SUITE 180
PLEASANTON, CA 94558
(925) 225-7400

PREPARED BY:
KAZ ASSOCIATES
ENVIRONMENTAL SERVICES
538 STONE ROAD SUITE 1 BENICIA CA, 94510
PHONE: (707) 747-1126 FAX: (925) 871-5172

WILDWOOD
MANTECA, CALIFORNIA
EROSION AND SEDIMENT CONTROL PLAN OVERVIEW
JULY 2013
SHEET 1 OF 3

This SWPPP shall be amended:

- Whenever there is a change in construction or operations which may affect the discharge of pollutants to surface waters, groundwater(s), or a municipal separate storm sewer system (MS4); or
- If any condition of the Permit is violated or the general objective of the SWPPP reducing or eliminating pollutants in storm water discharges has not been achieved.
- If the RWQCB determines that a Permit violation has occurred, the SWPPP shall be amended and implemented within 14 calendar days after notification by the RWQCB;
- As deemed necessary by the QSD or QSP
- As needed to meet the site needs and to reduce the potential of sediment or other pollutant discharges.

**RECORD OF SWPPP AMENDMENTS
FOR
WILDWOOD CONSTRUCTION PROJECT
WDID #: _____**

No.	Date	Description	Amended by
01			
02			
03			
04			
05			
06			
07			
08			
09			
10			

*All SWPPP amendments must be completed by a QSD per General Construction Permit Order No. 2009-0009-DWQ requirements (Section XIV.A).

QSD SWPPP AMENDMENT CERTIFICATION

Amendment Number: _____

Project Name: WILDWOOD CONSTRUCTION PROJECT

Date: _____

Brief description of SWPPP Amendment:

--

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure 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."

QSD Signature: _____

QSD Name: _____

Professional Registration: _____

ATTACHMENT C RISK LEVEL 1 REQUIREMENTS

A. Effluent Standards

[These requirements are the same as those in the General Permit order.]

1. Narrative – Risk Level 1 dischargers shall comply with the narrative effluent standards listed below:
 - a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.
 - b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.
2. Numeric – Risk Level 1 dischargers are not subject to a numeric effluent standard.

B. Good Site Management "Housekeeping"

1. Risk Level 1 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 1 dischargers shall implement the following good housekeeping measures:
 - a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).
 - b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

- c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).
 - d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).
 - e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.
2. Risk Level 1 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:
- a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.
 - b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.
 - c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.
 - d. Cover waste disposal containers at the end of every business day and during a rain event.
 - e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.
 - f. Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.
 - g. Implement procedures that effectively address hazardous and non-hazardous spills.
 - h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:
 - i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

- ii. Appropriate spill response personnel are assigned and trained.
 - i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.
3. Risk Level 1 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:
- a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.
 - b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.
 - c. Clean leaks immediately and disposing of leaked materials properly.
4. Risk Level 1 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:
- a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.
 - b. Contain fertilizers and other landscape materials when they are not actively being used.
 - c. Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.
 - d. Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.
 - e. Stack erodible landscape material on pallets and covering or storing such materials when not being used or applied.
5. Risk Level 1 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 1 dischargers shall do the following:

- a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.
 - b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.
 - c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.
 - d. Ensure retention of sampling, visual observation, and inspection records.
 - e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.
6. Risk Level 1 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

C. Non-Storm Water Management

1. Risk Level 1 dischargers shall implement measures to control all non-storm water discharges during construction.
2. Risk Level 1 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.
3. Risk Level 1 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

1. Risk Level 1 dischargers shall implement effective wind erosion control.
2. Risk Level 1 dischargers shall provide effective soil cover for inactive¹ areas and all finished slopes, open space, utility backfill, and completed lots.
3. Risk Level 1 dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. Risk Level 1 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.
2. On sites where sediment basins are to be used, Risk Level 1 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

F. Run-on and Runoff Controls

Risk Level 1 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

G. Inspection, Maintenance and Repair

1. Risk Level 1 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee trained to do the task(s) appropriately, but shall ensure adequate deployment.
2. Risk Level 1 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended

¹ Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.

storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 1 dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.
4. For each inspection required, Risk Level 1 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.
5. Risk Level 1 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:
 - a. Inspection date and date the inspection report was written.
 - b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.
 - c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.
 - d. A description of any BMPs evaluated and any deficiencies noted.
 - e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.
 - f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.
 - g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.
 - h. Photographs taken during the inspection, if any.
 - i. Inspector's name, title, and signature.

H. Rain Event Action Plan

Not required for Risk Level 1 dischargers.

I. Risk Level 1 Monitoring and Reporting Requirements

Table 1- Summary of Monitoring Requirements

Risk Level	Visual Inspections					Sample Collection	
	Quarterly Non-storm Water Discharge	Pre-storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water
		Baseline	REAP				
1	X	X		X	X		

1. Construction Site Monitoring Program Requirements

- a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.
- b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Programs to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Programs in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.
- c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. Objectives

The CSMP shall be developed and implemented to address the following objectives:

- a. To demonstrate that the site is in compliance with the Discharge Prohibitions;

- b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives;
- c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges; and
- d. To determine whether BMPs included in the SWPPP are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. Risk Level 1 - Visual Monitoring (Inspection) Requirements for Qualifying Rain Events

- a. Risk Level 1 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.
- b. Risk Level 1 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.
- c. Risk Level 1 dischargers shall conduct visual observations (inspections) during business hours only.
- d. Risk Level 1 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.
- e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 1 dischargers shall visually observe (inspect):
 - i. All storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.
 - ii. All BMPs to identify whether they have been properly implemented in accordance with the SWPPP. If needed, the discharger shall implement appropriate corrective actions.

- iii. Any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.
- f. For the visual observations (inspections) described in e.i and e.iii above, Risk Level 1 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.
- g. Within two business days (48 hours) after each qualifying rain event, Risk Level 1 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.
- h. Risk Level 1 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. Risk Level 1 – Visual Observation Exemptions

- a. Risk Level 1 dischargers shall be prepared to conduct visual observation (inspections) until the minimum requirements of Section I.3 above are completed. Risk Level 1 dischargers are not required to conduct visual observation (inspections) under the following conditions:
 - i. During dangerous weather conditions such as flooding and electrical storms.
 - ii. Outside of scheduled site business hours.
- b. If no required visual observations (inspections) are collected due to these exceptions, Risk Level 1 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the visual observations (inspections) were not conducted.

5. Risk Level 1 – Monitoring Methods

Risk Level 1 dischargers shall include a description of the visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures in the CSMP.

6. Risk Level 1 – Non-Storm Water Discharge Monitoring Requirements

a. Visual Monitoring Requirements:

- i. Risk Level 1 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.
- ii. Risk Level 1 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).
- iii. Risk Level 1 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 1 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

7. Risk Level 1 – Non-Visible Pollutant Monitoring Requirements

- a. Risk Level 1 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.
- b. Risk Level 1 dischargers shall ensure that water samples are large enough to characterize the site conditions.
- c. Risk Level 1 dischargers shall collect samples at all discharge locations that can be safely accessed.
- d. Risk Level 1 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.
- e. Risk Level 1 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the

presence of pollutants identified in the pollutant source assessment required (Risk Level 1 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

- f. Risk Level 1 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.
- g. Risk Level 1 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.²
- h. Risk Level 1 dischargers shall keep all field /or analytical data in the SWPPP document.

8. Risk Level 1 – Particle Size Analysis for Project Risk Justification

Risk Level 1 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

9. Risk Level 1 – Records

Risk Level 1 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 1 dischargers shall retain all records on-site while construction is ongoing. These records include:

- a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.
- b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.
- c. The date and approximate time of analyses.
- d. The individual(s) who performed the analyses.

² 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.

- e. A summary of all analytical results from the last three years, the method detection limits and reporting units, and the analytical techniques or methods used.
- f. Rain gauge readings from site inspections.
- g. Quality assurance/quality control records and results.
- h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.6 above).
- i. Visual observation and sample collection exception records (see Section I.4 above).
- j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

Construction General NPDES Permit

ORDER NO. 2009-0009-DWQ

The complete document can be found at:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/wgo_2009_0009_complete.pdf

Construction Site Monitoring Program (CSMP)

For

WILDWOOD CONSTRUCTION PROJECT

WDID #:

1.0 GENERAL REQUIREMENTS FOR RISK LEVEL 1 PROJECTS

The General Construction NPDES Permit Order No. 2009-009-DWQ, (Attachments C, D, E; Section I.1.a) requires that a written site specific Construction Site Monitoring Program (CSMP) be developed by each discharger prior to the commencement of construction activities, and or revise the existing monitoring program to meet the new General Permit requirements.

Risk Level 1 dischargers shall comply with the effluent standards listed below:

- Risk Level 1 dischargers are not subject to a numeric effluent standard.
- Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.
- Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants. Below is the chart of when inspections are required to be conducted.

Purpose

The Construction Site Monitoring Program (CSMP) was developed to address the following objectives:

- To demonstrate that the site is in compliance with the Discharge Prohibitions.
- To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives
- To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges;

- To determine whether BMPs included in the SWPPP are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

The following information describes the Project's Construction Site Monitoring Program (CSMP).

2.0 VISUAL OBSERVATIONS AND INSPECTIONS

Under the guidance of the project's Qualified SWPPP Practitioner (QSP) and or trained site personnel by the QSP, Risk Level 1 dischargers shall visually inspect their project site drainage areas (Active, Inactive, and Storage Areas) for the presence of potential pollutants in storm water and non-storm water (authorized or unauthorized) discharges.

The frequencies of which the Discharger shall perform the visual inspections are the following:

- Weekly – Year Around
- Pre Storm – 48 hours prior to a predicted rain event of 50% or greater
- Post Storm – Within 48 hours of a Qualify Rain Event* (QRE) of 0.50 inches or more
- Extended Rain Events – Once each 24 hour period during extended rain events
- Quarterly Non Storm Water Inspection as described in section 2.2

All Visual inspections will be conducted during business operation hours. Each inspection will evaluate the site construction activities, condition of all drainage areas, conditions of implemented BMP, observe runoff and/or non-storm water discharges for the presence of potential pollutants, such as floating and suspended material, sheen, discoloration, turbidity, and odor. Visual Inspections are also required within two business days (48 hours) after each qualifying rain event.

****Qualifying Rain Event:*** Any event that produces 0.5 inches or more precipitation without a 48 hour or greater period between rain events.

All Visual Observations/Inspections will be documented using an appropriate SWPPP checklist or inspection form. All inspections will document the following information:

- Dates and approximate time each drainage area was observed
- Person conducting inspection

- Summary of the status of construction activities
- Conditions of installed BMPs and locations of potential failures/breaches
- Locations of non-storm water pollution sources and their conditions
- Are the installed BMPs effective in minimizing potential pollutant discharge as described in the SWPPP and if the SWPPP needs to be amended.
- Any corrective actions taken to repair failed BMPs or eliminate potential pollutant discharges and unauthorized non-storm water discharges.

2.1 Rain Event Action Plans (REAPs)

REAPs are not required for Risk Level 1 projects per the General Permit guidelines. In General, the following procedure will be conducted before rain:

Within 2 business days (48 hours) prior to a forecasted rain event of 50% chance or greater, the site QSP or designated representative will conduct a pre storm inspection to assess the site conditions and implement appropriate corrective actions to minimize potential pollutant discharges from the construction area.

2.2 Quarterly Non Storm Water Inspection

In addition to the inspections described above, Risk Level 1 dischargers shall conduct one visual inspection quarterly for each of the following periods to assess the areas where construction materials are stored where potential spills/leaks may have occurred and non-storm water discharges may have occurred.

- January-March,
- April-June,
- July-September,
- October-December

A summary of when visual inspections are required to be conducted is shown in the table below.

Weekly	Pre Storm	Post Storm	Extended Rain Events	Quarterly Non-Storm Water Discharge
X	X	X	X	X

2.3 Monitoring Locations

See Project Site Map(s) for the monitoring locations described below.

- Active Areas
- Inactive Areas
- All storm drain inlets, drainage ditches or conveyance systems and outfall locations
- Areas that receive Run-on from adjacent properties
- Material Storage Yards and other areas where construction materials are stored
- Potential Control and Sample locations

2.4 Visual Observation Exceptions for Risk Level 1 Sites

General Permit outlines exceptions for visual inspections under the following circumstances:

1. During severe and abnormal weather conditions such as flooding and electrical storms
2. Outside of scheduled site business hours

If visual inspections are not conducted due to the above circumstances, the dischargers will include an explanation in their SWPPP and in the Annual Report documenting why the visual inspections were not conducted.

3.0 WATER QUALITY SAMPLING AND ANALYSIS

Per the General Permit requirements, all sites are required to routinely monitor runoff for pollutants, as well as non-visible pollutants. All sampling and sample preservation will be in accordance with the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association).

3.1 Non-Visible Pollutant Monitoring Requirements

In the event of a BMP failure, breach, spill or it is observed that runoff may be contaminated by non visible pollutants the runoff should be sampled. Furthermore, a control sample must be taken from an area unaffected by the failure, breach, or spill to serve as the basis for comparison. Samples will be taken during the first two hours of discharge when the discharge occurs in daylight business hours. For laboratory analysis, all sampling, sample preservation, and analysis will be conducted according to test procedures per 40 CFR Part 136 and/or in accordance with Method 1060 of Standard Methods for the Examination of Water and Waste Water 20th Edition.

Field samples will consist of grab samples with appropriate sampling devices obtained from a local certified laboratory, such as clean sample bottles. Appropriate Chain of Custody forms will be used and the records will be kept with the SWPPP. All field/portable meters will be calibrated according to manufacturer specifications prior to sampling.

The QSP and or staff assigned to sampling will be trained to collect samples both for field and laboratory analysis, and to perform field tests. Contractors that perform sampling will be certified for laboratory and field tests. Appropriate actions will be taken to ensure Quality Assurance/Quality Control for all samples taken and that the necessary materials are used, (Personal Protective Equipment, rubber gloves, coolers, appropriate number and volume of sample bottles, identification labels, re-sealable storage bags, paper towels, personal rain gear, ice, Sampling Activity Log forms, and Chain of Custody forms).

The Contractor will obtain and maintain the field-testing instruments for analyzing samples in the field by sampling personnel. The QSP will contact sampling personnel 24 hours prior to a predicted rain event and if one of the triggering conditions is identified during an inspection before, during, or after a storm event. This will ensure that adequate sample collection personnel, supplies, and field test equipment for monitoring non-visible pollutants are available and mobilized to collect samples on the project site in accordance with the sampling schedule.

Below is a summary (trigger events) of when Non Visible Pollutant (NVP) samples should be taken:

1. Only when it is safe to do so and the sampling locations are safely accessible to prevent injury, other health hazards, or death.
2. Samples should be taken by the QSP and or trained staff by the QSP within 2 hours of the discharge.
3. **When visual inspections indicate that there has been:**
 - Storm water runoff contact with exposed construction materials or spilled materials.
Normally these instances are due to a BMP:
 - a breach
 - malfunction
 - leakage or spill
4. Two samples will be taken
 1. A control sample will be taken from an area unaffected by the identified breach/failure for the basis of comparison.
 2. Suspected NVP sample from the area of concern.
5. All water samples to be taken will be conducted using the appropriate Chain of Custody, Sampling Techniques, Sample Bottles and will be analyzed by a certified laboratory.

**CASQA Handbook Pollutant Testing Guidance Table and Sampling Log are attached to the CSMP.*

3.2 Non-Storm Water Sampling Procedures and Analysis

Discharges shall visually observe each drainage area for the presence of or indication of prior unauthorized and authorized non-storm water discharges and their sources. Discharges shall ensure that visual observations document the presence of evidence of any non storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. On-site records will be maintained indicating the personnel performing the visual observations, the dates and approximate time each drainage area and non-storm water discharge was observed, and response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

Non-Storm Water Sampling:

- Dischargers shall sample effluent at all discharge points where non-storm water and/or authorized non-storm water is discharged off-site.
- All non-storm water samples will be sent to an authorized laboratory certified by the State Department of Health Services (not applicable for Turbidity and pH).
- Run-on will be monitored from surrounding areas if there is reason to believe run-on may contribute to an exceedance of Water Quality Objectives.

3.3 Sample Locations

Reference Project's Site Map(s) to show the approximate potential sample locations. QSP will field verify all sampling locations and make changes as necessary to the on-site site map.

Control Sample(s): **Cx**

Shall be taken from an area that has been unaffected by the potential pollutant discharge. Control Grab sample(s) will be taken from one of the following locations:

1. At a storm drain above the breach, failure, or potential discharge location.
2. From a storm drain manhole above where the breach, failure, or potential discharge has occurred.

Potential Pollutant Sample(s): **Sx**

Shall be taken from an area that receives storm water flow that is below the breach, failure, or potential discharge location. The Potential Pollutant Sample will be taken from one of the following locations.

1. A storm drain inlet below the breach, failure or potential discharge location.
2. At a storm drain inlet/manhole below the breach, failure or potential discharge location.
3. At the last storm drain manhole from where project runoff is connected to the city system or intermingles with the surrounding area runoff.
4. At the project outfall if accessible and if it is safe to do so.

All grab samples taken should be conducted using calibrated portable equipment, clean sampling bottles and rubber gloves. If lab analysis is required, the grab sample should be stored in ice and taken to the lab within the appropriate sampling time frame. All Chain of Custody forms shall be filled out appropriately and a record of the results kept on-site.

***If Hazardous Materials are observed or suspected to have contaminated storm water runoff contact the local Fire Department immediately. Samples should only be taken by on-site personnel if it is safe to do so using appropriate Personal Protection Equipment (PPE) to prevent potential health hazards. For significant or hazardous spills that cannot be completely controlled by on-site personnel the procedure will be as follows:

1. Notify the local emergency response agency by dialing 911. Also, notify the Regional Board and other appropriate state and local officials.
2. The Governor's **Office of Emergency Services** Warning Center will be notified at (800) 852-7550. **Central Valley Regional Water Quality Control Board** (Region 5), Sacramento office at (916) 464-3291. **City of Manteca Public Works** at (209) 456-8400.
3. Notification will be first made by telephone and followed with a written report within seven working days or sooner.
4. A spill cleanup contractor will be contacted immediately to address the spill.
5. The Emergency telephone number of the project manager will be posted at the construction office for notification in case of a spill.
6. All implemented corrective actions will be documented and will be part of the formal written report.

3.5 Sampling Lab

DR Horton designates the following certified lab for grab samples that will need laboratory analysis.

Laboratory Name:	Delta Environmental Laboratories, LLC
Street Address:	685 Stone Road #11 & #12
City, State, Zip:	Benicia, CA 94510
Number:	(707) 747-6081
Contact:	Hossein Khoshkhoo, Ph.D.

4.0 RETENTION OF RECORDS FOR INSPECTIONS AND SAMPLING

Per the General Permit Guidelines, all Risk Level 1 dischargers shall retain records of all storm water monitoring information and copies of all reports for a period of at least three years. Risk Level 1 dischargers shall retain all records on-site while construction is ongoing. These records include:

- The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.
- The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.
- The date and approximate time of analyses.
- The individual(s) who performed the analysis.
- A summary of all analytical results from the last three years, the method detection limits and reporting units, and the analytical techniques or methods used.
- Rain gauge readings from site inspections.
- Quality assurance/quality control records and results.
- Non-storm water discharge inspections and visual observations (inspections) and storm water discharge visual observation records
- Visual observation and sample collection exception records
- The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

Attachments:

Attachment 1 – Pollutant Testing Guidance Table

Attachment 2 – Field Sampling Log

Attachment 3 – Rain Gauge Log

Attachment 1

Pollutant Testing Guidance Table

Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory
Asphalt Products (Sections 37, 39, 92, 93, 94, and Special Provisions)	Hot Asphalt	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		
	Asphalt Emulsion				
	Liquid Asphalt (tack coat)				
	Cold Mix				
	Crumb Rubber	Yes – Black, solid material	Visually Observable - No Testing Required		
	Asphalt Concrete (Any Type)	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		
Cleaning Products	Acids	No	pH Acidity Anions (acetic acid, phosphoric acid, sulfuric acid, nitric acid, hydrogen chloride)	pH Meter Acidity Test Kit	EPA 150.1 (pH)
					SM 2310B (Acidity)
					EPA 300.0 (Anion)
	Bleaches	No	Residual Chlorine	Chlorine	SM 4500-CL G (Res. Chlorine)
	Detergents	Yes - Foam	Visually Observable - No Testing Required		
	TSP	No	Phosphate	Phosphate	EPA 365.3 (Phosphate)

Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory
	Solvents	No	VOC	None	EPA 601/602 or EPA 624 (VOC)
			SVOC	None	EPA 625 (SVOC)
Portland Concrete Cement & Masonry Products (Section 27, 28, 29, 40, 41, 42, 49, 50, 51, 53, 63, 65, 72, 73, 80, 81, 83, 90, and Special Provisions)	Portland Cement (PCC)	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Masonry products	No	pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
			Alkalinity		SM 2320 (Alkalinity)
	Sealant (Methyl Methacrylate - MMA)	No	Methyl Methacrylate	None	EPA 625 (SVOC)
			Cobalt		EPA 200.8 (Metal)
			Zinc		
	Incinerator Bottom Ash Bottom Ash Steel Slag Foundry Sand Fly Ash Municipal Solid Waste	No	Aluminum Calcium Vanadium Zinc	Calcium Test	EPA 200.8 (Metal) EPA 200.7 (Calcium)
	Mortar	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Concrete Rinse Water	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Non-Pigmented Curing Compounds	No	Acidity	pH Meter Alkalinity or Acidity Test Kit	SM 2310B (Acidity)
			Alkalinity		SM 2320 (Alkalinity)
			pH		EPA 150.1 (pH)

Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
Landscaping and Other Products (Section 20, 24, and Special Provisions)	Aluminum Sulfate	No	Aluminum	TDS Meter Sulfate	EPA 200.8 (Metal)
			TDS		EPA 160.1 (TDS)
			Sulfate		EPA 300.0 (Sulfate)
	Sulfur-Elemental	No	Sulfate	Sulfate	EPA 300.0 (Sulfate)
	Fertilizers-Inorganic ⁴	No	Nitrate	Nitrate	EPA 300.0 (Nitrate)
			Phosphate	Phosphate	EPA 365.3 (Phosphate)
			Organic Nitrogen	None	EPA 351.3 (TKN)
			Potassium	None	EPA 200.8 (Metal)
	Fertilizers-Organic	No	TOC	Nitrate	EPA 415.1 (TOC)
			Nitrate		EPA 300.0 (Nitrate)
			Organic Nitrogen		EPA 351.3 (TKN)
			COD		EPA 410.4 (COD)
	Natural Earth (Sand, Gravel, and Topsoil)	Yes - Cloudiness and turbidity	Visually Observable - No Testing Required		
	Herbicide	No	Herbicide	None	Check lab for specific herbicide or pesticide
	Pesticide		Pesticide		

Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory
	Lime		Alkalinity	pH Meter Alkalinity or Acidity Test Kit	SM 2320 (Alkalinity)
			pH		EPA 150.1 (pH)
Painting Products (Section 12-3.08, 20-2.32, 50-1.05, 59, 91, and Special Provisions)	Paint	Yes	Visually Observable - No Testing Required		
	Paint Strippers	No	VOC	None	EPA 601/602 or EPA 624 (VOC)
			SVOC	None	EPA 625 (SVOC)
	Resins	No	COD	None	EPA 410.4 (COD)
			SVOC		EPA 625 (SVOC)
	Sealants	No	COD	None	EPA 410.4 (COD)
	Solvents	No	COD	None	EPA 410.4 (COD)
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
	Lacquers, Varnish, Enamels, and Turpentine	No	COD	None	EPA 410.4 (COD)
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
	Thinners	No	VOC	None	EPA 601/602 or EPA 624 (VOC)
			COD		EPA 410.4 (COD)

Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory
Portable Toilet Waste Products	Portable Toilet Waste	Yes	Visually Observable - No Testing Required		
Contaminated Soil ⁵	Aerially Deposited Lead ³	No	Lead	None	EPA 200.8 (Metal)
	Petroleum	Yes – Rainbow Surface Sheen and Odor	Visually Observable - No Testing Required		
	Mining or Industrial Waste, etc.	No	Contaminant Specific	Contaminant Specific – Check with laboratory	Contaminant Specific – Check with laboratory
Line Flushing Products	Chlorinated Water	No	Total chlorine	Chlorine	SM 4500-CL G (Res. Chlorine)
Adhesives	Adhesives	No	COD	None	EPA 410.4 (COD)
			Phenols	Phenol	EPA 420.1 (Phenol)
			SVOC	None	EPA 625 (SVOC)
Dust Palliative Products (Section 18)	Salts (Magnesium Chloride, Calcium Chloride, and Natural Brines)	No	Chloride	Chloride	EPA 300.0 (Chloride)
			TDS	TDS Meter	EPA 160.1 (TDS)
			Cations (Sodium, Magnesium, Calcium)	None	EPA 200.7 (Cations)
Vehicle	Antifreeze and Other Vehicle Fluids	Yes - Colored Liquid	Visually Observable - No Testing Required		
	Batteries	No	Sulfuric Acid	None	EPA 300.0 (Sulfate)
			Lead	None	EPA 200.8 (Metal)

Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory
			pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
	Fuels, Oils, Lubricants	Yes - Rainbow Surface Sheen and Odor	Visually Observable - No Testing Required		
Soil Amendment/Stabilization Products	Polymer/Copolymer ^{6, 7}	No	Organic Nitrogen	None	EPA 351.3 (TKN)
			BOD	None	EPA 405.1 (BOD)
			COD	None	EPA 410.4 (COD)
			DOC	None	EPA 415.1 (DOC)
			Nitrate	Nitrate	EPA 300.0 (Nitrate)
			Sulfate	Sulfate	EPA 300.0 (Sulfate)
			Nickel	None	EPA 200.8 (Metal)
	Straw/Mulch	Yes - Solids	Visually Observable - No Testing Required		
	Lignin Sulfonate	No	Alkalinity	Alkalinity	SM 2320 (Alkalinity)
			TDS	TDS Meter	EPA 160.1 (TDS)
	Psyllium	No	COD	None	EPA 410.4 (COD)
			TOC		EPA 415.1 (TOC)
	Guar/Plant Gums	No	COD	None	EPA 410.4 (COD)
			TOC		EPA 415.1 (TOC)
			Nickel		EPA 200.8 (Metal)
	Gypsum	No	pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
			Calcium	Calcium	EPA 200.7 (Calcium)

Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory
			Sulfate	Sulfate	EPA 300.0 (Sulfate)
			Aluminum	None	EPA 200.8 (Metal)
			Barium		
			Manganese		
			Vanadium		
Treated Wood Products (Section 58, 80-3.01B(2), and Special Provisions)	Ammoniacal-Copper-Zinc-Arsenate (ACZA)	No	Arsenic	Total Chromium	EPA 200.8 (Metal)
	Copper-Chromium-Arsenic (CCA)		Total Chromium		
	Ammoniacal-Copper-Arsenate (ACA)		Copper		
	Copper Naphthenate		Zinc		
	Creosote	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		

Notes:

- 1 If specific pollutant is known, analyze only for that specific pollutant. See MSDS to verify.
- 2 For each construction material, test for one of the pollutant indicators. Bolded pollutant indicates lowest analysis cost or best indicator. However, the composition of the specific construction material, if known, is the first criterion for selecting which analysis to use.
- 3 See www.hach.com, www.lamotte.com, www.ysi.com and www.chemetrics.com for some of the test kits
- 4 If the type of inorganic fertilizer is unknown, analyze for all pollutant indicators listed.
- 5 Only if special handling requirements are required in the Standard Special Provisions for aerially deposited lead (ADL)
- 6 If used with a dye or fiber matrix, it is considered visually observable and no testing is required.

- 7. Based upon research conducted by Caltrans, the following copolymers/polymers do not discharge pollutants and water quality sampling and analysis is **not** required: Super Tak™, M-Binder™, Fish Stik™, Pro40dc™, Fisch-Bond™, and Soil Master WR™.

Acronyms:

BOD – Biochemical Oxygen Demand

COD – Chemical Oxygen Demand

DOC – Dissolved Organic Carbon

EPA – Environmental Protection Agency

HACH – Worldwide company that provides advanced analytical systems and technical support for water quality testing.

SM – Standard Method

SVOC – Semi-Volatile Organic Compounds

TDS – Total Dissolved Solids

TKN – Total Kjeldahl Nitrogen

TOC – Total Organic Carbon

TSP – Tri-Sodium Phosphate

VOC - Volatile Organic Compounds

References:

Construction Storm Water Sampling and Analysis Guidance Document, California Stormwater Quality Task Force, October 2001.

Environmental Impact of Construction and Repair Materials on Surface and Ground Waters, Report 448, National Cooperative Highway Research Program, 2001

Soil Stabilization for Temporary Slopes, Environmental Programs, California Department of Transportation, October 1, 1999.

Statewide Storm Water Management Plan, Division of Environmental Analysis, California Department of Transportation, April 2002.

Statewide Storm Water Quality Practice Guidelines, Environmental Program, California Department of Transportation, August 2000.

Soil Stabilization for Temporary Slopes and District 7 Erosion Control Pilot Study, June 2000.

Stormwater Monitoring Protocols, Guidance Manual, California Department of Transportation, May 2000.

Risk Level 1, 2, 3 Visual Inspection Field Log Sheet						
Date and Time of Inspection:				Report Date:		
Inspection Type:	☐ Weekly	☐ Before predicted rain	☐ During rain event	☐ Following qualifying rain event	☐ Contained stormwater release	☐ Quarterly non-stormwater
Site Information						
Construction Site Name:						
Construction stage and completed activities:					Approximate area of exposed site:	
Weather and Observations						
Date Rain Predicted to Occur:				Predicted % chance of rain:		
Estimate storm beginning: _____ (date and time)		Estimate storm duration: _____ (hours)		Estimate time since last storm: _____ (days or hours)		Rain gauge reading: _____ (inches)
Observations: If yes identify location						
Odors		Yes ☐ No ☐				
Floating material		Yes ☐ No ☐				
Suspended Material		Yes ☐ No ☐				
Sheen		Yes ☐ No ☐				
Discolorations		Yes ☐ No ☐				
Turbidity		Yes ☐ No ☐				
Site Inspections						
Outfalls or BMPs Evaluated			Deficiencies Noted			
(add additional sheets or attached detailed BMP Inspection Checklists)						
Photos Taken:		Yes ☐	No ☐	Photo Reference IDs:		
Corrective Actions Identified (note if SWPPP/REAP change is needed)						
Inspector Information						
Inspector Name:				Inspector Title:		
Signature:					Date:	

[illegible]

Grab Samples Collected		
Discharge Location Description	Sample Type	Time

Additional Sampling Notes:

Time End:

Rain Gauge Log Sheet

WDID #:

[illegible]

Storm Water Pollution Prevention Site Inspection Form

1. General Information

Project:		WDID#:	
Project Type:	☐ LUP ☐ Traditional	Risk Level:	☐ Level 1 ☐ Level 2 ☐ Level 3
Inspection Type:	☐ Weekly ☐ Pre Storm ☐ Post Storm ☐ Extended Rain		
Status of Construction:	☐ Mass Grading ☐ Street/Utility Installation ☐ Vertical Construction ☐ Landscaping ☐ Demo ☐ Other		
Weather Conditions:	☐ Sunny ☐ Cloudy ☐ Rain ☐ Other ☐ Windy		
Date of Forecasted Rain:		Time Since Last Storm:	
Probability of Rain:		Rain Amount:	
Date of Inspection:		Date Report Written:	
Project Contact:	Company:	Phone:	
Inspector:	Company:	Phone:	

Best Management Practices (Site Review)

2. Erosion Control (EC)

Comments

Are there Exposed Disturbed Soils On-site?	☐ Yes ☐ No ☐ N/A
Do Disturbed Areas Have Appropriate EC or Dust BMP Installed?	☐ Yes ☐ No ☐ N/A
Does the installed EC or Dust BMP Need Maintenance?	☐ Yes ☐ No ☐ N/A
Are Erosion Control BMPs Effective at Preventing Dust?	☐ Yes ☐ No ☐ N/A
Are Water Trucks or Other Watering Devices On-site?	☐ Yes ☐ No ☐ N/A

3. Sediment Control (SC)

Comments

Are Sediment Control Measures Installed On-site?	☐ Yes ☐ No ☐ N/A
Are Slope Breaks Installed and in Good Condition? (Risk 2/3 Sites)	☐ Yes ☐ No ☐ N/A
Are Storm Drain Inlets Protected with BMPs?	☐ Yes ☐ No ☐ N/A
Evidence of Sediment/Other Pollutant Discharge around inlets?	☐ Yes ☐ No ☐ N/A
Does the installed Sediment Control BMPs Need Maintenance?	☐ Yes ☐ No ☐ N/A
Area Stabilized Construction Entrance/Exits Deployed and Effective	☐ Yes ☐ No ☐ N/A

4. Good Housekeeping (GH)

Comments

Are Paved Areas Free of Dirt and Debris?	☐ Yes ☐ No ☐ N/A
Are Exposed Stockpiles (Dirt, Debris or Materials) Stored On-site?	☐ Yes ☐ No ☐ N/A
Were Stockpiles covered prior to rain?	☐ Yes ☐ No ☐ N/A
Are Waste Management BMPs Deployed and lids closed daily?	☐ Yes ☐ No ☐ N/A
Non Storm Water BMPs deployed per SWPPP?	☐ Yes ☐ No ☐ N/A
Materials stored appropriately within Storage Yard?	☐ Yes ☐ No ☐ N/A
Are Washout Pits on-site and in good condition?	☐ Yes ☐ No ☐ N/A
Evidence of Washout or Waste Material on Ground?	☐ Yes ☐ No ☐ N/A
Portable Toilets stored in appropriate locations away from inlets?	☐ Yes ☐ No ☐ N/A
Other Concerns within the Project?	☐ Yes ☐ No ☐ N/A

5. Site Observations/Conditions/Sampling Results

6. Corrective Actions to be Conducted

Inspector:

Date:

LIST OF POTENTIAL CONSTRUCTION POLLUTANTS

CATEGORY	PRODUCT	POLLUTANTS
Adhesives	Adhesives, Glues Resins, Epoxy Synthetics Calks, Sealers, Putty, Sealing Agents Coal Tars (Naphtha, Pitch)	Phenolics, Formaldehydes Phenolics, Formaldehydes Asbestos, Phenolics, Formaldehydes Benzene, Phenols, Naphthalene
Cleaners	Polishers (Metal, Ceramic, Tile) Etching Agents Cleaners, Ammonia, Lye, Caustic Sodas Bleaching Agents Chromate salts	Metals Metals Acidity/Alkalinity Acidity/Alkalinity Chromium
Plumbing	Solder (Lead, Tin), Flux (Zinc, Chloride) Pipe Fitting (Cut Shavings) Galvanized Metals (Nails, Fences) Electric Wiring	Lead, Copper, Zinc, Tin Copper Zinc Copper, Lead
Painting	Paint Thinner, Acetone, MEK, Stripper Paints, Lacquers, Varnish, Enamels Turpentine, Gum Spirit, Solvents Sanding, Stripping Paints (Pigments) Dyes	VOC's Metals, Phenolics, Mineral Spirits VOC's Metals Metals
Wood	Sawdust Particle Board Dust Treated Woods	BOD Formaldehyde Copper, Creosol
Masonry & Concrete	Dust (Brick, Cement) Colored Chalks (Pigments) Concrete Cutting Compounds Glazing Compounds Cleaning Surfaces	Acidity, Sediments Metals Asbestos Acidity
Floors & Walls	Flashing Drywall Tile cutting (Ceramic Dusts) Adhesives (see above)	Copper, Aluminum Dusts Minerals
Remodeling & Demolition	Insulation Venting Systems Dusts (Brick, Cement, Drywall)	Asbestos Aluminum, Zinc
Air Conditioning & Heating	Insulating Coolant Reservoirs Adhesives (see above)	Asbestos Freon

CATEGORY	PRODUCT	POLLUTANTS
Yard O&M	Vehicle and Machinery Maintenances Gasoline, Oils, Additives Marking Paints (Sprays) Grading, Earth Moving Portable Toilets Fire Hazard Control (Herbicides) Health and Safety Wash Waters (Herbicides, Concrete, Oils, Greases)	Oils and Grease, Coolants Benzene & Derivatives, Oils & Grease Vinyl Chloride, Metals Erosion (Sediments) BOD, Disinfectants 9Spills) Sodium Arsenite, Dinitro Compounds Rodenticides, Insecticides
Landscaping and Earthmoving	Planting, Plant Maintenance Excavation, Tilling Masonry & Concrete Solid Wastes (Tree, Shrubs) Exposing Natural Lime or Other Mineral Deposits Soil Additives Revegetation of Graded Areas	Pesticides, Herbicides, Nutrients Erosion (Sediments) BOD Acidity/Alkalinity, Metals Aluminum Sulfate, Sulfur Fertilizers
Materials Storage	Waste Storage (Used oils, Solvents, etc.) Hazardous Waste Containment Raw Material piles	Spills, Leaks Spills, Leaks Dusts, Sediments

VOC = Volatile Organic Compounds, BOD = Biochemical Oxygen Demand due to the use of oxygen by decomposing materials

References: USEPA,1973. Processes, Procedures, and Methods to Control Pollution Resulting From Construction

LIST OF COMMON POTENTIAL NON-VISIBLE POLLUTANTS AT CONSTRUCTION SITES

The following table represents potential sources of non-visible pollutants that are common to most construction sites. This list is not meant to be inclusive, but to provide direction to construction site operators.

Category	Potential Pollutant Source	Field Indicator or Pollutant Release	Laboratory Analysis
Line Flushing	Chlorinated water	Colorimetric Kit	Residual chloride
Portable toilets	Bacteria, Disinfectants	N/A	Total/fecal coli form
Concrete & Masonry	Acid wash	pH meter	pH
	Curing compounds	pH meter	pH, alkalinity
	Concrete rinse water	pH meter	Volatile organic compounds (VOC's) pH
Painting	Resins	N/A	Semi-volatile organic compounds (SVOC's)

	Thinners Paint Strippers Solvents Adhesives Sealants	Phenols kit N/A Phenols kit Phenols kit N/A	Phenols, VOC's VOC's Phenols, VOC's Phenols, SVOC's SVOC's
Cleaning	Detergents Bleaches Solvents	Colorimetric Kit Colorimetric Kit Phenols kit	MBAS, phosphates Residual chlorine VOC's
Landscaping	Pesticides/Herbicides Fertilizers Lime and gypsum Aluminum sulfate, sulfur	N/A N/A pH meter Total dissolved solids (TDS), pH	Check with analytical laboratory NO3/NH3/P Acidity/alkalinity TDS, alkalinity
Treated wood	Copper, arsenic, selenium	Metals test kits may be available	Metals
Soil amendments & dust control	Lime, gypsum Plan gums Magnesium Chloride Calcium chloride Natural brines Lignosulfonates	pH meter N/A TDS TDS TDS TDS	pH Biochemical oxygen demand (BOD) Alkalinity, TDS Alkalinity, TDS Alkalinity, TDS Alkalinity, TDS

Source: California Stormwater Quality Task Force, October 2001

SAMPLE HANDLING GUIDE



Inorganic and Conventional Parameters

Parameters	EPA Method*	Container	Recommended Quantity (mL)	Preservative	Holding Time
Acidity	305.1	P,G	100	4°C	14 days
Alkalinity	310.1, 310.2	P,G	100	4°C	14 days
Ammonia	350.1, 350.2, 350.3	P,G	500	4°C, H ₂ SO ₄ to pH <2	28 days
Biochemical Oxygen Demand (BOD)	405.1	P,G	1000	4°C	48 hours
Boron	200.7, 212.3	P, PFTE, Quartz	200	HN0 ₃ to pH <2	6 months
Bromide	320.1	P,G	200	None	28 days
Chemical Oxygen Demand (COD)	410.1, 410.2, 410.3, 410.4	P,G	100	4°C H ₂ SO ₄ to pH <2	28 days
Chloride	325.1, 325.2, 325.3, 9252A, 9253	P,G	200	None	28 days
Chlorine, Residual	330.1, 330.2, 330.3, 330.4, 330.5	P,G	200	None	Immediately
Chromium VI	218.4	P,G	250	4°C	24 hours
Coliform, Total	SM 9221B, 9222B	P,G (sterile)	100	4°C	6 hours
Coliform, Fecal	SM 9221C, 9222D	P,G (sterile)	100	4°C	6 hours
Color	110.1, 110.2, 110.3	P,G	100	4°C	48 hours
Cyanide	335.2, 335.3 9010A	P,G	1000	4°C, ascorbic acid, NaOH to pH > 12	14 days
Flashpoint	1010	P,G	100	None	Not specified
Fluoride	340.1, 340.2, 340.3	P	500	None	28 days
Hardness	130.1, 130.2	P,G	100	HN0 ₃ or H ₂ SO ₄ to pH < 2	6 months
Iodide	345.1	P,G	200	4°C	24 hours
Metals	6010A, 200, 7000 series	P,G	500	HN0 ₃ to pH < 2	6 months
Mercury	245.1, 245.2	P,G	500	HN0 ₃ to pH < 2	28 days
Nitrogen, Kjeldahl (TKN)	351.1, 351.2, 351.3	P,G	500	4°C, H ₂ SO ₄ to pH < 2	28 days
Nitrate	352.1, 9200	P,G	100	4°C	48 hours
Nitrite	354.1	P,G	100	4°C	48 hours
Nitrate-Nitrite	353.1, 353.2, 353.3	P,G	200	4°C, H ₂ SO ₄ to pH < 2	28 days
Oil and Grease	413.1, 9070	G	1000	4°C, H ₂ SO ₄ or HCl to pH < 2	28 days
Phenols	420.1, 420.2, 9065, 9066	G	1000	4°C, H ₂ SO ₄ to pH < 2	28 days
Phosphorus, Total	365.1, 365.2, 365.3, 365.4	P,G	200	4°C, H ₂ SO ₄ to pH < 2	28 days
Phosphate, Ortho	365.1, 365.2, 365.3	P,G	200	4°C	48 hours
pH	150.1, 9040B	P,G	100	None	Immediately
Radiochemistry					
Alpha, Beta, Radium	900 & 9000 series	P,G	2000	HN0 ₃ to pH < 2	6 months
Tritium		P,G	100	None	6 months
Radon, I-131		P,G	1000	HN0 ₃ to pH < 2	14 days
Silica	370.1, 200.7	P, PFTE, Quartz	100	4°C	28 days
Solids, Dissolved (TDS)	160.1	P,G	100	4°C	7 days
Solids, Suspended (TSS)	160.2	P,G	500	4°C	7 days
Solids, Volatile (TVS)	160.4	P,G	100	4°C	7 days

Inorganic and Conventional Parameters

Parameters	EPA Method*	Container	Recommended Quantity (mL)	Preservative	Holding Time
Solids, Total (TS)	160.3	P,G	100	4°C	7 days
Specific Conductance	120.1, 9050	P,G	100	4°C	28 days
Sulfate	375.1, 375.3, 375.4, 9035, 9036, 9038	P,G	200	4°C	28 days
Sulfide	376.1, 376.2	P,G	500	4°C, Zn acetate, NaOH to pH > 9	7 days
Sulfite	377.1	P,G	200	None	Immediately
Surfactants (MBAS)	425.1	P,G	250	4°C	48 hours
Total Organic Carbon (TOC)	415.1, 9060	P,G	100	4°C, H ₂ SO ₄ , H ₃ PO ₄ or HCl to pH < 2	28 days
Total Organic Halogens (TOX)	9020B	G-TLC (amber)	100	4°C, H ₂ SO ₄ to pH < 2	28 days
Total Petroleum Hydrocarbon (TPH)	418.1	G-TLC	1000	4°C, H ₂ SO ₄ or HCl to pH < 2	28 days
Turbidity	180.1	P,G	100	4°C	48 hours

Organic Parameters

Parameters	EPA Method*	Container	Minimum Quantity (mL)	Preservative	Holding Time
Purgeable Halocarbons	601, 8010B	G-TLS	2 x 40	4°C	14 days
Purgeable Aromatics	602, 8020A	G-TLS	2 x 40	4°C, HCl to pH < 2	14 days
Acrolein and Acrylonitrile	603, 8030A	G-TLS	2 x 40	4°C, pH 4-5	14 days
Volatile Organics	524, 624, 8240B, 8260A, CLP	G-TLS	2 x 40	4°C, HCl to pH < 2	14 days 10 days for CLP
Organochlorine Pesticides and PCBs	608, 8080A	G-TLC (amber)	1000	4°C, pH 5-9	7/40 days
Organophosphorous Pesticides	8140	G-TLC (amber)	1000	4°C	7/40 days
Chlorinated Herbicides	615, 8150B	G-TLC (amber)	1000	4°C	7/40 days
Base/Neutrals and Acids	525, 625, 8250A, 8270B, CLP	G-TLC (amber)	1000	4°C	7/40 days 5/35 days for CLP
Dioxins and Furans	23, 613, 8280A, 8290, 1613, CLP	G-TLC (amber)	1000	4°C	30/45 days

TCLP Parameters

Parameters	Holding Time from Collection to TCLP Extraction (days)	Holding Time from TCLP Extraction to Preparative Extraction (days)	Holding Time from TCLP/Preparative Extraction to Analysis (days)	Total Elapsed Time (days)
Volatiles	14	NA	14	28
Semivolatiles	14	7	40	61
Mercury	28	NA	28	56
Metals	160	NA	160	320

Reference: 40CFR Part 136 Tables IA, IB, IC, ID & IE and Table II.

* The methods listed are for typical EPA references, except for SM, which refers to Standard Methods for the Examination of Water and Wastes, 18th Edition.

For bacteriological and organic parameters, add sodium thiosulfate if residual chlorine is present. Soil samples should be collected in 4-8 oz glass containers with a Teflon®-lined cap and preserved at 4°C. No preservative is required for waste samples. Teflon is a registered trademark of E.I. du Pont.

Acronym Definitions

CLP EPA Contract Laboratory Program

G Glass

G-TLC Glass with Teflon®-lined cap

All rights reserved. Copyright 1996

G-TLS Glass with Teflon®-lined septum

NA Not Applicable

P Polyethylene

Core Laboratories Inc.

5295 Hollister Road

Houston, TX 77040

(713) 460-9600 Fax (713) 690-3947

Trained Contractor Personnel Log Sheet

Stormwater Management Training Log

Project Name: _____

Storm Water Management Topic: (check as appropriate)

- | | |
|---|---|
| ☐ Soil Stabilization | ☐ Sediment Control |
| ☐ Wind Erosion Control | ☐ Tracking Control |
| ☐ Non-storm Water Management | ☐ Waste Management and Materials Pollution Control |
| ☐ Storm Water Sampling | ☐ Other: _____ |

Specific Training Objective: _____

Location: _____ Date: _____

Instructor: _____ Telephone: _____

Course Length (hours): _____

Attendee Roster (attach additional forms if necessary)

Name	Company	Phone

Trained Contractor Personnel Log Sheet

[illegible]

*Use separate sheet for additional Attendees

COMMENTS:

[illegible]



The CPESC® Application Review Committee
certifies that



Sean R. Kazemi

Subscribes to the Code of Conduct and Ethics and has met the requirements
established by the CPESC Council as a

**Certified Professional in Erosion
and Sediment Control™**

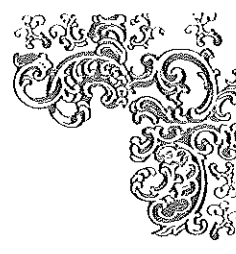
An EnviroCert International, Inc. Program

Certification Number: 5869

Certification Date: July 1, 2011

Donald W. Lake Jr.
Chair, CPESC Council

Lina Burleson
CPESC Program Manager





The CESSWI™ Application Review Committee
certifies that



Sean R. Kazemi

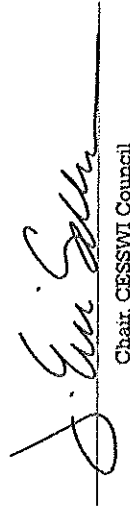
Subscribes to the Code of Ethics and has met the requirements
established by the CESSWI Council as a

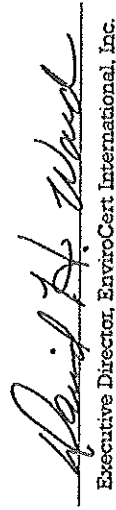
Certified Erosion, Sediment and Storm Water Inspector™

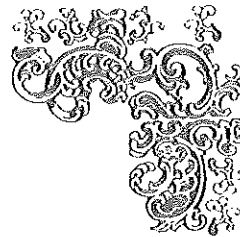
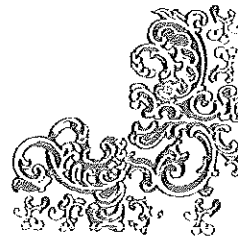
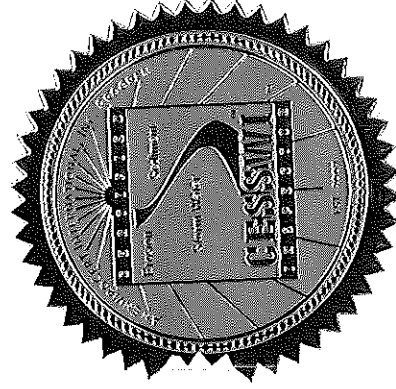
An EnviroCert International, Inc. Program

Certification Number: 0327

Certification Date: August 12, 2008


Chair, CESSWI Council


Executive Director, EnviroCert International, Inc.



Certificate of **COMPLETION**

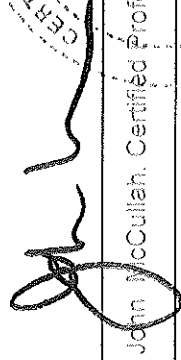
This is to certify that

SEAN KAZEMI

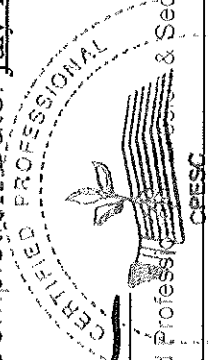
has successfully completed 24 hours of Caltrans certified
Storm Water Pollution Prevention Plan (SWPPP) training

Course Title: Special Topics In Construction-SWPPP Preparation Training Completion Date: July 18, 2007

Shasta College Instructor Signature



John McCullah, Certified Professional in Stormwater & Sediment Control



JOHN A. McCULLAH
CP SOIL EROSION &
SEDIMENT CONTROL
SPECIALIST
No. 00571



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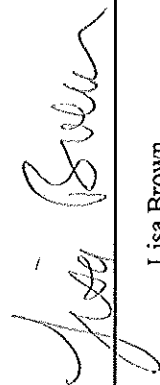
Has successfully completed the

Cal/EPA

Basic Inspector Academy

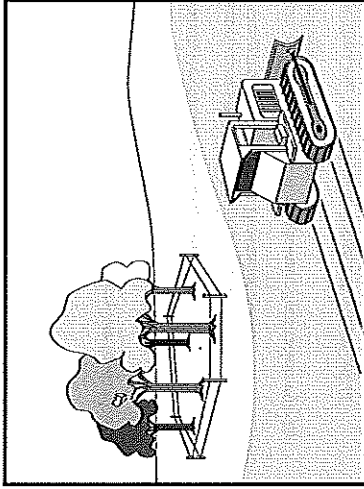
November 19, 2009

The mission of the California Environmental Protection Agency (Cal/EPA) is to restore, protect and enhance the environment, to ensure public health, environmental quality, and economic vitality.



Lisa Brown
Assistant General Counsel
Cal/EPA

Preservation Of Existing Vegetation EC-2



Categories	
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
Legend:	
☒	Primary Objective
☐	Secondary Objective

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.

Limitations

- Requires forward planning by the owner/developer.



Preservation Of Existing Vegetation EC-2

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.

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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.
- Clearly 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.

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Preservation Of Existing Vegetation EC-2

- 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 conditions 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.

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Straw Mulch

EC-6

- There is a potential for introduction of weed seed and unwanted plant material if weed-free agricultural straw is not specified.
- Straw mulch applied by hand is more time intensive and potentially costly.
- 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.
- Potential fugitive dust control issues associated with straw applications can occur.
- Application of a stabilizing emulsion or a water stream at the same time straw is being blown can reduce this problem.
- Use of plastic netting should be avoided in areas where wildlife may be entrapped and may be prohibited for projects in certain areas with sensitive wildlife species, especially reptiles and amphibians.

Implementation

- Straw should be derived from weed-free wheat, rice, or barley. Where required by the plans, specifications, permits, or environmental documents, native grass straw should be used.
- Use tackifier to anchor 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 can be used where other methods are impractical.
- Avoid placing straw onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.
- Straw mulch with tackifier should not be applied during or immediately before rainfall.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Application Procedures

- When using a tackifier to anchor the straw mulch, 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.
- Apply straw at a rate of between 3,000 and 4,000 lb/acre, either by machine or by hand distribution and provide 100% ground cover. A lighter application is used for flat surfaces and a heavier application is used for slopes.
- Evenly distribute straw mulch on the soil surface.
- Anchoring straw mulch to the soil surface by "punching" it into the soil mechanically (incorporating) can be used in lieu of a tackifier.

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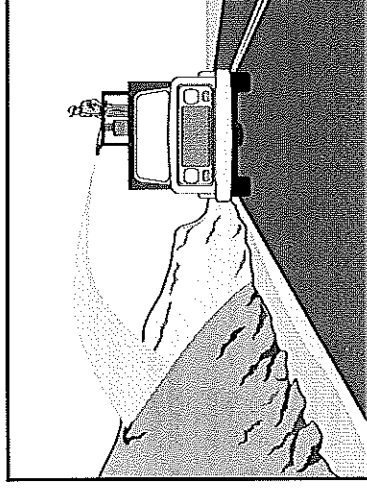
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Straw Mulch

EC-6



Categories

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	

Legend:

☒ Primary Category

☐ Secondary Category

Targeted Constituents

☒	Sediment
	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
EC-14	Compost Blanket

Description and Purpose

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or crimper, or anchoring it with a tackifier or 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 disturbed areas requiring temporary protection until permanent stabilization is established. Straw mulch can be specified for the following applications:

- As a stand-alone BMP on disturbed areas until soils can be prepared for permanent vegetation. The longevity of straw mulch is typically less than six months.
- Applied in combination with temporary seeding strategies
- Applied in combination with permanent seeding strategies to enhance plant establishment and final soil stabilization
- Applied around containerized plantings to control erosion until the plants become established to provide permanent stabilization

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.



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References

- Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.
- Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.
- 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), March 2003.
- 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.

- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions, and longevity.
 - A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier should 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.
 - On very 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."

Costs

Average annual cost for installation and maintenance is included in the table below. Application by hand is more time intensive and potentially more costly.

BMP	Unit Cost per Acre
Straw mulch, crimped or punched	\$2,458-\$5,375
Straw mulch with tackifier	\$1,823-\$4,802

Source: Caltrans Soil Stabilization BMP Research for Erosion and Sediment Controls, July 2007

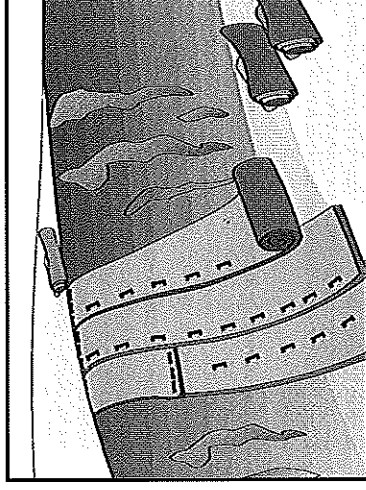
Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- 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. Straw mulch as a stand-alone BMP is temporary and is not suited for long-term erosion control.
- 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.

- Channels with flows exceeding 3.3 ft/s
- Channels to be vegetated
- Stockpiles
- Slopes adjacent to water bodies

Limitations

- RECP installed costs are generally higher than other erosion control BMPs, limiting their use to areas where other BMPs are ineffective (e.g. channels, steep slopes).
- RECPs may delay seed germination, due to reduction in soil temperature.
- RECPs are generally not suitable for excessively rocky sites or areas where the final vegetation will be moved (since staples and netting can catch in mowers). If a staple or pin cannot be driven into the soil because the underlying soil is too hard or rocky, then an alternative BMP should be selected.
- If used for temporary erosion control, RECPs should be removed and disposed of prior to application of permanent soil stabilization measures.
- 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 more environmentally friendly measures, such as seeding and mulching, may be installed.
 - Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.
 - Plastic sheeting results in 100% runoff, which may cause serious erosion problems in the areas receiving the increased flow.
- RECPs may have limitations based on soil type, slope gradient, or channel flow rate; consult the manufacturer for proper selection.
- Not suitable for areas that have foot traffic (tripping hazard) – e.g., pad areas around buildings under construction.
- RECPs that incorporate a plastic netting (e.g. straw blanket typically uses a plastic netting to hold the straw in place) may not be suitable near known wildlife habitat. Wildlife can become trapped in the plastic netting.
- RECPs may have limitations in extremely windy climates. However, when RECPs are properly trenched at the top and bottom and stapled in accordance with the manufacturer's recommendations, problems with wind can be minimized.



Categories	
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
Legend:	
☒	Primary Category
☐	Secondary Category

Targeted Constituents	
Sediment	☒
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives	
EC-3 Hydraulic Mulch	
EC-4 Hydroseeding	

Description and Purpose

Mattings, or Rolled Erosion Control Products (RECPs), can be made of natural or synthetic materials or a combination of the two. RECPs 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, RECPs may be used to stabilize soils until vegetation is established or to reinforce non-woody surface vegetation.

Suitable Applications

RECPs are typically applied on slopes where erosion hazard is high and vegetation will be slow to establish. Mattings are also used on stream banks, swales and other drainage channels where moving water at velocities between 3 ft/s and 6 ft/s are likely to cause scour and wash out new vegetation, and in areas where the soil surface is disturbed and where existing vegetation has been removed. RECPs may also be used when seeding cannot occur (e.g., late season construction and/or the arrival of an early rain season). RECPs should be considered when the soils are fine grained and potentially erosive. RECPs 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



- Jute is a natural fiber that is made into a yarn that is loosely woven into a biodegradable mesh. The performance of jute as a stand-alone RECP is low. Most other RECPs outperform jute as a temporary erosion control product and therefore jute is not commonly used. It is designed to be used in conjunction with vegetation. 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/yd², ±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.

Implementation

Material Selection

- Natural RECPs have been found to be effective where re-vegetation will be provided by re-seeding. The choice of material should be based on the size of area, side slopes, surface conditions such as hardness, moisture, weed growth, and availability of materials.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.
- The following natural and synthetic RECPs are commonly used:

Geotextiles

- Material can be a woven or a non-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 permeability 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

- Generally plastic sheeting should only be used as stockpile covering or for very small graded areas for short periods of time (such as through one imminent storm event). If plastic sheeting must be used, choose a plastic that will withstand photo degradation.
- Plastic sheeting should have a minimum thickness of 6 mils, and must be keyed in at the top of slope (when used as a temporary slope protection) 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 (when used as a temporary slope protection).
- 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 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. See typical installation details at the end of this fact sheet.

which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Site Preparation

- Proper soil preparation is essential to ensure complete contact of the RECP with the soil. Soil roughening is not recommended in areas where RECPs will be installed.
- 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/Planting

Seed the area before blanket installation for erosion control and re-vegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all areas disturbed during blanket installation must be re-seeded. Where soil filling is specified for turf reinforcement mats (TRMs), 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. 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 shall be installed as required by the manufacturer.

Laying and Securing Matting

- Before laying the matting, all check slots should be installed and the seedbed should be friable, 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.

- **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 1/4 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,

- 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 mat (TRM))

Installation should be in accordance with the manufacturer's recommendations. Typical installation guidelines are as follows:

- After seeding, spread and lightly rake $\frac{1}{2}$ - $\frac{3}{4}$ inches of fine topsoil into the TRM apertures to completely fill TRM thickness. Use backside of rake or other flat implement.
- Alternatively, if allowed by product specifications, spread topsoil using lightweight loader, backhoe, or other power equipment. Avoid sharp turns with equipment.
- 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

Installed costs can be relatively high compared to other BMPs. Approximate costs for installed materials are shown below:

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 (or greater, per manufacturer's specifications).
- 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 $\frac{1}{2}$ staples/yd². Check manufacturer's specifications to determine if a higher density staple pattern is required.

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.

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), March 2003.

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

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.

Rolled Erosion Control Products		Installed Cost per Acre (2000) ¹	Estimated Cost per Acre (2009) ²
Biodegradable	Jute Mesh	\$6,000-\$7,000	\$6,600-\$7,700
	Curled Wood Fiber	\$8,000-\$10,500	\$8,800-\$11,050
	Straw	\$8,000-\$10,500	\$8,800-\$11,050
	Wood Fiber	\$8,000-\$10,500	\$8,800-\$11,050
	Coconut Fiber	\$13,000-\$14,000	\$14,300-\$15,400
	Coconut Fiber Mesh	\$30,000-\$33,000	\$33,000-\$36,300
Non-Biodegradable	Straw Coconut Fiber	\$10,000-\$12,000	\$11,000-\$13,200
	Plastic Netting	\$2,000-\$2,200	\$2,200-\$2,420
	Plastic Mesh	\$3,000-\$3,500	\$3,300-\$3,850
	Synthetic Fiber with Netting	\$34,000-\$40,000	\$37,400-\$44,000
	Bonded Synthetic Fibers	\$45,000-\$55,000	\$49,500-\$60,500
Combination with Biodegradable		\$30,000-\$36,000	\$33,000-\$39,600

1. Source: Erosion Control Pilot Study Report, Caltrans, June 2000.
2. 2009 costs reflect a 10% escalation over year 2000 costs. Escalation based on informal survey of industry trends. Note: Expected cost increase is offset by competitive economic conditions.

Inspection and Maintenance

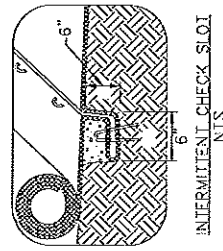
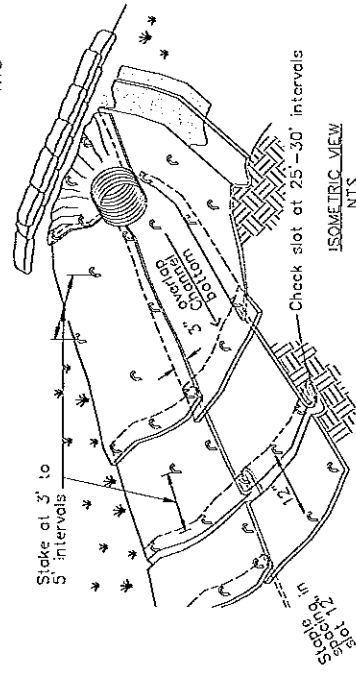
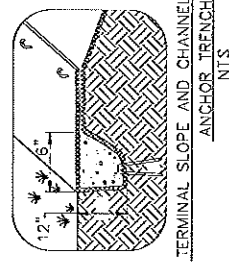
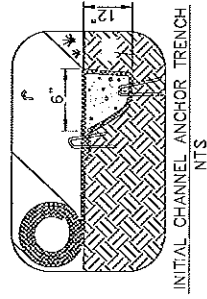
- RECPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas 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.

References

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005

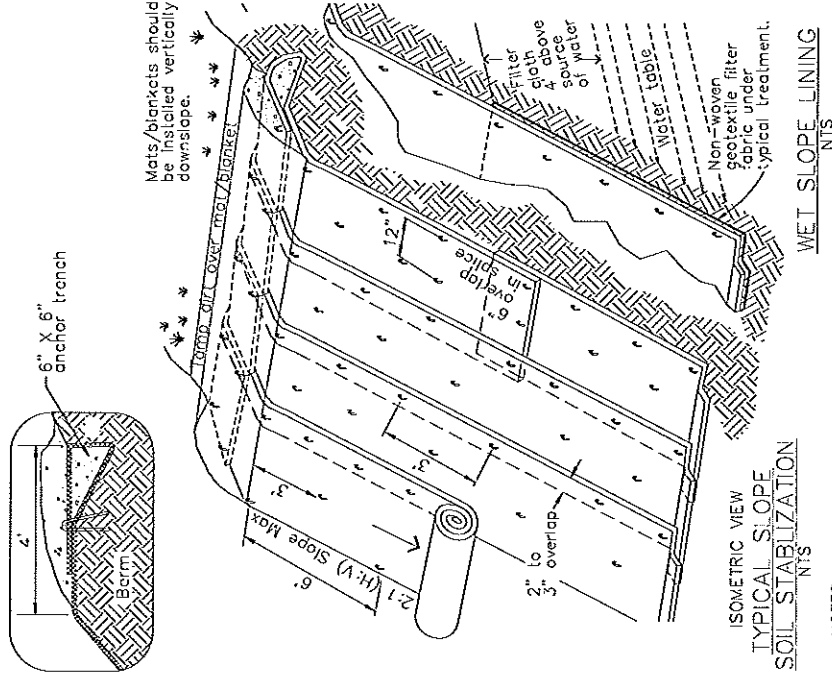
Erosion Control Pilot Study Report, State of California Department of Transportation (Caltrans), June 2000.

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



- NOTES:
1. Check slots to be constructed per manufacturers specifications.
 2. Slaking or staling layout per manufacturers specifications.
 3. Install per manufacturer's recommendations

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

TYPICAL INSTALLATION DETAIL

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.



Categories

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	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	☒
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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.
- Direct construction water runoff to areas where it can soak



Limitations

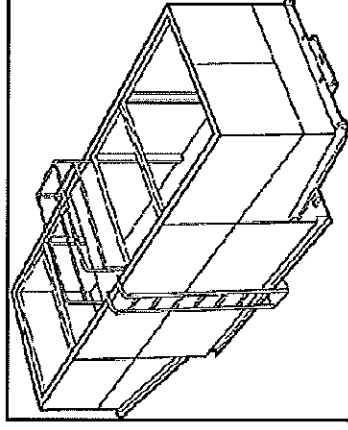
- Dewatering operations will require, and should comply with applicable local and project-specific permits and regulations. In some areas, all dewatering activities, regardless of the discharge volume, require a dewatering permit.
- Site conditions will dictate design and use of dewatering operations.
- The controls discussed in this fact sheet primarily address sediment. Other secondary pollutant removal benefits are discussed where applicable.
- The controls detailed in this fact sheet only allow for minimal settling time for sediment particles. Use only when site conditions restrict the use of the other control methods.
- Avoid dewatering discharges where possible by using the water for dust control.

Implementation

- A Construction Site Monitoring Plan (CSMP) should be included in the project Stormwater Pollution Prevention Plan (SWPPP).
- Regional Water Quality Control Board (RWQCB) Regions may require notification and approval prior to any discharge of water from construction sites.
- The destination of discharge from dewatering activities will typically determine the type of permit required by the discharger. For example, when discharging to a water of the U.S., a groundwater extraction permit will be required through the site's governing RWQCB. When discharging to a sanitary sewer or Municipal Separate Storm Sewer System (MS4), a permit may need to be obtained through the owner of the sanitary sewer or MS4 in addition to obtaining an RWQCB dewatering permit. Additional permits or permissions from other agencies may be required for dewatering cofferdams or diversions.
- Dewatering discharges should not cause erosion at the discharge point. Appropriate BMPs should be implemented to maintain compliance with all applicable permits.
- Maintain dewatering records in accordance with all local and project-specific permits and regulations.

Sediment Treatment

A variety of methods can be used to treat water during dewatering operations. Several devices are presented below and provide options to achieve sediment removal. The sediment particle size and permit or receiving water limitations on sediment are key considerations for selecting sediment treatment option(s); in some cases, the use of multiple devices may be appropriate. Use of other enhanced treatment methods (i.e., introduction of chemicals or electric current to enhance flocculation and removal of sediment) must comply with: 1) for storm drain or surface water discharges, the requirements for Active Treatment Systems (SE-11); or 2) for sanitary sewer discharges, the requirements of applicable sanitary sewer discharge permits.



Categories	
EC	Erosion Control
SE	Sediment Control ☒
TC	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater ☒
MS	Management Control
WM	Waste Management and Materials Pollution Control
Legend:	
☒	Primary Category
☐	Secondary Category

Description and Purpose

Dewatering operations are practices that manage the discharge of pollutants when non-stormwater and accumulated precipitation (stormwater) must be removed from a work location to proceed with construction work or to provide vector control.

The General Permit incorporates Numeric Effluent Limits (NEL) and Numeric Action Levels (NAL) for turbidity (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Discharges from dewatering operations can contain high levels of fine sediment that, if not properly treated, could lead to exceedences of the General Permit requirements.

Suitable Applications

These practices are implemented for discharges of non-stormwater from construction sites. Non-stormwaters include, but are not limited to, groundwater, water from cofferdams, water diversions, and waters used during construction activities that must be removed from a work area to facilitate construction.

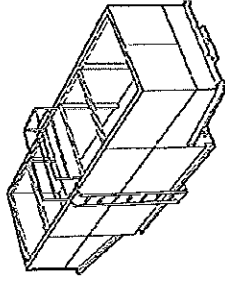
Practices identified in this section are also appropriate for implementation when managing the removal of accumulated precipitation (stormwater) from depressed areas at a construction site.

Stormwater mixed with non-stormwater should be managed as non-stormwater.

Targeted Constituents	
Sediment	☒
Nutrients	
Trash	
Metals	
Bacteria	☒
Oil and Grease	
Organics	
Potential Alternatives	
SE-5: Fiber Roll	
SE-6: Gravel Bag Berm	



Weir Tanks



Description:

- A weir tank separates water and waste by using weirs. The configuration of the weirs (over and under weirs) maximizes the residence time in the tank and determines the waste to be removed from the water, such as oil, grease, and sediments.

Appropriate Applications:

- The tank removes trash, some settleable solids (gravel, sand, and silt), some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

Implementation:

- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.
- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors should be consulted to appropriately size tank.
- Treatment capacity (i.e., volume and number of tanks) should provide at a minimum the required volume for discrete particle settling for treatment design flows.

Maintenance:

- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal should be conducted by a licensed waste disposal company.

Sediment Basin (see also SE-2)

Description:

- A sediment basin is a temporary basin with a controlled release structure that is formed by excavation or construction of an embankment to detain sediment-laden runoff and allow sediment to settle out before discharging. Sediment basins are generally larger than Sediment Traps (SE-3) and have a designed outlet structure.

Appropriate Applications:

- Effective for the removal of trash, gravel, sand, silt, some metals that settle out with the sediment.

Implementation:

- Excavation and construction of related facilities is required.
- Temporary sediment basins should be fenced if safety is a concern.
- Outlet protection is required to prevent erosion at the outfall location.

Maintenance:

- Maintenance is required for safety fencing, vegetation, embankment, inlet and outlet, as well as other features.
- Removal of sediment is required when the storage volume is reduced by one-third.

Sediment Trap (See also SE-3)

Description:

- A sediment trap is a temporary basin formed by excavation and/or construction of an earthen embankment across a waterway or low drainage area to detain sediment-laden runoff and allow sediment to settle out before discharging. Sediment traps are generally smaller than Sediment Basins (SE-2) and do not have a designed outlet (but do have a spillway or overflow).

Appropriate Applications:

Effective for the removal of large and medium sized particles (sand and gravel) and some metals that settle out with the sediment.

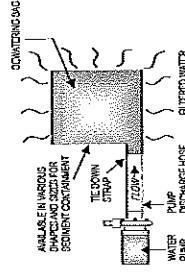
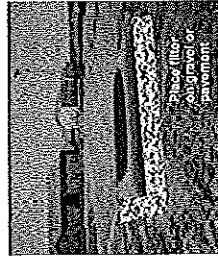
Implementation:

- Excavation and construction of related facilities is required.
- Trap inlets should be located to maximize the travel distance to the trap outlet.
- Use rock or vegetation to protect the trap outlets against erosion.

Maintenance:

- Maintenance is required for vegetation, embankment, inlet and outfall structures, as well as other features.
- Removal of sediment is required when the storage volume is reduced by one-third.

Gravity Bag Filter



Description:

- A gravity bag filter, also referred to as a dewatering bag, is a square or rectangular bag made of non-woven geotextile fabric that collects gravel, sand, silt, and fines.

Appropriate Applications:

- Effective for the removal of sediments (gravel, sand, silt, and fines). Some metals are removed with the sediment.

Implementation:

- Water is pumped into one side of the bag and seeps through the top, bottom, and sides of the bag.

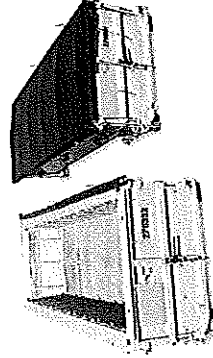
- Place filter bag on pavement or a gravel bed or paved surface. Avoid placing a dewatering bag on unprotected bare soil. If placing the bag on bare soil is unavoidable, a secondary barrier should be used, such as a rock filter bed placed beneath and beyond the edges of the bag to, prevent erosion and capture sediments that escape the bag.

- Perimeter control around the downstream end of the bag should be implemented. Secondary sediment controls are important especially in the initial stages of discharge, which tend to allow fines to pass through the bag.

Maintenance:

- Inspection of the flow conditions, bag condition, bag capacity, and the secondary barrier (as applicable) is required.
- Replace the bag when it no longer filters sediment or passes water at a reasonable rate.
- Caution should be taken when removing and disposing of the bag, to prevent the release of captured sediment
- Properly dispose of the bag offsite. If sediment is removed from the bag prior to disposal (bags can potentially be reused depending upon their condition), dispose of sediment in accordance with the general maintenance procedures described at the end of this BMP Fact Sheet.

Dewatering Tanks



Description:

- A dewatering tank removes debris and sediment. Flow enters the tank through the top, passes through a fabric filter, and is discharged through the bottom of the tank. The filter separates the solids from the liquids.

Appropriate Applications:

- The tank removes trash, gravel, sand, and silt, some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

Implementation:

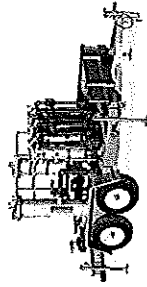
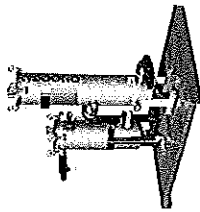
- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.

- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors should be consulted to appropriately size tank.

Maintenance:

- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal should be conducted by licensed waste disposal company.

Pressurized Bag Filter



Description:

- A pressurized bag filter is a unit composed of single filter bags made from polyester felt material. The water filters through the unit and is discharged through a header. Vendors provide bag filters in a variety of configurations. Some units include a combination of bag filters and cartridge filters for enhanced contaminant removal.

Appropriate Applications:

- Effective for the removal of sediment (sand and silt) and some metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Oil absorbent bags are available for hydrocarbon removal.
- Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

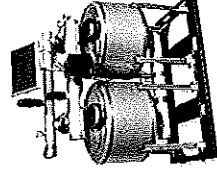
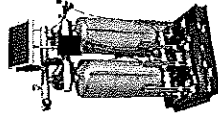
Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

Maintenance:

- The filter bags require replacement when the pressure differential equals or exceeds the manufacturer's recommendation.

Sand Media Particulate Filter



Description:

- Water is treated by passing it through canisters filled with sand media. Generally, sand filters provide a final level of treatment. They are often used as a secondary or higher level of treatment after a significant amount of sediment and other pollutants have been removed using other methods.

Appropriate Applications:

- Effective for the removal of trash, gravel, sand, and silt and some metals, as well as the reduction of biochemical oxygen demand (BOD) and turbidity.
- Sand filters can be used for stand-alone treatment or in conjunction with bag and cartridge filtration if further treatment is required.
- Sand filters can also be used to provide additional treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

Maintenance:

- The filters require regular service to monitor and maintain the level of the sand media. If subjected to high loading rates, filters can plug quickly.
- Vendors generally provide data on maximum head loss through the filter. The filter should be monitored daily while in use, and cleaned when head loss reaches target levels.
- If cleaned by backwashing, the backwash water may need to be hauled away for disposal, or returned to the upper end of the treatment train for another pass through the series of dewatering BMPs.

- Inspect all equipment before use. Monitor dewatering operations to ensure they do not cause offsite discharge or erosion.
- Sample dewatering discharges as required by the General Permit.
- Unit-specific maintenance requirements are included with the description of each unit.
- Sediment removed during the maintenance of a dewatering device may be either spread onsite and stabilized, or disposed of at a disposal site as approved by the owner.
- Sediment that is commingled with other pollutants should be disposed of in accordance with all applicable laws and regulations and as approved by the owner.

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.

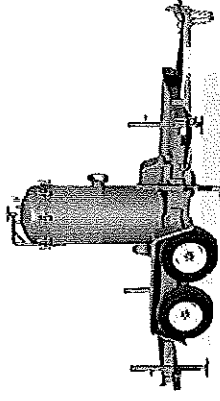
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003; Updated March 2004.

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

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

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Cartridge Filter



Description:

- Cartridge filters provide a high degree of pollutant removal by utilizing a number of individual cartridges as part of a larger filtering unit. They are often used as a secondary or higher (polishing) level of treatment after a significant amount of sediment and other pollutants are removed. Units come with various cartridge configurations (for use in series with bag filters) or with a larger single cartridge filtration unit (with multiple filters within).

Appropriate Applications:

- Effective for the removal of sediment (sand, silt, and some clays) and metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Hydrocarbons can effectively be removed with special resin cartridges.

- Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance.

Maintenance:

- The cartridges require replacement when the pressure differential equals or exceeds the manufacturer's recommendation.

Costs

- Sediment control costs vary considerably depending on the dewatering and sediment treatment system that is selected. Pressurized filters tend to be more expensive than gravity settling, but are often more effective. Simple tanks are generally rented on a long-term basis (one or more months) and can range from \$360 per month for a 1,000 gallon tank to \$2,660 per month for a 10,000 gallon tank. Mobilization and demobilization costs vary considerably.

Inspection and Maintenance

- Inspect and verify that dewatering BMPs are in place and functioning prior to the commencement of activities requiring dewatering.
- Inspect dewatering BMPs daily while dewatering activities are being conducted.

Paving and Grinding Operations NS-3

Implementation

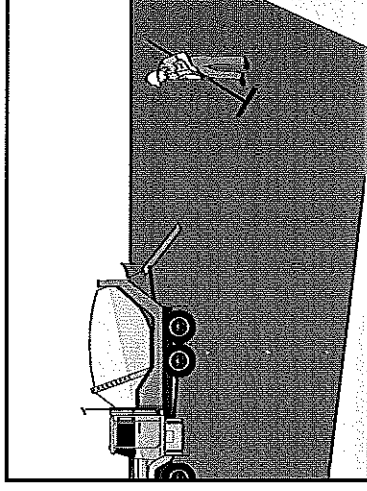
General

- Avoid paving during the wet season when feasible.
- Reschedule paving and grinding activities if rain is forecasted.
- Train employees and sub-contractors in pollution prevention and reduction.
- Store materials away from drainage courses to prevent stormwater runoff (see WM-1, Material Delivery and Storage).
- Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or to trap and filter sediment.
- Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses. These materials should be stored consistent with WM-3, Stockpile Management.
- Disposal of PCC (Portland cement concrete) and AC (asphalt concrete) waste should be in conformance with WM-8, Concrete Waste Management.

Saw Cutting, Grinding, and Pavement Removal

- Shovel or vacuum saw-cut slurry and remove from site. Cover or barricade storm drains during saw cutting to contain slurry.
- When paving involves AC, the following steps should be implemented to prevent the discharge of grinding residue, uncompacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:
 - AC grindings, pieces, or chunks used in embankments or shoulder backing should not be allowed to enter any storm drains or watercourses. Install inlet protection and perimeter controls until area is stabilized (i.e. cutting, grinding or other removal activities are complete and loose material has been properly removed and disposed of) or permanent controls are in place. Examples of temporary perimeter controls can be found in EC-9, Earth Dikes and Drainage Swales; SE-4, Silt Fence; SE-5, Fiber Rolls, or SE-13 Compost Socks and Berms
 - Collect and remove all broken asphalt and recycle when practical. Old or spilled asphalt should be recycled or disposed of properly.
- Do not allow saw-cut slurry to enter storm drains or watercourses. Residue from grinding operations should be picked up by a vacuum attachment to the grinding machine, or by sweeping, should not be allowed to flow across the pavement, and should not be left on the surface of the pavement. See also WM-8, Concrete Waste Management, and WM-10, Liquid Waste Management.
- Pavement removal activities should not be conducted in the rain.
- Collect removed pavement material by mechanical or manual methods. This material may be recycled for use as shoulder backing or base material.

Paving and Grinding Operations NS-3



Categories

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 ☒

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

☒	Sediment
	Nutrients
	Trash
	Metals
	Bacteria
☒	Oil and Grease
	Organics

Potential Alternatives

None

Description and Purpose

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent runoff and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

The General Permit incorporates Numeric Effluent Limits (NEL) and Numeric Action Levels (NAL) for pH and turbidity (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials associated with paving and grinding operations, including mortar, concrete, and cement and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute stormwater runoff or discharge to the storm drain system or watercourses.

Limitations

- Paving opportunities may be limited during wet weather.
- Discharges of freshly paved surfaces may raise pH to environmentally harmful levels and trigger permit violations.



Paving and Grinding Operations NS-3

Thermoplastic Striping

- Thermoplastic striper and pre-heater equipment shutoff valves should be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the stormwater drainage system, or watercourses.
- Pre-heaters should be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move.
- Do not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. When possible, recycle thermoplastic material.

Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near drain inlets, the stormwater drainage system, or watercourses.
- Melting tanks should be loaded with care and not filled to beyond six inches from the top to leave room for splashing.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large-scale projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.

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 paving and grinding operations.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sample stormwater runoff required by the General Permit.
- Keep ample supplies of drip pans or absorbent materials onsite.
- Inspect and maintain machinery regularly to minimize leaks and drips.

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.

Paving and Grinding Operations NS-3

- If removed pavement material cannot be recycled, transport the material back to an approved storage site.

Asphaltic Concrete Paving

- If paving involves asphaltic cement concrete, follow these steps:
 - Do not allow sand or gravel placed over new asphalt to wash into storm drains, streets, or creeks. Vacuum or sweep loose sand and gravel and properly dispose of this waste by referring to WM-5, Solid Waste Management.
 - Old asphalt should be disposed of properly. Collect and remove all broken asphalt from the site and recycle whenever possible.

Portland Cement Concrete Paving

- Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect waste materials by dry methods, such as sweeping or shoveling, and return to aggregate base stockpile or dispose of properly. Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in WM-8, Concrete Waste Management, or pump the water to the sanitary sewer if authorized by the local wastewater authority.

Sealing Operations

- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate should not be allowed to enter any storm drain or water courses. Apply temporary perimeter controls until structure is stabilized (i.e. all sealing operations are complete and cured and loose materials have been properly removed and disposed).
- Inlet protection (SE-10, Storm Drain Inlet Protection) should be used during application of seal coat, tack coat, slurry seal, and fog seal.
- Seal coat, tack coat, slurry seal, or fog seal should not be applied if rainfall is predicted to occur during the application or curing period.

Paving Equipment

- Leaks and spills from paving equipment can contain toxic levels of heavy metals and oil and grease. Place drip pans or absorbent materials under paving equipment when not in use. Clean up spills with absorbent materials and dispose of in accordance with the applicable regulations. See NS-10, Vehicle and Equipment Maintenance, WM-4, Spill Prevention and Control, and WM-10, Liquid Waste Management.
- Substances used to coat asphalt transport trucks and asphalt spreading equipment should not contain soap and should be non-foaming and non-toxic.
- Paving equipment parked onsite should be parked over plastic to prevent soil contamination.
- Clean asphalt coated equipment offsite whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in WM-5, Solid Waste Management. Any cleaning onsite should follow NS-8, Vehicle and Equipment Cleaning.

Paving and Grinding Operations NS-3

Hot Mix Asphalt-Paving Handbook AC 150/5370-14, Appendix I, U.S. Army Corps of Engineers, July 1991.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Paving and Grinding Operations NS-3

Implementation

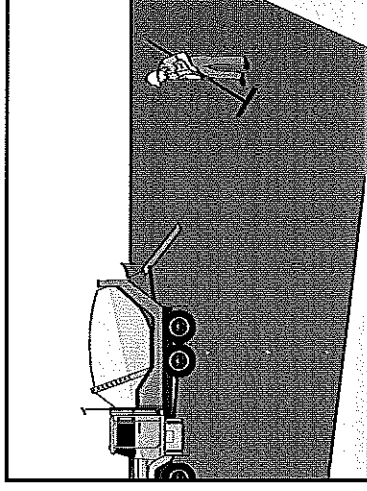
General

- Avoid paving during the wet season when feasible.
- Reschedule paving and grinding activities if rain is forecasted.
- Train employees and sub-contractors in pollution prevention and reduction.
- Store materials away from drainage courses to prevent stormwater runoff (see WM-1, Material Delivery and Storage).
- Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or to trap and filter sediment.
- Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses. These materials should be stored consistent with WM-3, Stockpile Management.
- Disposal of PCC (Portland cement concrete) and AC (asphalt concrete) waste should be in conformance with WM-8, Concrete Waste Management.

Saw Cutting, Grinding, and Pavement Removal

- Shovel or vacuum saw-cut slurry and remove from site. Cover or barricade storm drains during saw cutting to contain slurry.
- When paving involves AC, the following steps should be implemented to prevent the discharge of grinding residue, uncompacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:
 - AC grindings, pieces, or chunks used in embankments or shoulder backing should not be allowed to enter any storm drains or watercourses. Install inlet protection and perimeter controls until area is stabilized (i.e. cutting, grinding or other removal activities are complete and loose material has been properly removed and disposed of) or permanent controls are in place. Examples of temporary perimeter controls can be found in EC-9, Earth Dikes and Drainage Swales; SE-4, Silt Fence; SE-5, Fiber Rolls, or SE-13 Compost Socks and Berms
 - Collect and remove all broken asphalt and recycle when practical. Old or spilled asphalt should be recycled or disposed of properly.
- Do not allow saw-cut slurry to enter storm drains or watercourses. Residue from grinding operations should be picked up by a vacuum attachment to the grinding machine, or by sweeping, should not be allowed to flow across the pavement, and should not be left on the surface of the pavement. See also WM-8, Concrete Waste Management, and WM-10, Liquid Waste Management.
- Pavement removal activities should not be conducted in the rain.
- Collect removed pavement material by mechanical or manual methods. This material may be recycled for use as shoulder backing or base material.

Paving and Grinding Operations NS-3



Categories

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

Legend:

- ☒ Primary Category
- ☐ Secondary Category

Targeted Constituents

☒	Sediment
	Nutrients
	Trash
	Metals
	Bacteria
☒	Oil and Grease
	Organics

Potential Alternatives

None

Description and Purpose

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent runoff and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

The General Permit incorporates Numeric Effluent Limits (NEL) and Numeric Action Levels (NAL) for pH and turbidity (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials associated with paving and grinding operations, including mortar, concrete, and cement and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute stormwater runoff or discharge to the storm drain system or watercourses.

Limitations

- Paving opportunities may be limited during wet weather.
- Discharges of freshly paved surfaces may raise pH to environmentally harmful levels and trigger permit violations.



Paving and Grinding Operations NS-3

Thermoplastic Striping

- Thermoplastic striper and pre-heater equipment shutoff valves should be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the stormwater drainage system, or watercourses.
- Pre-heaters should be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move.
- Do not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. When possible, recycle thermoplastic material.

Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near drain inlets, the stormwater drainage system, or watercourses.
- Melting tanks should be loaded with care and not filled to beyond six inches from the top to leave room for splashing.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large-scale projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.

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 paving and grinding operations.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sample stormwater runoff required by the General Permit.
- Keep ample supplies of drip pans or absorbent materials onsite.
- Inspect and maintain machinery regularly to minimize leaks and drips.

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.

Paving and Grinding Operations NS-3

- If removed pavement material cannot be recycled, transport the material back to an approved storage site.

Asphaltic Concrete Paving

- If paving involves asphaltic cement concrete, follow these steps:
 - Do not allow sand or gravel placed over new asphalt to wash into storm drains, streets, or creeks. Vacuum or sweep loose sand and gravel and properly dispose of this waste by referring to WM-5, Solid Waste Management.
 - Old asphalt should be disposed of properly. Collect and remove all broken asphalt from the site and recycle whenever possible.

Portland Cement Concrete Paving

- Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect waste materials by dry methods, such as sweeping or shoveling, and return to aggregate base stockpile or dispose of properly. Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in WM-8, Concrete Waste Management, or pump the water to the sanitary sewer if authorized by the local wastewater authority.

Sealing Operations

- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate should not be allowed to enter any storm drain or water courses. Apply temporary perimeter controls until structure is stabilized (i.e. all sealing operations are complete and cured and loose materials have been properly removed and disposed).
- Inlet protection (SE-10, Storm Drain Inlet Protection) should be used during application of seal coat, tack coat, slurry seal, and fog seal.
- Seal coat, tack coat, slurry seal, or fog seal should not be applied if rainfall is predicted to occur during the application or curing period.

Paving Equipment

- Leaks and spills from paving equipment can contain toxic levels of heavy metals and oil and grease. Place drip pans or absorbent materials under paving equipment when not in use. Clean up spills with absorbent materials and dispose of in accordance with the applicable regulations. See NS-10, Vehicle and Equipment Maintenance, WM-4, Spill Prevention and Control, and WM-10, Liquid Waste Management.
- Substances used to coat asphalt transport trucks and asphalt spreading equipment should not contain soap and should be non-foaming and non-toxic.
- Paving equipment parked onsite should be parked over plastic to prevent soil contamination.
- Clean asphalt coated equipment offsite whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in WM-5, Solid Waste Management. Any cleaning onsite should follow NS-8, Vehicle and Equipment Cleaning.

Paving and Grinding Operations NS-3

Hot Mix Asphalt-Paving Handbook AC 150/5370-14, Appendix I, U.S. Army Corps of Engineers, July 1991.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Illicit Connection/Discharge

NS-6

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

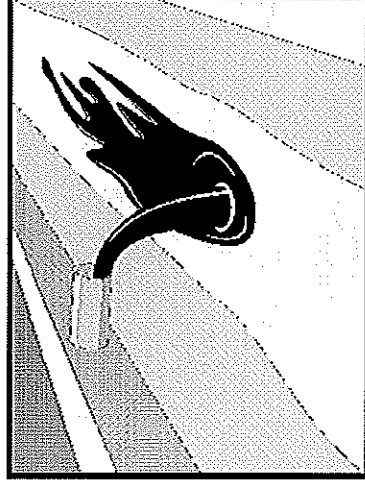
Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery. For illicit connections or discharges to the storm drain system, notify the local stormwater management agency. For illegal dumping, notify the local law enforcement agency.

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.

Illicit Connection/Discharge

NS-6



Categories

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

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	☒
Nutrients	☒
Trash	☒
Metals	☒
Bacteria	☒
Oil and Grease	☒
Organics	☒

Potential Alternatives

None

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.
- Inspect site regularly during project execution for evidence



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.

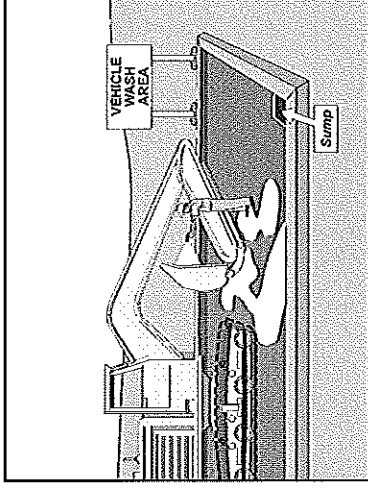
Vehicle and Equipment Cleaning NS-8

- Use phosphate-free, biodegradable soaps.
- Educate employees and subcontractors on pollution prevention measures.
- Do not permit steam cleaning onsite. Steam cleaning can generate significant pollutant concentrates.
- Cleaning of vehicles and equipment with soap, solvents or steam should not occur on the project site unless resulting wastes are fully contained and disposed of. Resulting wastes should not be discharged or buried, and must be captured and recycled or disposed according to the requirements of WM-10, Liquid Waste Management or WM-6, Hazardous Waste Management, depending on the waste characteristics. Minimize use of solvents. Use of diesel for vehicle and equipment cleaning is prohibited.
- All vehicles and equipment that regularly enter and leave the construction site must be cleaned offsite.
- When vehicle and equipment washing and cleaning must occur onsite, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area should have the following characteristics:
 - Located away from storm drain inlets, drainage facilities, or watercourses
 - Paved with concrete or asphalt and bermed to contain wash waters and to prevent runoff
 - Configured with a sump to allow collection and disposal of wash water
 - No discharge of wash waters to storm drains or watercourses
 - Used only when necessary
- When cleaning vehicles and equipment with water:
 - Use as little water as possible. High-pressure sprayers may use less water than a hose and should be considered
 - Use positive shutoff valve to minimize water usage
 - Facility wash racks should discharge to a sanitary sewer, recycle system or other approved discharge system and must not discharge to the storm drainage system, watercourses, or to groundwater

Costs

Cleaning vehicles and equipment at an offsite facility may reduce overall costs for vehicle and equipment cleaning by eliminating the need to provide similar services onsite. When onsite cleaning is needed, the cost to establish appropriate facilities is relatively low on larger, long-duration projects, and moderate to high on small, short-duration projects.

Vehicle and Equipment Cleaning NS-8



Categories	
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
Legend:	
☒	Primary Objective
☒	Secondary Objective

Description and Purpose

Vehicle and equipment cleaning procedures and practices eliminate or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning operations. Procedures and practices include but are not limited to: using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors in proper cleaning procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment cleaning is performed.

Limitations

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Implementation

Other options to washing equipment onsite include contracting with either an offsite or mobile commercial washing business. These businesses may be better equipped to handle and dispose of the wash waters properly. Performing this work offsite can also be economical by eliminating the need for a separate washing operation onsite.

If washing operations are to take place onsite, then:

Targeted Constituents	
Sediment	☒
Nutrients	☒
Trash	
Metals	
Bacteria	☒
Oil and Grease	☒
Organics	
Potential Alternatives	
None	



Vehicle and Equipment Cleaning **NS-8**

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.
- Inspection and maintenance is minimal, although some berm repair may be necessary.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed.
- Prohibit employees and subcontractors from washing personal vehicles and equipment on the construction site.

References

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

Swisher, R.D. Surfactant Biodegradation, Marcel Dekker Corporation, 1987.

Gravel Bag Berm

SE-6

- At the top of slopes to divert runoff away from disturbed slopes.
- As chevrons (small check dams) across mildly sloped construction roads. For use check dam use in channels, see SE-4, Check Dams.

Limitations

- Gravel berms may be difficult to remove.
- Removal problems limit their usefulness in landscaped areas.
- Gravel bag berm may not be appropriate for drainage areas greater than 5 acres.
- Runoff will pond upstream of the berm, possibly causing flooding if sufficient space does not exist.
- Degraded gravel bags may rupture when removed, spilling contents.
- Installation can be labor intensive.
- Durability of gravel bags is somewhat limited and bags may need to be replaced when installation is required for longer than 6 months.
- Easily damaged by construction equipment.
- When used to detain concentrated flows, maintenance requirements increase.

Implementation

General

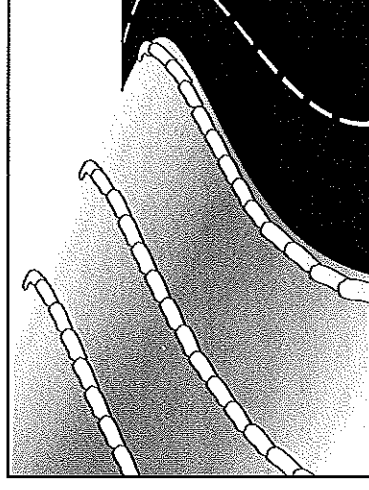
A gravel bag berm consists of a row of open graded gravel-filled bags placed on a level contour. When appropriately placed, a gravel bag berm intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. The open graded gravel in the bags is porous, which allows the ponded runoff to flow slowly through the bags, releasing the runoff as sheet flows. Gravel bag berms also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils. Gravel bag berms are similar to sand bag barriers, but are more porous. Generally, gravel bag berms should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Design and Layout

- Locate gravel bag berms on level contours.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
 - Slope inclination of 4:1 (H:V) or flatter: Gravel bags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
 - Slope inclination between 4:1 and 2:1 (H:V): Gravel bags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

Gravel Bag Berm

SE-6



Description and Purpose

A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flow, preventing erosion.

Suitable Applications

Gravel bag berms may be suitable:

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes
 - As sediment traps at culvert/pipe outlets
 - Below other small cleared areas
 - Along the perimeter of a site
 - Down slope of exposed soil areas
 - Around temporary stockpiles and spoil areas
 - Parallel to a roadway to keep sediment off paved areas
 - Along streams and channels
- As a linear erosion control measure:
 - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

Categories	
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
Legend:	
☒	Primary Category
☐	Secondary Category

Targeted Constituents	
Sediment	☒
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives	
SE-1 Silt Fence	
SE-5 Fiber Roll	
SE-8 Sandbag Barrier	
SE-14 Biofilter Bags	



1 of 4

- **Bag Size:** Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.

- **Fill Material:** Fill material should be 0.5 to 1 in. crushed rock, clean and free from clay, organic matter, and other deleterious material, or other suitable open graded, non-cohesive, porous gravel.

Costs

Material costs for gravel bags are average and are dependent upon material availability. \$2.50-3.00 per filled gravel bag is standard based upon vendor research.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.
- Reshape or replace gravel bags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove gravel bag berms when no longer needed and recycle gravel fill whenever possible and properly dispose of bag material. Remove sediment accumulation and clean, re-grade, and stabilize the area.

References

- Handbook of Steel Drainage and Highway Construction, American Iron and Steel Institute, 1983.
- Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.
- Stormwater Pollution Plan Handbook, First Edition, State of California, Department of Transportation Division of New Technology, Materials and Research, October 1992.
- Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Slope inclination 2:1 (H:V) or greater: Gravel bags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Turn the ends of the gravel bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the gravel bag berm to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, gravel bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the gravel bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- In Non-Traffic Areas:
 - Height = 18 in. maximum
 - Top width = 24 in. minimum for three or more layer construction
 - Top width = 12 in. minimum for one or two layer construction
 - Side slopes = 2:1 (H:V) or flatter
- In Construction Traffic Areas:
 - Height = 12 in. maximum
 - Top width = 24 in. minimum for three or more layer construction.
 - Top width = 12 in. minimum for one or two layer construction.
 - Side slopes = 2:1 (H:V) or flatter.
- Butt ends of bags tightly.
- On multiple row, or multiple layer construction, overlap butt joints of adjacent row and row beneath.

- Use a pyramid approach when stacking bags.

Materials

- **Bag Material:** Bags should be woven polypropylene, polyethylene or polyamide fabric or butriap, minimum unit weight of 4 ounces/yds. Mullen burst strength exceeding 300 lb/in² in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.

Street Sweeping and Vacuuming SE-7

- 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 yds hopper) to \$88/hour (9 yds 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.

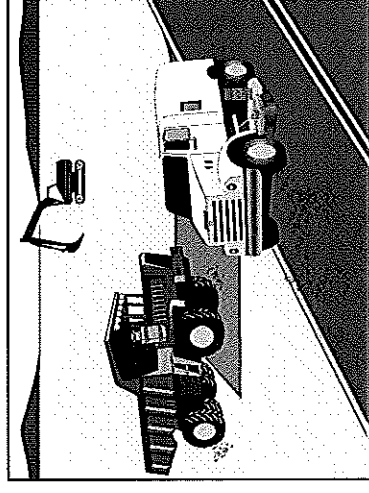
Inspection and Maintenance

- 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.

Street Sweeping and Vacuuming SE-7



Categories	
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
Legend:	
☒	Primary Objective
☐	Secondary Objective

Targeted Constituents	
Sediment	☒
Nutrients	
Trash	☒
Metals	
Bacteria	
Oil and Grease	☒
Organics	
Potential Alternatives	
None	

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.
- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.



Material Delivery and Storage WM-1

- Asphalt and concrete components
- 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 limitations may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

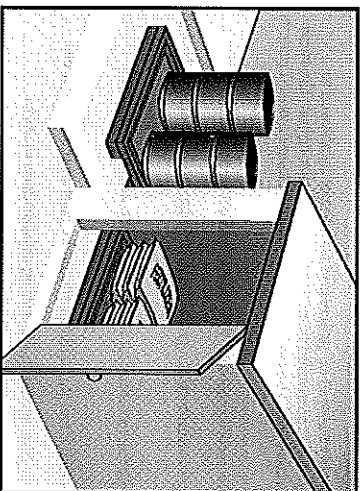
- Chemicals must be stored in water tight containers with appropriate secondary containment or in a storage shed.
- When a material storage area is located on bare soil, the area should be lined and bermed.
- Use containment pallets or other practical and available solutions, such as storing materials within newly constructed buildings or garages, to meet material storage requirements.
- Stack erodible landscape material on pallets and cover when not in use.
- Contain all fertilizers and other landscape materials when not in use.
- Temporary storage areas should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be available on-site for all materials stored that have the potential to effect water quality.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located away from waterways, if possible.
 - Avoid transport near drainage paths or waterways.
 - Surround with earth berms or other appropriate containment BMP. See EC-9, Earth Dikes and Drainage Swales.
 - Place in an area that 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.

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Material Delivery and Storage WM-1



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 watertight containers and/or a completely enclosed 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

Categories	
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
Legend:	
☒	Primary Category
☐	Secondary Category

Targeted Constituents	
Sediment	☒
Nutrients	☒
Trash	☒
Metals	☒
Bacteria	☒
Oil and Grease	☒
Organics	☒

Potential Alternatives	
None	

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Material Delivery and Storage WM-1

- 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 completely enclosed storage 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 wastes.

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.
- If spills or leaks of materials occur that are not contained and could discharge to surface waters, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

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

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep storage areas clean and well organized, including a current list of all materials onsite.
- Inspect labels on containers for legibility and accuracy.

Material Delivery and Storage WM-1

- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Keep ample spill cleanup supplies appropriate for the materials being stored. Ensure that cleanup supplies are in a conspicuous, labeled area.
- 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 and dispose of 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.
- Materials should be covered 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.

Material Delivery and Storage WM-1

- 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), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92006; USEPA, April 1992.

Material Use

WM-2

Limitations

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

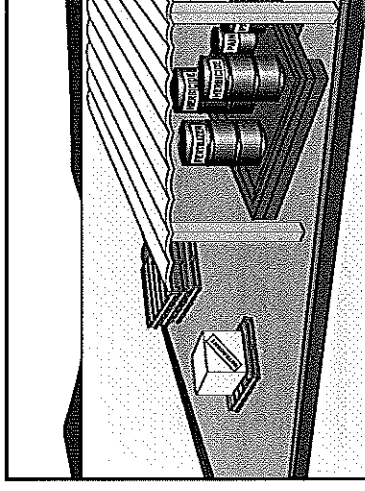
Implementation

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.
- The preferred method of termiticide application is soil injection near the existing or proposed structure foundation/slab; however, if not feasible, soil drench application of termiticides should follow EPA label guidelines and the following recommendations (most of which are applicable to most pesticide applications):
 - Do not treat soil that is water-saturated or frozen.
 - Application shall not commence within 24-hours of a predicted precipitation event with a 40% or greater probability. Weather tracking must be performed on a daily basis prior to termiticide application and during the period of termiticide application.
 - Do not allow treatment chemicals to runoff from the target area. Apply proper quantity to prevent excess runoff. Provide containment for and divert stormwater from application areas using berms or diversion ditches during application.
 - Dry season: Do not apply within 10 feet of storm drains. Do not apply within 25 feet of aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds).
 - Wet season: Do not apply within 50 feet of storm drains or aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds) unless a vegetative buffer is present (if so, refer to dry season requirements).
 - Do not make on-grade applications when sustained wind speeds are above 10 mph (at application site) at nozzle end height.
 - Cover treatment site prior to a rain event in order to prevent run-off of the pesticide into non-target areas. The treated area should be limited to a size that can be backfilled and/or covered by the end of the work shift. Backfilling or covering of the treated area shall be done by the end of the same work shift in which the application is made.
 - The applicator must either cover the soil him/herself or provide written notification of the above requirement to the contractor on site and to the person commissioning the

Material Use

WM-2



Categories

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

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	☒
Nutrients	☒
Trash	☒
Metals	☒
Bacteria	☒
Oil and Grease	☒
Organics	☒

Potential Alternatives

None

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
- 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
- Other materials that may be detrimental if released to the environment



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Material Use

WM-2

- Provide containment for material use areas such as masons' areas or paint mixing/preparation areas to prevent materials/pollutants from entering stormwater.

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.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Ensure employees and subcontractors throughout the job are using appropriate practices.

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.

Comments on Risk Assessments Risk Reduction Options for Cypermethrin: Docket No. OPR-2005-0293; California Stormwater Quality Association (CASQA) letter to USEPA, 2006; Environmental Hazard and General Labeling for Pyrethroid Non-Agricultural Outdoor Products, EPA-HQ-OPP-2008-0331-0021; USEPA, 2008.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92003; USEPA, April 1992.

Material Use

WM-2

application (if different than the contractor). If notice is provided to the contractor or the person commissioning the application, then they are responsible under the Federal Insecticide Fungicide, and Rodenticide Act (FIFRA) to ensure that: 1) if the concrete slab cannot be poured over the treated soil within 24 hours of application, the treated soil is covered with a waterproof covering (such as polyethylene sheeting), and 2) the treated soil is covered if precipitation is predicted to occur before the concrete slab is scheduled to be poured.

- 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 hydraulic application. 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 before predicted rainfall.
- 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 contain for proper disposal off site. 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.
- Document the location, time, chemicals applied, and applicator's name and qualifications.
- 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.
- Discontinue use of erodible landscape material within 2 days prior to a forecasted rain event and materials should be covered and/or bermed.

Stockpile Management

WM-3

- On larger sites, a minimum of 50 ft separation from concentrated flows of stormwater, drainage courses, and inlets is recommended.
- All stockpiles are required to be protected immediately if they are not scheduled to be used within 14 days.
- Protect all stockpiles from stormwater runoff using temporary perimeter sediment barriers such as compost berms (SE-13), temporary silt dikes (SE-12), fiber rolls (SE-5), silt fences (SE-1), sandbags (SE-8), gravel bags (SE-6), or biofilter bags (SE-14). Refer to the individual fact sheet for each of these controls for installation information.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-4, Wind Erosion Control.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.
- Ensure that stockpile coverings are installed securely to protect from wind and rain.
- Some plastic covers withstand weather and sunlight better than others. Select cover materials or methods based on anticipated duration of use.

Protection of Non-Active Stockpiles

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

Soil stockpiles

- Soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- Temporary vegetation should be considered for topsoil piles that will be stockpiled for extended periods.

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

- Stockpiles should be covered and protected with a temporary perimeter sediment barrier at all times.

Stockpiles of "cold mix"

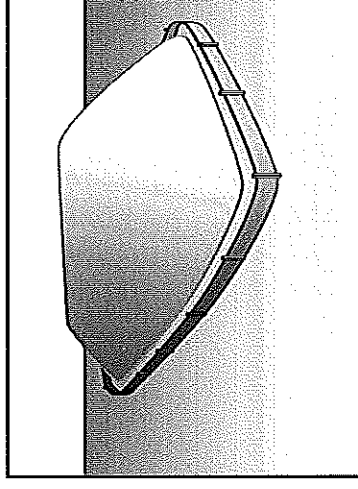
- Cold mix stockpiles should be placed on and covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Stockpiles of fly ash, sludge, hydrated lime

- Stockpiles of materials that may raise the pH of runoff (i.e., basic materials) should be covered with plastic and surrounded by a berm.

Stockpile Management

WM-3



Categories

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	☒

Legend:

- ☒ Primary Category
- ☐ Secondary Category

Description and Purpose

Stockpile management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, soil amendments, sand, 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 loose materials.

Limitations

- Plastic sheeting as a stockpile protection is temporary and hard to manage in windy conditions. Where plastic is used, consider use of plastic tarps with nylon reinforcement which may be more durable than standard sheeting.
- Plastic sheeting can increase runoff volume due to lack of infiltration and potentially cause perimeter control failure.
- Plastic sheeting breaks down faster in sunlight.
- The use of Plastic materials and photodegradable plastics should be avoided.

Implementation

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

Targeted Constituents

Sediment	☒
Nutrients	☒
Trash	☒
Metals	☒
Bacteria	☒
Oil and Grease	☒
Organics	☒

Potential Alternatives

None



Stockpiles/Storage of wood (Pressure treated with chromated copper arsenate or ammoniacal copper zinc arsenate

- Treated wood should be covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Protection of Active Stockpiles

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

- All stockpiles should be covered and protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" and treated wood, and basic materials should be placed on and covered with plastic sheeting or comparable material and surrounded by a berm prior to the onset of precipitation.
- The downstream perimeter of an active stockpile should be protected with a linear sediment barrier or berm and runoff should be diverted around or away from the stockpile on the upstream perimeter.

Costs

For cost information associated with stockpile protection refer to the individual erosion or sediment control BMP fact sheet considered for implementation (For example, refer to SE-1 Silt Fence for installation of silt fence around the perimeter of a stockpile.)

Inspection and Maintenance

- Stockpiles must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- It may be necessary to inspect stockpiles covered with plastic sheeting more frequently during certain conditions (for example, high winds or extreme heat).
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.
- Sediment shall be removed when it reaches one-third of the barrier height.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

- 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

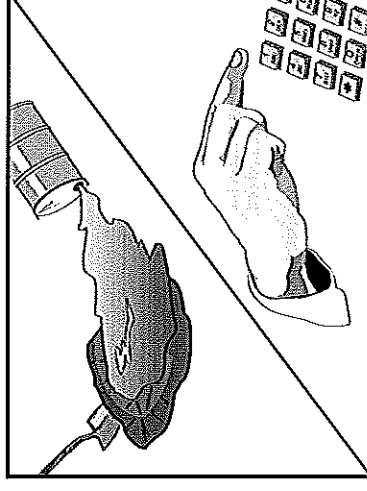
The following steps will help reduce the stormwater impacts of leaks and spills:

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.



Categories	
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
Legend:	
☒	Primary Objective
☐	Secondary Objective

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

Targeted Constituents	
Sediment	☒
Nutrients	☒
Trash	☒
Metals	☒
Bacteria	☒
Oil and Grease	☒
Organics	☒
Potential Alternatives	
None	



Spill Prevention and Control WM-4

- 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 ramps 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:

Spill Prevention and Control WM-4

- 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.

- 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.

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.

Solid Waste Management

WM-5

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).

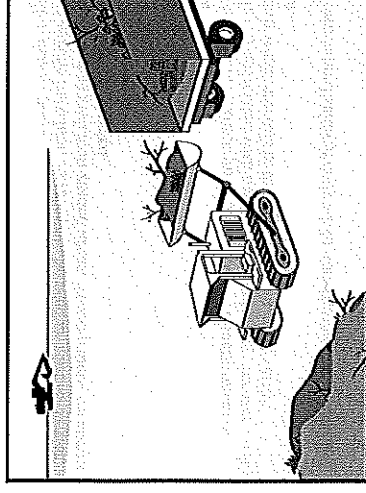
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Solid Waste Management

WM-5



Categories

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

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	☒
Nutrients	☒
Trash	☒
Metals	☒
Bacteria	☒
Oil and Grease	☒
Organics	☒

Potential Alternatives

None

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
- Highway planting wastes, including vegetative material,



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- 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.

- 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.

Hazardous Waste Management WM-6

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 aerially deposited lead (ADL) soils. For ADL soils refer to WM-7, Contaminated Soil Management.

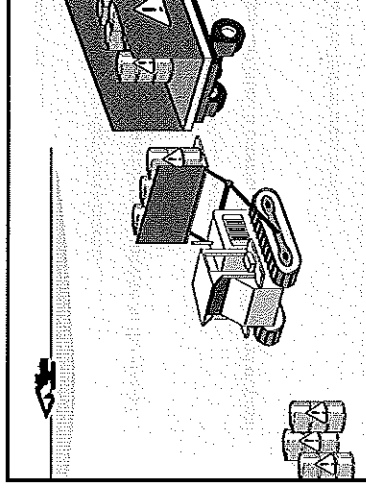
Implementation

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 COR, Division 4.5 and 49 CFR Parts 173, 173, 178, and 179.
- All hazardous waste should be stored, transported, and disposed as required in Title 22 COR, 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.

Hazardous Waste Management WM-6



Categories	
EC	Erosion Control
SE	Sediment Control
TC	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater
WM	Waste Management Control
	Materials Pollution Control
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
- 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	☒
Trash	☒
Metals	☒
Bacteria	☒
Oil and Grease	☒
Organics	☒

Potential Alternatives	
None	



Hazardous Waste Management WM-6

- 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 "Acutely Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

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Hazardous Waste Management WM-6

- 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.

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- 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

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.

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.

Contaminated Soil Management WM-7

plans, specifications, and 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.

Contaminated Soil Management WM-7



Categories	
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
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

Targeted Constituents	
☐	Sediment
☒	Nutrients
☒	Trash
☒	Metals
☒	Bacteria
☒	Oil and Grease
☒	Organics
Potential Alternatives	
None	



Contaminated Soil Management WM-7

- 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.

Contaminated Soil Management WM-7

- 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)

Contaminated Soil Management WM-7

- 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.

Concrete Waste Management

WM-8

- Concrete trucks and other concrete-coated equipment are washed onsite.
 - Mortar-mixing stations exist.
 - Stucco mixing and spraying .
 - See also NS-8, Vehicle and Equipment Cleaning.
- Limitations**
- Offsite washout of concrete wastes may not always be possible.
 - Multiple washouts may be needed to assure adequate capacity and to allow for evaporation.

Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
 - Store dry and wet materials under cover, away from drainage areas. Refer to WM-1, Material Delivery and Storage for more information.
 - Avoid mixing excess amounts of concrete.
 - Perform washout of concrete trucks in designated areas only, where washout will not reach stormwater.
 - Do not wash out concrete trucks into storm drains, open ditches, streets, streams or onto the ground. Trucks should always be washed out into designated facilities.
 - Do not allow excess concrete to be dumped onsite, except in designated areas.
 - For onsite washout:
 - On larger sites, it is recommended to locate washout areas at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
 - Washout wastes into the temporary washout where the concrete can set, be broken up, and then disposed properly.
 - Washout should be lined so there is no discharge into the underlying soil.
 - Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose in the trash.
 - See typical concrete washout installation details at the end of this fact sheet.
- Education**
- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.

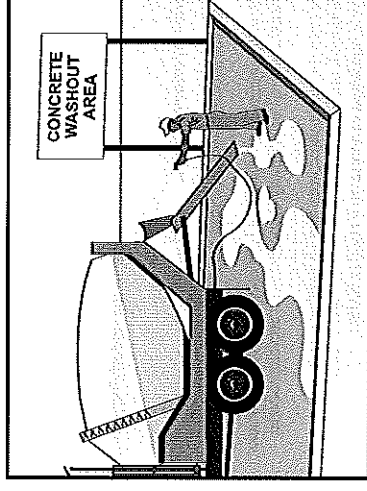
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Concrete Waste Management

WM-8



Categories	
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
Legend:	
☒	Primary Category
☐	Secondary Category

Description and Purpose

Prevent the discharge of pollutants to stormwater from concrete waste by conducting washout onsite or offsite in a designated area, and by employee and subcontractor training.

The General Permit incorporates Numeric Effluent Limits (NEL) and Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials, including mortar, concrete, stucco, cement and block and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows and raising pH to levels outside the accepted range.

Suitable Applications

Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Slurries containing portland cement concrete (PCC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition.

Targeted Constituents	
☒	Sediment
☐	Nutrients
☐	Trash
☒	Metals
☐	Bacteria
☐	Oil and Grease
☐	Organics

Potential Alternatives	
☐	None



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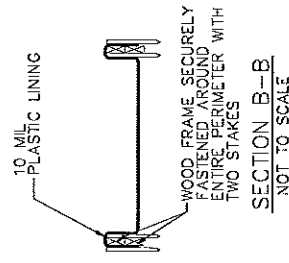
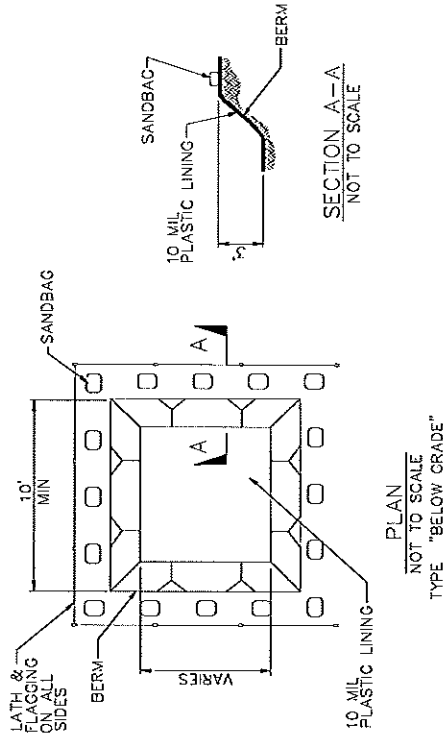
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Concrete Waste Management WM-8

- Temporary washout facilities should have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- Temporary washout facilities should be lined to prevent discharge to the underlying ground or surrounding area.
- Washout of concrete trucks should be performed in designated areas only.
- Only concrete from mixer truck chutes should be washed into concrete wash out.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of or recycled offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per WM-5, Solid Waste Management. Dispose of or recycle hardened concrete on a regular basis.
- Temporary Concrete Washout Facility (Type Above Grade)
 - Temporary concrete washout facility (Type above grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft; however, smaller sites or jobs may only need a smaller washout facility. With any washout, always maintain a sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
 - Materials used to construct the washout area should conform to the provisions detailed in their respective BMPs (e.g., SE-8 Sandbag Barrier).
 - Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
 - Alternatively, portable removable containers can be used as above grade concrete washouts. Also called a "roll-off", this concrete washout facility should be properly sealed to prevent leakage, and should be removed from the site and replaced when the container reaches 75% capacity.
- Temporary Concrete Washout Facility (Type Below Grade)
 - Temporary concrete washout facilities (Type below grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.
 - Lath and flagging should be commercial type.
 - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

Concrete Waste Management WM-8

- Arrange for contractor's superintendent or representative to oversee and enforce concrete waste management procedures.
 - Discuss the concrete management techniques described in this BMP (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.
- Concrete Demolition Wastes**
- Stockpile concrete demolition waste in accordance with BMP WM-3, Stockpile Management.
 - Dispose of or recycle hardened concrete waste in accordance with applicable federal, state or local regulations.
- Concrete Slurry Wastes**
- PCC and AC waste should not be allowed to enter storm drains or watercourses.
 - PCC and AC waste should be collected and disposed of or placed in a temporary concrete washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below).
 - A foreman or construction supervisor should monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.
 - Saw-cut concrete slurry should not be allowed to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine or by sweeping. Saw cutting residue should not be allowed to flow across the pavement and should not be left on the surface of the pavement. See also NS-3, Paving and Grinding Operations; and WM-10, Liquid Waste Management.
 - Concrete slurry residue should be disposed in a temporary washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below) and allowed to dry. Dispose of dry slurry residue in accordance with WM-5, Solid Waste Management.
- Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures**
- Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking.
 - A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.
 - Temporary concrete washout facilities should be constructed above grade or below grade at the option of the contractor. Temporary concrete washout facilities should be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.



- NOTES**
1. ACTUAL LAYOUT DETERMINED IN FIELD.
 2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

- The base of a washout facility should be free of rock or debris that may damage a plastic liner.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and properly disposed or recycled in accordance with federal, state or local regulations. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and properly disposed or recycled in accordance with federal, state or local regulations.
- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

Costs

All of the above are low cost measures. Roll-off concrete washout facilities can be more costly than other measures due to removal and replacement; however, provide a cleaner alternative to traditional washouts. The type of washout facility, size, and availability of materials will determine the cost of the washout.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Temporary concrete washout facilities should be maintained to provide adequate holding capacity with a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilities. Maintaining temporary concrete washout facilities should include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials should be removed and properly disposed or recycled in accordance with federal, state or local regulations.
- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.
- Inspect washout facilities for damage (e.g. torn liner, evidence of leaks, signage, etc.). Repair all identified damage.

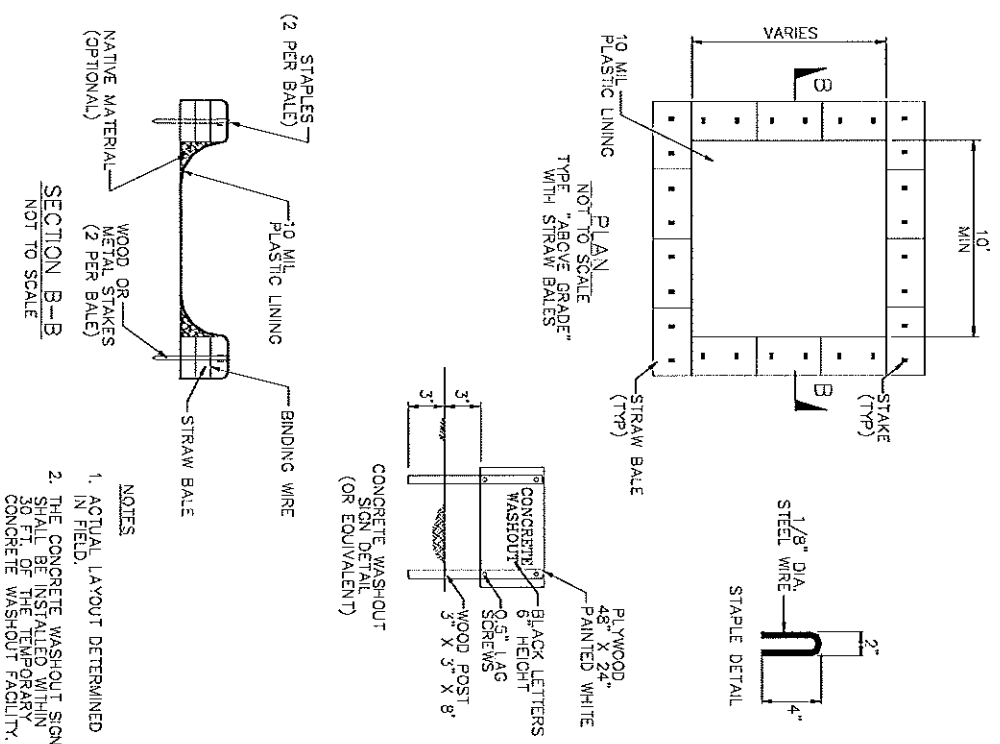
References

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, Updated March 2003.

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

Concrete Waste Management WM-8



Sanitary/Septic Waste Management WM-9

- Temporary sanitary facilities must be equipped with containment to prevent discharge of pollutants to the stormwater drainage system of the receiving water.
- Consider safety as well as environmental implications before placing temporary sanitary facilities.
- Wastewater should not be discharged or buried within the project site.
- 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.
- 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.
- If a spill does occur from a temporary sanitary facility, follow federal, state and local regulations for containment and clean-up.

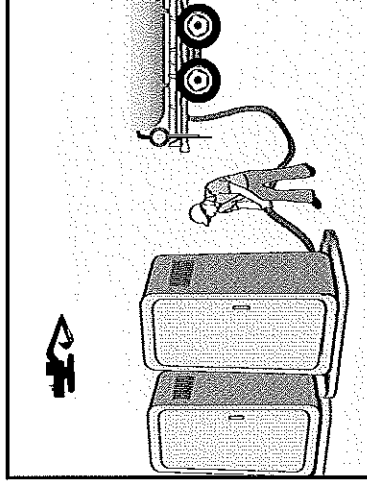
Education

- 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 the use of sanitary facilities (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Costs

All of the above are low cost measures.

Sanitary/Septic Waste Management WM-9



Categories	
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
Legend:	
☒	Primary Category
☐	Secondary Category

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. If site conditions allow, place portable facilities a minimum of 50 feet from drainage conveyances and traffic areas. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.

Targeted Constituents	
Sediment	☒
Nutrients	☒
Trash	☒
Metals	☒
Bacteria	☒
Oil and Grease	☒
Organics	☒
Potential Alternatives	
None	



Sanitary/Septic Waste Management WM-9

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- 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.
- If spills or leaks from sanitary or septic facilities occur that are not contained and discharge from the site, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

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

Stabilized Construction Entrance/Exit TC-1

runoff.

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

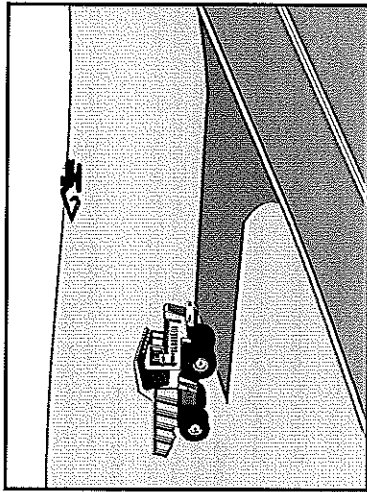
- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft minimum, and 30 ft minimum width.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized 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.

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Stabilized Construction Entrance/Exit TC-1



Categories

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	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

☒	Sediment
	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



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Stabilized Construction Entrance/Exit TC-1

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.

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.

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

Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters, EPA 840-B-9-002, USEPA, Office of Water, Washington, DC, 1993.

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

Stabilized Construction Entrance/Exit TC-1

- 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.
- 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

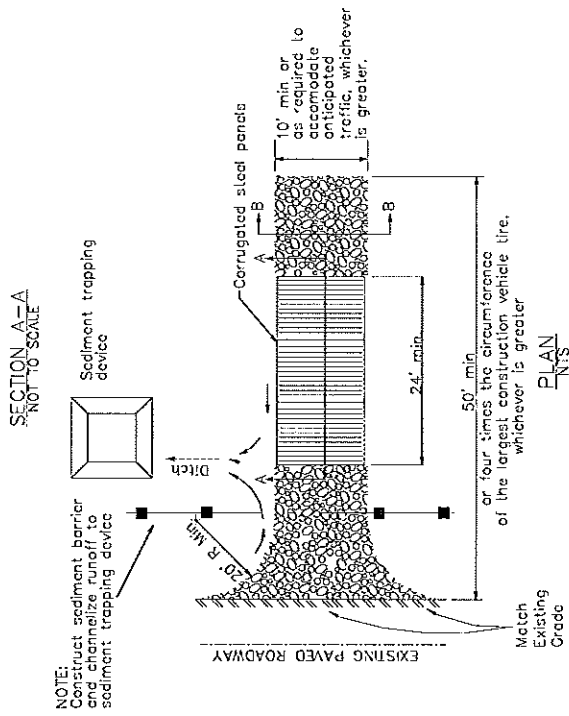
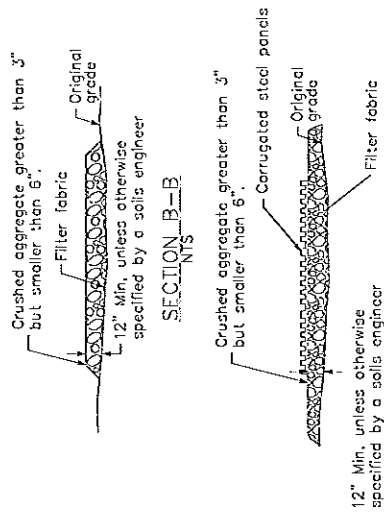
Costs

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.

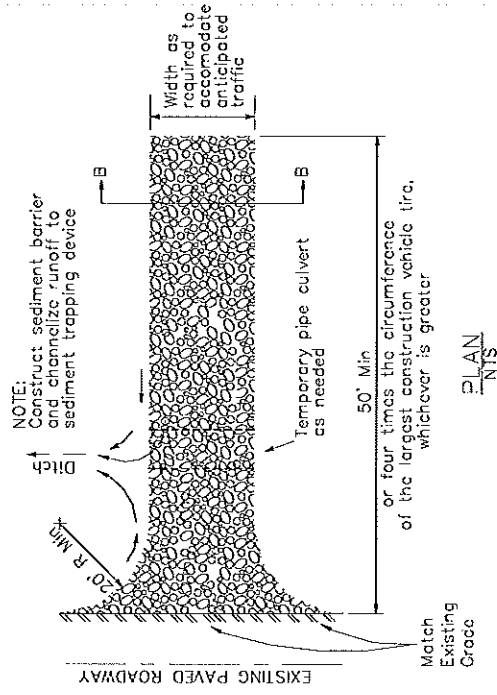
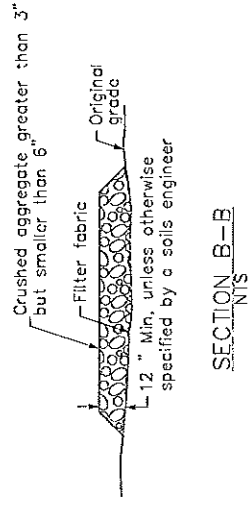
References

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

Stabilized Construction Entrance/Exit TC-1



Stabilized Construction Entrance/Exit TC-1



Wind Erosion Control

WE-1

- Construction vehicle traffic on unpaved roads
 - Drilling and blasting activities
 - 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 (generally less than a few hours) and should be applied daily (or more often) to be effective.
 - Over watering may cause erosion and track-out.
 - 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.
 - Chemical dust suppression agents may have potential environmental impacts. Selected chemical dust control agents should be environmentally benign.
 - Effectiveness of controls depends on soil, temperature, humidity, wind velocity and traffic.
 - Chemical dust suppression agents should not be used within 100 feet of wetlands or water bodies.
 - Chemically treated subgrades 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.
 - In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.
 - If the soil surface has minimal natural moisture, the affected area may need to be pre-wetted so that chemical dust control agents can uniformly penetrate the soil surface.

Implementation

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table presents dust control practices that can be applied to varying site conditions that could potentially 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 include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph or less, and controlling the number and activity of vehicles on a site at any given time.

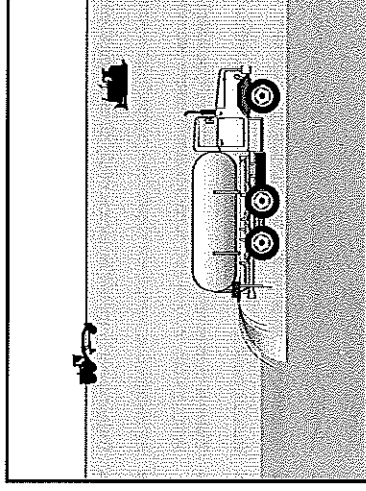
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Wind Erosion Control

WE-1



Categories

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	

Legend:

- ☒ Primary Category
- ☐ Secondary Category

Targeted Constituents

☒	Sediment
	Nutrients
	Trash
	Metals
	Bacteria
	Oil and Grease
	Organics

Potential Alternatives

EC-3 Soil Blinders

Description and Purpose

Wind erosion or dust control consists of applying water or other chemical dust suppressants 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.

California's Mediterranean climate, with a short "wet" season and a typically long, hot "dry" season, allows the soils to thoroughly dry out. During the dry season, 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. Site conditions and climate can make dust control more of an erosion problem than water based erosion. Additionally, many local agencies, including Air Quality Management Districts, require dust control and/or dust control permits in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. Wind erosion control is required to be implemented at all construction sites greater than 1 acre by the General Permit.

Suitable Applications

Most BMPs that provide protection against water-based erosion will also protect against wind-based erosion and dust control requirements required by other agencies will generally meet wind erosion control requirements for water quality protection. Wind erosion control BMPs are suitable during the following construction activities:



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Wind Erosion Control

WE-1

Control Board (RWQCB) 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."

- 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 rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and wheel wash areas.
- Stabilize inactive areas of construction sites using temporary vegetation or chemical stabilization methods.

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 and should meet all applicable regulatory requirements.

Costs

Installation costs for water and chemical dust suppression vary based on the method used and the length of effectiveness. Annual costs may be high since some of 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.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check areas protected to ensure coverage.
- Most water-based dust control measures require frequent application, often daily or even multiple times per day. Obtain vendor or independent information on longevity of chemical dust suppressants.

References

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.
California Air Pollution Control Laws, California Air Resources Board, updated annually.
Construction Manual, Chapter 4, Section 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative", California Department of Transportation (Caltrans), July 2001.

Wind Erosion Control

WE-1

Chemical dust suppressants include: mulch and fiber based dust palliatives (e.g. paper mulch with gypsum binder), salts and brines (e.g. calcium chloride, magnesium chloride), non-petroleum based organics (e.g. vegetable oil, lignosulfonate), petroleum based organics (e.g. asphalt emulsion, dust oils, petroleum resins), synthetic polymers (e.g. polyvinyl acetate, vinylis, acrylic), clay additives (e.g. bentonite, montmorillonite) and electrochemical products (e.g. enzymes, ionic products).

Site Condition	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Grass or Asphalt	Temporary Gravel Concentrations (Temporary Wash Down)	Synthetic Geotextiles	Minimize Impact of Disturbance Area
Disturbed Areas not Subject to Traffic	X	X	X	X	X			X
Disturbed Areas Subject to Traffic			X	X	X	X		X
Material Stockpiles		X	X	X			X	X
Demolition			X			X	X	
Clearing / Grading			X	X				X
Travel Traffic on Bare Soils			X	X	X	X	X	
Trucking					X	X		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (see EC-1, Scheduling).
- Quickly treat exposed soils using water, mulching, chemical dust suppressants, or 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.
- Restrict construction traffic to stabilized roadways within the project site, as practicable.
- 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

Wind Erosion Control

WE-1

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), March 2003.

