Water Quality Assessment Report

New Temescal Canyon Road Bridge and Roadway Project

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County of Riverside
City of Lake Elsinore, CA
Caltrans District 8-SBD
Federal Project No. BRLO 5074 (015)

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STATE OF CALIFORNIA
Department of Transportation

Prepared By: Ceazar Aguilar, P.E. Date: March 21, 2017
President
Office: (951) 300-1431
Fax: (951) 300-1435
Aguilar Consulting, Inc.
2155 Chicago Avenue, Suite 301 Riverside CA 92508

Approved By: _____ Date: _____
Professional Content Reviewer, Title
Phone Number
Office Name
Partner Agency Name

Approved By: _____ Date: _____
Management Content Reviewer, Title
Phone Number
Office Name
Partner Agency Name

Executive Summary

The City of Lake Elsinore proposes to construct a new bridge and roadway for Temescal Canyon Road at Temescal Wash on a new roadway alignment under the Federal Highway Administration (FHWA) Highway Bridge Program (HBP) in the City of Lake Elsinore, California. The proposed bridge will be located approximately 1,200 feet west of the existing bridge while the proposed roadway will follow a new east-west alignment, roughly 3,540 feet in length, that will extend from Lake Street to the existing Temescal Canyon Road to the northwest.

The construction, use, operation, and maintenance of the proposed bridge and roadway have the potential to contribute pollutants to stormwater runoff from the Project. Because stormwater runoff from the Project may enter Temescal Wash by direct discharge or by indirect discharge through the municipal separate storm drain system (MS4), measures to control, reduce, or eliminate the discharge of pollutants to the Project's stormwater runoff are required. These pollutant control measures are known as Best Management Practices (BMPs) and are implemented in two distinct phases of the Project; (1) Construction Phase, and (2) Post-Construction Phase.

The federal Clean Water Act and the California Porter-Cologne Water Quality Act implement the National Pollutant Discharge Elimination System (NPDES) program in California. The NPDES program controls water pollution by regulating sources that discharge pollutants to waters of the United States. The state program is administered by the California State Water Resources Control Board (SWRCB) and the California Regional Water Quality Control Boards (RWQCB). The SWRCB and RWQCB programs require the control of pollutants during construction and throughout the life of the Project.

Locally, the City of Lake Elsinore holds an NPDES permit for discharges from its MS4 system. On January 29, 2010 the Santa Ana Regional Water Quality Control Board issued a fourth-term area wide National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System Permit (MS4 Permit) to the Riverside County Flood Control and Water Conservation District (the Principal Permittee), the County of Riverside and the City of Lake Elsinore. The Santa Ana MS4 Permit is for the portion of the Santa Ana River watershed located within Riverside County (Order No. R8-2010-0033, NPDES Permit No. CAS618033). The Permittees' storm water programs are designed to ensure compliance with this permit.

All pertinent environmental and water quality permitting such as the USACE 404, California Fish and Game Code FGC Section 1602, RWQCB 404 Water Quality Certification, and Jurisdiction Determination are currently in process. However, the Project has not been reviewed by the California Department of Fish and Wildlife, the US Army Corps of Engineers, or the Regional Water Quality Control Board. A delineation of potential wetlands and waters subject to the jurisdiction of the United States Army Corps of Engineers (USACE), the California Department of Fish and Wildlife (CDFW), and the Regional Water Quality Control Board (RWQCB) was prepared as part of the evaluation for potential permit requirements under Section 404 of the Federal Clean Water Act (CWA), for Streambed Alteration Agreement processing under Section 1600 et seq. of the California Fish and Game Code, and for water quality certification under Section 401 of the CWA, respectively. The analysis in the

jurisdictional delineation resulted in 0.47 acre of Temescal Wash within the Biological Study Area as potential non-wetland waters of the U.S and 1.36 acres of streambed/associated riparian habitat expected to be regulated by the CDFW. Since there are areas within the Project area subject to USACE and CDFW jurisdiction, RWQCB jurisdiction in this case is coincident with USACE jurisdiction for purposes of the Section 401 water quality certification. The total area of potential RWQCB jurisdiction is 0.47 acre.

The Project is subject to the previsions of the Western Riverside County Multiple-Species Habitat Conservation Plan (MSHCP). An MSHCP consistency analysis has been prepared for the Project. Because the Project cannot avoid all impacts to riparian/riverine areas, a Determination of Biologically Superior or Equivalent Preservation (DBESP) analysis is required to mitigate for any impacts. At the minimum, compensation for riparian/riverine impacts in the DBESP will include off-site participation in an in lieu fee program, and/or purchase of credits from a mitigation bank for habitat creation. Mitigation in the DBESP will be equivalent or superior to that which would occur if impacts to the riparian/riverine resources were avoided. The Project is scheduled to be reviewed by the Western Riverside County Regional Conservation Authority (RCA), who manages the MSHCP, in April 2017. Compensatory mitigation is anticipated to be required by the USACE, the CDFW, the RWQCB, and for MSHCP consistency to offset the loss of jurisdictional waters and riparian/riverine habitat.

The City of Lake Elsinore requires the Project to develop and implement two plans to control water pollution. The Storm Water Pollution Prevention Plan (SWPPP) will identify the potential pollutants associated with construction of the Project and the BMPs that will be implemented during construction to control, reduce, or eliminate these pollutants in discharges of stormwater runoff from the Project. The second plan is the Water Quality Management Plan (WQMP) that will identify the potential pollutants associated with the use, operation, and maintenance of the completed Project and the BMPs that will be incorporate into the Project to control, reduce, or eliminate these pollutants in discharges of stormwater runoff throughout the operational life of the Project.

To efficiently and effectively comply with both the City of Lake Elsinore's requirements for water quality control, two documents are being prepared for this Project:

- **Storm Water Pollution Prevention Plan (SWPPP) –** The SWPPP will include treatment BMPs to control the discharge of pollutants in stormwater runoff associated with the construction of the Project. The SWPPP will include a description of the post-construction BMPs identified in the WQMP for the Project. Some of the construction phase BMPs for the Project include:

    - Scheduling
    - Streambank Stabilization
    - Wind Erosion Controls
    - Storm Drain Inlet Protection
    - Gravel Bag Berm
    - Gravel Bag Check Dams
    - Sediment Sweeping and Vacuuming

- Material and Waste Handling and Storage

- **Water Quality Management Plan (WQMP) –** The WQMP is a post-construction plan for managing the quality and quantity of stormwater runoff that flows from the Project after construction is completed and the Project is operational. The WQMP will describe the site design, source control and treatment control Best Management Practices (BMPs) that will be implemented and maintained throughout the life of Project to prevent and minimize water pollution that can be caused by stormwater runoff. The WQMP includes the following three major categories of BMPs:

  - Site Design BMPs (also known as Low Impact Development strategies) – are Project features that are designed or incorporated into a project to minimize the increase in stormwater runoff from the developed project site. Examples of Site Design BMPs include the use of porous pavement or pavers, minimizing the use of impervious pavement areas, directing roof drains to landscaped areas, disconnecting impervious areas, and conserving natural areas, etc., to allow water to percolate into the ground.
  - Source Control BMPs – Activities or structures aimed at eliminating or minimizing contact between pollutant sources and stormwater/urban runoff. Examples of Source Control BMPs include education, contractor training, storm drain markings, sweeping, litter collection, canopies over fueling islands, and awnings or tarps to cover materials stored outdoors. These BMPs help keep water from carrying pollutants to storm drain systems and then to Temescal Wash.
  - Treatment Control BMPs – Engineered devices or systems incorporated into the project's drainage system to remove pollutants from stormwater runoff before the runoff leaves the project site. Examples of Treatment Control BMPs include vegetated swales, infiltration trenches, detention/retention basins, catch basin filters, and vortex separators. These devices help remove potential pollutants from stormwater runoff prior to leaving site and entering storm drain systems and then to Temescal Wash.

  The Post-Construction BMPs for the Project may include:
  - Education for Property Owners
  - Drainage Facility Inspection and Maintenance
  - Street Sweeping
  - MS4 Stenciling and Signage
  - Channel and Slope Protection

Collectively, the BMPs described in the SWPPP and/or the WQMP are expected to mitigate the discharge of pollutants associated with the construction, use, operation, and maintenance of the Project to levels that are less than significant.

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1. INTRODUCTION

1.1 Project Description

The City of Lake Elsinore (City), in coordination with the California Department of Transportation (Caltrans), is pursuing a new bridge project at Temescal Canyon Road over Temescal Wash through the Highway Bridge Program. The Project is located in the city of Lake Elsinore between Lake Street and Bernard Street (see Figures 1 and 4).

The existing Temescal Canyon Road Bridge (23-foot wide bridge) has been rated by Caltrans as 'Functionally Obsolete' (FO) with a low Sufficiency Rating (SR) of 68.5. Additionally, the existing structure does not provide adequate channel cross section and freeboard to convey the 100-year flood waters, thus resulting in regular closure of the Bridge and roadway during an ordinary storm event. The existing bridge structure is also on a sharp curved alignment at the west approach for the eastbound traffic, which can only accommodate a safe design speed of 30 to 40 miles per hour (MPH). The narrow bridge with 10-foot traveled lanes further reduces the safe speed to less than 30 MPH, which is not acceptable to the traffic operation standpoint as Temescal Canyon Road serves as a Major Road requiring a design speed of 55 MPH for flat terrain per City of Lake Elsinore's (City) General Plan.

The purpose of the Project is to replace the existing structurally and hydraulically deficient bridge with a new bridge on a new roadway alignment to ensure public safety, enhance vehicular and non-motorized traffic circulation in the area, provide an all-weather 100-year crossing over Temescal Wash, and remove the existing bridge from the Federal Eligible Bridge List. The need for the Project is to construct a new bridge that meets current design standards and accommodate local requirements. The Project will improve traffic safety and circulation by providing a roadway alignment and section (sidewalk and bike lane) that conforms to the Circulation Element of the City's General Plan (see Figure 2).

The bridge replacement/roadway realignment project will replace the current 2-lane, 23-foot wide bridge with a 98-foot wide bridge (with a curb to curb width of 80 feet). As shown in Figure 3, the bridge will be striped with a 14-foot painted median, two 12-foot inside lanes, two 15-foot outside lanes, two 6-foot shoulders that can accommodate Class II bike lanes, and two 6-foot sidewalks separated from traffic with a concrete barrier, which is necessary due to a posted speed limit greater than 45 MPH. The bridge structure type tentatively selected for the proposed new bridge is a Cast-In-Place Prestressed (CIP/PS) Concrete Box Girder. Use of piles are tentatively anticipated for the bridge foundation. The Project includes an 825-foot long roadway transition on the northwest end to tie into the existing 2-lane roadway of Temescal Canyon Road and a 696-foot transition on the southeast end of the bridge to tie into the new realigned 2-lane roadway that connects to Lake Street. The realigned Temescal Canyon Road will intersect Lake Street approximately 180 feet south of the current intersection, which conforms to the location detailed in the City's General Plan Circulation Element.

The 2017 FTIP description for the bridge replacement states: "IN LAKE ELSINORE - CONS OF A NEW 4-LANE DIVIDED ROADWAY, REALIGNING EXISTING TEMESCAL CANYON ROAD AND REPLACE EXISTING 2- LANE UNIMPROVED TEMESCAL CANYON ROAD FROM LAKE STREET TO 650 FT EASTERLY OF CITY'S WESTERLY BOUNDARY. SEGMENT OF THIS REALIGNED ROAD INCLUDES A 706' BRIDGE FUNDED BY HBP LISTED SEPARATELY UNDER RIV111203." As previously stated, the proposed bridge is on a new roadway alignment. In the interim, the existing roadway northwest of the relocated bridge and the new roadway southeast of the relocated bridge will be two lanes (one lane in each direction). In the future, both segments of the roadway will be widened to 4 lanes.

The area to be potentially impacted by the Project includes properties within the Alberhill Villages Specific Plan (AVSP) in the City of Lake Elsinore. The Project will require the permanent acquisition of new right-of-way, temporary construction easements, and permanent easements for drainage and roadway improvements and maintenance are expected. Since the proposed bridge is not located in an existing roadway, it will not require relocation of existing utilities (water, sewer, cable, telephone, gas, electric utilities, etc.). However, the bridge sidewalk and deck will include utility openings to accommodate future utilities should it become necessary. The existing bridge and roadway will be removed under a separate plan and permit in conjunction with the development of AVSP.

The Project will include minimal drainage improvements within Temescal Wash. Activities will include minor re-grading of the creek in the vicinity of the bridge and construction of concrete slope protection, cutoff wall, and riprap launch pad to protect the bridge abutments from scour. An 850-foot segment of the existing low flow channel (404 Jurisdictional Delineation) will be relocated to convey low flows through the proposed bridge. The relocated low flow channel will extend approximately 560 feet downstream of the proposed bridge. It will also extend approximately 510 feet upstream of the proposed bridge. This relocated low flow channel will be restored. The approximate total construction area of the Project is 7.4 acres with an impervious area of approximately 1.7 acres (paved roadway and concrete slope protection near the bridge abutment). In contrast, the pavement removal of the existing Temescal Canyon Road and bridge in conjunction with the AVSP development will reduce the impervious area by approximately 1.8 acres, resulting in a net decrease of impervious area of 0.1 acre.

Bridge construction and drainage improvements will result in disturbance to waters of the State and Federal Waters. Therefore, the Project will require a standard Section 1602 Streambed Alteration Agreement with the California Department of Fish and Wildlife (CDFW), a Section 401 Water Quality Certification from the California Regional Water Quality Control Board (RWQCB), and a Section 404 Nationwide Permit from the U.S. Army Corps of Engineers (ACOE). Those permits will be coordinated, processed and obtained during the PS&E phase of the Project.

The scope of the WQAR is limited to the new bridge, the 200-foot roadway transition from the bridge to the northwest near Bernard Street, and the 200-foot roadway transition from the bridge to the southeast towards Lake Street (Segment "B" of Appendix I). The new

roadway segment from the end of the 200-foot transition to Bernard Street will be constructed by the City (see Segment "A" of Appendix I). Applicable and appropriate treatment BMPs will be implemented in this segment such as a stormwater quality basin located at the southeast corner of Temescal Canyon Road and Bernard Street that will be sized to treat stormwater flow and volume from this segment of the roadway including the tributary area of Segment "B" (bridge and roadway). On the other hand, the new roadway segment from the end of the 200-foot transition to Lake Street (Segment "C") will be constructed in conjunction with the AVSP development via a separate plan and permit. Applicable and appropriate treatment BMPs will be implemented in this segment by the developer such as multiple stormwater quality basins that will be sized to treat stormwater flow and volume from Segment "C" including the tributary area of Segment "B" (bridge and roadway). Due to the proposed high point on the bridge, roadway and bridge stormwater runoff from Segment "B" will drain northwesterly onto Segment "A" and southeasterly onto Segment "C".

A Risk Level Assessment was performed. From its findings, the Project has a medium sediment risk, low receiving waters risk, leading to the combined risk of the Project to be a Level 2.

1.1.1 No Project Alternative

The No Project Alternative would have this segment of Temescal Canyon Road remain in its current condition, which will not address the safety issues and road closures within the Project limits.

1.1.2 Alternative 1

Alternative 1 proposes to replace the current 2-lane, 23-foot wide bridge with a 98-foot wide bridge on a new roadway alignment. The bridge will be striped with a 14-foot painted median, two 12-foot inside lanes, two 15-foot outside lanes, two 6-foot shoulders that can accommodate Class II bike lanes, and two 6-foot sidewalks separated from traffic with a concrete barrier, which is necessary due to a posted speed limit greater than 45 MPH. The Project includes roadway transitions on both sides of the bridge. The proposed improvements will require construction of a new concrete bridge, roadway excavation and backfill, minor channel grading, channel slope lining and cutoff walls near the bridge abutment (for scour protection), and installation of street lights and Midwest Guardrail System (MGS) at various locations. This alternative will require acquisition of temporary construction easement (TCE), permanent roadway rights-of-way and easements, and permanent drainage and slope easements. Additionally, this alternative will require off-site mitigation for loss of riparian habitat.

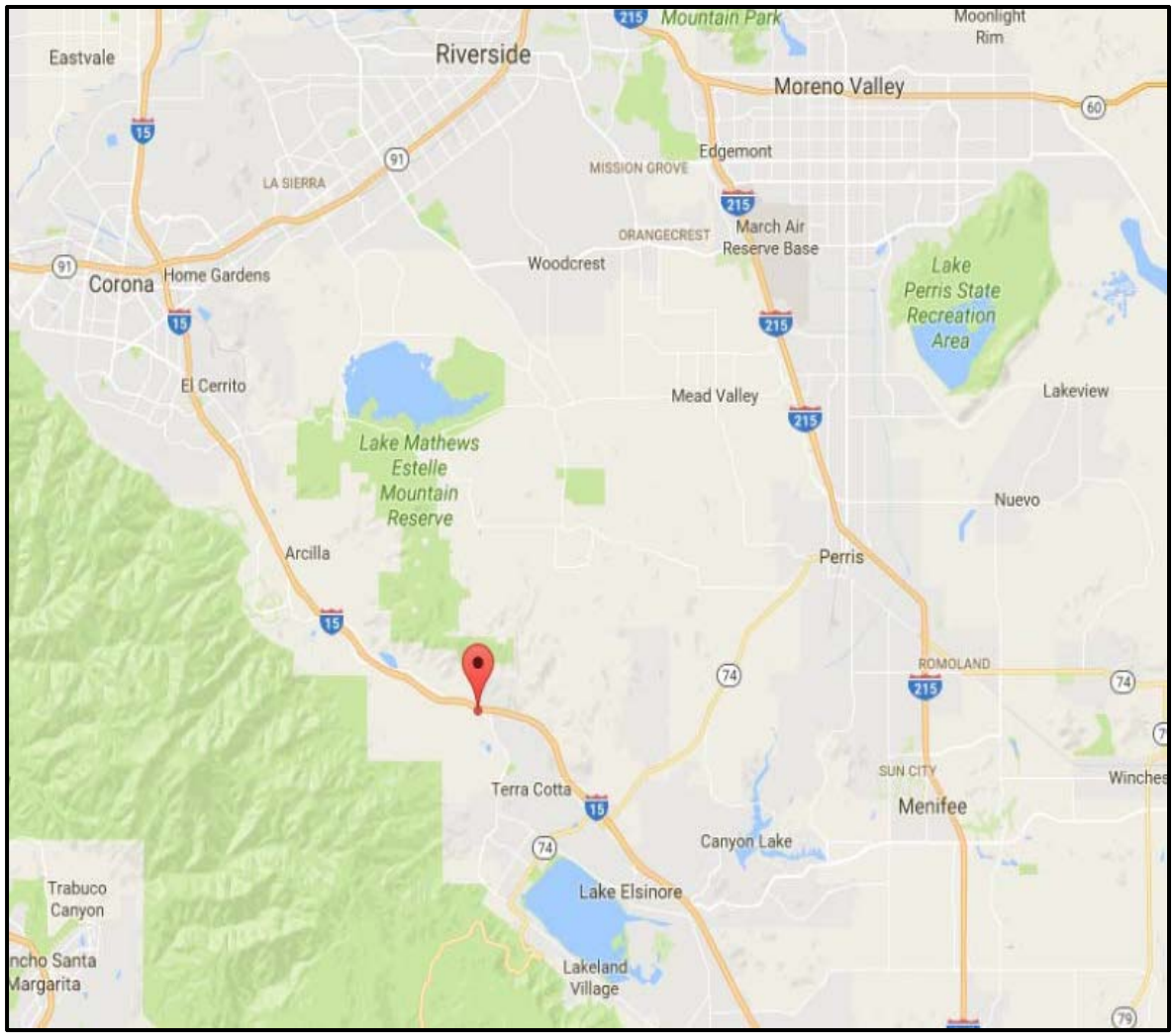


Figure 1: Project Vicinity

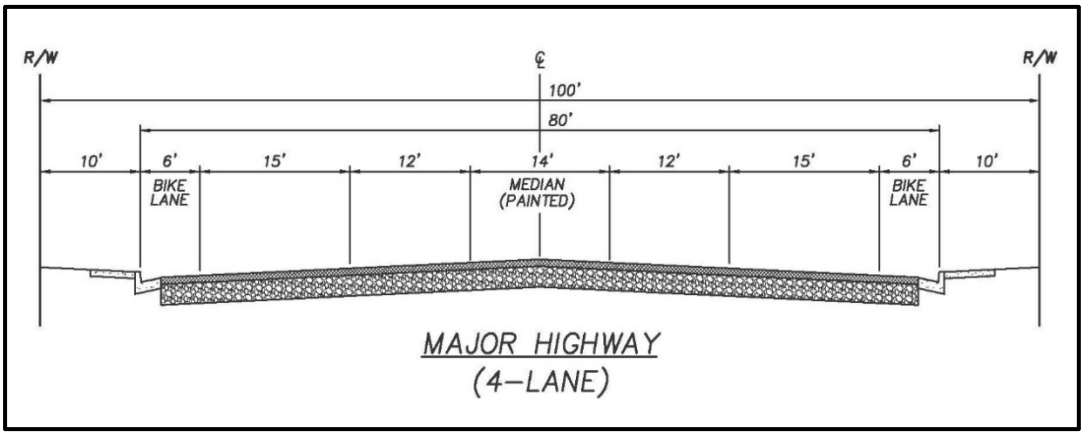


Figure 2: Typical Section of Ultimate Temescal Canyon Road

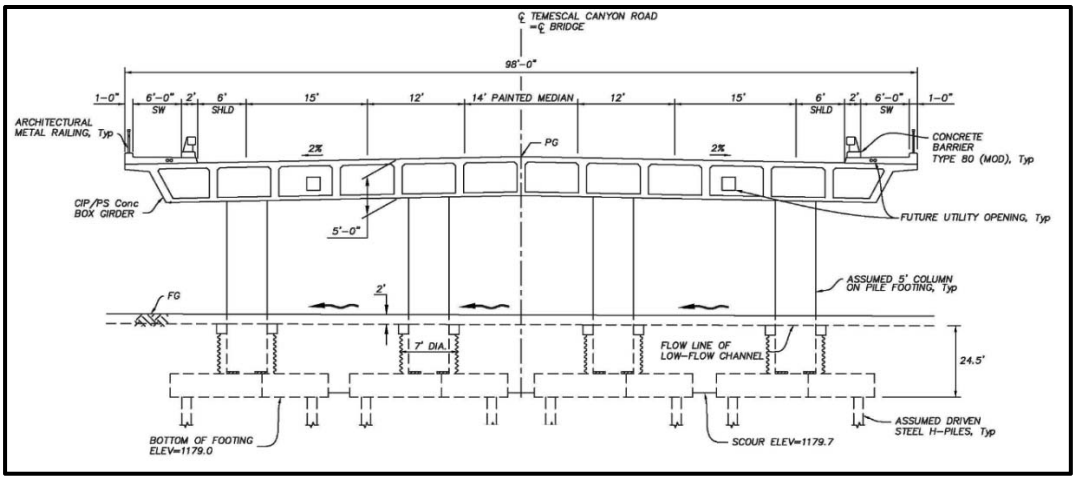


Figure 3: Typical Section of Proposed Temescal Canyon Road Bridge

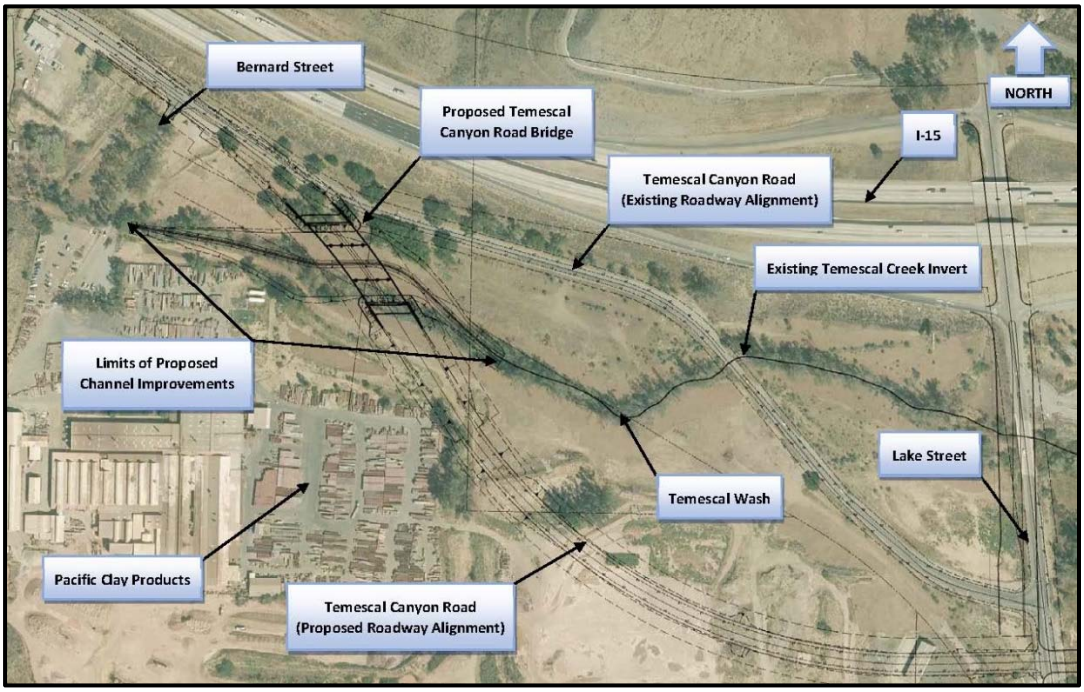


Figure 4: Project Location

1.2 Approach to Water Quality Assessment

The purpose of the Water Quality Assessment Report (WQAR) is to fulfill the requirements of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), and to provide information, to the extent possible, for National Pollution Discharge Elimination System (NPDES) permitting. The document includes a discussion of the proposed Project, the physical setting of the Project area, and the regulatory framework with respect to water quality; it also provides data on surface water and groundwater resources within the Project area and the water quality of these waters, describes water quality impairments and beneficial uses, and identifies potential water quality impacts/benefits associated with the

proposed Project, and recommends avoidance and/or minimization measures for potentially adverse impacts.

2. Regulatory Setting

2.1 Federal Laws and Requirements

Clean Water Act

In 1972 Congress amended the Federal Water Pollution Control Act, making the addition of pollutants to the waters of the United States (U.S.) from any point source unlawful unless the discharge is in compliance with a NPDES permit. Known today as the Clean Water Act (CWA), Congress has amended it several times. In the 1987 amendments, Congress directed dischargers of storm water from municipal and industrial/construction point sources to comply with the NPDES permit scheme. Important CWA sections are:

- Sections 303 and 304 require states to promulgate water quality standards, criteria, and guidelines.

- Section 401 requires an applicant for a federal license or permit to conduct any activity, which may result in a discharge to waters of the U.S., to obtain certification from the State that the discharge will comply with other provisions of the act. (Most frequently required in tandem with a Section 404 permit request. See below).

- Section 402 establishes the NPDES, a permitting system for the discharges (except for dredge or fill material) of any pollutant into waters of the U.S. Regional Water Quality Control Boards (RWQCB) administer this permitting program in California. Section 402(p) requires permits for discharges of storm water from industrial/construction and Municipal Separate Storm Sewer Systems (MS4s).

- Section 404 establishes a permit program for the discharge of dredge or fill material into waters of the U.S. This permit program is administered by the U.S. Army Corps of Engineers (USACE).

The objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

USACE issues two types of 404 permits: Standard and General permits. For General permits there are two types: Regional permits and Nationwide permits. Regional permits are issued for a general category of activities when they are similar in nature and cause minimal environmental effect. Nationwide permits are issued to authorize a variety of minor project activities with no more than minimal effects.

There are also two types of Standard permits: Individual permits and Letters of Permission. Ordinarily, projects that do not meet the criteria for a Nationwide Permit may be permitted under one of USACE's Standard permits. For Standard permits, the USACE decision to approve is based on compliance with U.S. Environmental Protection Agency's (EPA) Section 404 (b)(1) Guidelines (U.S. EPA CFR 40 Part 230), and whether permit approval is in the public interest. The 404(b)(1) Guidelines were developed by the U.S. EPA in conjunction with USACE, and allow the discharge of dredged or fill material into the aquatic system (waters of the U.S.) only if there is no practicable alternative which would have less adverse effects. The

Guidelines state that USACE may not issue a permit if there is a least environmentally damaging practicable alternative (LEDPA), to the proposed discharge that would have less effects on waters of the U.S., and not have any other significant adverse environmental consequences. Per Guidelines, documentation is needed that a sequence of avoidance, minimization, and compensation measures have been followed, in that order. The Guidelines also restrict permitting activities that violate water quality or toxic effluent standards, jeopardize the continued existence of listed species, violate marine sanctuary protections, or cause "significant degradation" to waters of the U.S. In addition, every permit from the USACE, even if not subject to the 404(b)(1) Guidelines, must meet general requirements. See 33 CFR 320.4.

2.2 State Laws and Requirements

Porter-Cologne Water Quality Control Act

California's Porter-Cologne Act, enacted in 1969, provides the legal basis for water quality regulation within California. This Act requires a "Report of Waste Discharge" for any discharge of waste (liquid, solid, or gaseous) to land or surface waters that may impair beneficial uses for surface and/or groundwater of the State. It predates the CWA and regulates discharges to waters of the State. Waters of the State include more than just waters of the U.S., like groundwater and surface waters not considered waters of the U.S. Additionally, it prohibits discharges of "waste" as defined and this definition is broader than the CWA definition of "pollutant". Discharges under the Porter-Cologne Act are permitted by Waste Discharge Requirements (WDRs) and may be required even when the discharge is already permitted or exempt under the CWA.

The State Water Resources Control Board (SWRCB) and RWQCBs are responsible for establishing the water quality standards (objectives and beneficial uses) required by the CWA, and regulating discharges to ensure compliance with the water quality standards. Details regarding water quality standards in a project area are contained in the applicable RWQCB Basin Plan. In California, Regional Boards designate beneficial uses for all water body segments in their jurisdictions, and then set criteria necessary to protect these uses. Consequently, the water quality standards developed for particular water segments are based on the designated use and vary depending on such use. In addition, the SWRCB identifies waters failing to meet standards for specific pollutants, which are then state-listed in accordance with CWA Section 303(d). If a state determines that waters are impaired for one or more constituents and the standards cannot be met through point source or non-source point controls (NPDES permits or Waste Discharge Requirements), the CWA requires the establishment of Total Maximum Daily Loads (TMDLs). TMDLs specify allowable pollutant loads from all sources (point, non-point, and natural) for a given watershed.

State Water Resources Control Board and Regional Water Quality Control Boards

The SWRCB adjudicates water rights, sets water pollution control policy, and issues water board orders on matters of statewide application, and oversees water quality functions throughout the state by approving Basin Plans, TMDLs, and NPDES permits. RWCQBs are responsible for protecting beneficial uses of water resources within their regional jurisdiction using planning, permitting, and enforcement authorities to meet this responsibility.

- **National Pollution Discharge Elimination System (NPDES) Program**

Municipal Separate Storm Sewer Systems (MS4)
The federal Clean Water Act (CWA) establishes requirements for the discharge of urban stormwater runoff from Municipal Separate Storm Sewer Systems (MS4) under the National Pollutant Discharge Elimination System (NPDES) program. On January 29, 2010, the Santa Ana Regional Water Quality Control Board (RWQCB) issued Permit Order No. R8-2010-0033 ("MS4 Permit") to authorize the discharge of stormwater urban runoff from MS4 facilities in Riverside County within the Santa Ana Region MS4 Permit area.

The MS4 Permit requires development of a standard design and post-development Best Management Practices (BMP) guidance to guide application of Low Impact Development (LID) BMPs to the maximum extent practicable (MEP) on streets, roads or highways under the jurisdiction of the Permittees used for transportation of automobiles, trucks, motorcycles, and other vehicles. The Santa Ana Region MS4 Permit Program prepared the Low Impact Development: Guidance and Standards for Transportation Projects ("Guidance") to provide direction to Transportation Project owners and operators regarding how to address MS4 Permit requirements for public works Transportation Projects within their jurisdiction.

Construction General Permit
Construction General Permit (Order No. 2009-009-DWQ, as amended by 2010-0014-DWG), adopted on November 16, 2010, became effective on February 14, 2011. The permit regulates storm water discharges from construction sites which result in a Disturbed Soil Area (DSA) of one acre or greater, and/or are smaller sites that are part of a larger common plan of development. For all projects subject to the CGP, applicants are required to develop and implement an effective Storm Water Pollution Prevention Plan (SWPPP).

By law, all storm water discharges associated with construction activity where clearing, grading, and excavation results in soil disturbance of at least one acre must comply with the provisions of the CGP. Construction activity that results in soil disturbances of less than one acre is subject to this CGP if there is potential for significant water quality impairment resulting from the activity as determined by the RWQCB. Operators of regulated construction sites are required to develop storm water pollution prevention plans; to implement sediment, erosion, and pollution prevention control measures; and to obtain coverage under the CGP.

The CGP separates projects into Risk Levels 1, 2, or 3. Risk levels are determined during the planning and design phases, and are based on potential erosion and transport to receiving waters. Requirements apply according to the Risk Level determined. For example, a Risk Level 3 (highest risk) project would require compulsory stormwater runoff pH and turbidity monitoring, and pre- and post-construction aquatic biological assessments during specified seasonal windows.

Section 401 Permitting

Under Section 401 of the CWA, any project requiring a federal license or permit that may result in a discharge to a water of the United States must obtain a 401 Certification, which certifies that the project will be in compliance with State water quality standards. The most common federal permit triggering 401 Certification is a CWA Section 404 permit, issued by USACE. The 401 permit certifications are obtained from the appropriate RWQCB, dependent on the project location, and are required before USACE issues a 404 permit.

In some cases the RWQCB may have specific concerns with discharges associated with a project. As a result, the RWQCB may issue a set of requirements known as Waste Discharge Requirements (WDRs) under the State Water Code (Porter-Cologne Act) that define activities, such as the inclusion of specific features, effluent limitations, monitoring, and plan submittals that are to be implemented for protecting or benefiting water quality. WDRs can be issued to address both permanent and temporary discharges of a project.

2.3 Regional and Local Requirements

Locally, the City of Lake Elsinore holds an NPDES permit for discharges from its MS4 system. On January 29, 2010 the Santa Ana Regional Water Quality Control Board issued a fourth-term area wide National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System Permit (MS4 Permit) to the Riverside County Flood Control and Water Conservation District (the Principal Permittee), the County of Riverside and the City of Lake Elsinore. The Santa Ana MS4 Permit is for the portion of the Santa Ana River watershed located within Riverside County (Order No. R8-2010-0033, NPDES Permit No. CAS618033). The Permittees' stormwater programs are designed to ensure compliance with this permit.

See Section 2.2 for relevant requirements of the Construction General Permit and the City of Lake Elsinore NPDES/MS4 Program.

3. AFFECTED ENVIRONMENT

3.1 Introduction

The City of Lake Elsinore is located in Riverside County, California, United States. The city is situated in the Inland Empire region of Southern California and it is approximately 60 miles east of Los Angeles. According to the 2010 census, the population of the City of Lake Elsinore is 51,821. It was 28,928 per the 2000 census.

3.2 General Setting

- Lake Elsinore is located at 33°40′53″N 117°20′43″W (33.681389, -117.345278). According to the United States Census Bureau, the city has a total area of 41.7 square miles; 36.2 square miles of it is land and 5.5 square miles of it is water.

- Lake Elsinore is bordered by the Elsinore Mountains to the west, which are a part of the larger Santa Ana Mountain Range, and receive a few inches of snowfall a few days each year. Included in the Santa Ana Mountains is the Cleveland National Forest and the community of El Cariso. Lake Elsinore is northwest of Wildomar and the northern portion is part of the Temescal Canyon. To the east of the lake are the much older and more eroded slopes of the Temescal Mountains.

- According to the Köppen Climate Classification system, the City Lake Elsinore has a semiarid climate, with hot, almost rainless summers and mild, wetter winters. The climate in this area is described by the Köppen climate classification system as "dry-summer subtropical" often referred to as "Mediterranean" and designated Csa. Climatological data for the City of Lake Elsinore includes the following:

    - The hottest month is July (average).
    - The highest recorded temperature was 118 °F (48 °C) in 1960.
    - Average high temperature is 81 °F (27 °C).
    - On average, the coolest month is December.
    - The lowest recorded temperature was 10 °F (−12 °C) in 1974.
    - Average low temperature is 47 °F (8 °C).

- The City of Lake Elsinore gets approximately 12.8 inches of rain per year. The US average is 39.2. Snowfall is 0.1 inches. The maximum average precipitation occurs in February. The average US city gets 25.8 inches of snow per year. The number of days with any measurable precipitation is 32.

- On average, there are 270 sunny days per year in the City of Lake Elsinore. The July high is around 97.7 degrees. The January low is 39.3.

- The Project discharges to Reach 5 of Temescal Creek and travels to Reach 1 in the City of Corona, leading to a discharge into Prado Dam.
- The Project is located in the Elsinore Valley Groundwater Sub-basin (Groundwater Basin Number: 8-004.01).
- There are no known existing wellhead protection areas within the vicinity of the Project.
- No 404(b)(1) water body is triggered for the Project.

3.2.1 Population and Land Use

The City of Lake Elsinore reported a population of approximately 51,821 in 2010. The population density was approximately 1,243 people per square mile. Land use in the City vary from residential, commercial, industrial, and parks and recreation.

3.2.2 Topography

The terrain of the Project vicinity is relatively flat, with existing slopes ranging from 1-5 percent. The Project will not impact the existing topography.

3.2.3 Hydrology

3.2.3.1 Regional Hydrology

Temescal Wash receives stormwater runoff from the Santa Ana Mountain, San Jacinto/, and Elsinore Mountain watersheds. Stormflows from the San Jacinto Mountain and Elsinore Mountain watersheds drain into Lake Elsinore while the Santa Ana Mountain watershed discharges into Temescal Wash. Outflow from the Lake outlets into Temescal Wash near Lakeshore Drive between South Poe Street and South Spring Street in the City of Lake Elsinore.

Lake Elsinore is formed in a natural depression against the eastern edge of the Elsinore Mountains. The original outlet for the lake was a low swale on the northeast shore in the town of the Elsinore, but in the period between 1900 and 1910, the outlet was notched to provide water for irrigation downstream.

In the drainage basin above the lake, the main tributary is the San Jacinto River, which begins in the upper slopes of the San Jacinto Mountain. The river flow northerly and then southwesterly to Railroad Canyon Reservoir (known as Canyon Lake) and ten into Lake Elsinore. Outflow from the lake flows through Temescal Canyon and exits south of the City of Corona and continues to Prado Dam. The total length of the tributary watershed extends approximately 60 miles in an east-west direction and has an average width of 25 miles. Upstream from Lake Elsinore, the total drainage area is approximately 770 square miles. Elevations range from a high of 10,805 feet above sea level to a low of 1,260 feet at

the Lake. Slopes range from 25 to 150 feet per mile within the basin (0.5 percent and 2.8 percent, respectively), with an average slope of 80 feet per mile measured along the longest watercourse (1.5 percent). The contributing area from Lake Elsinore to Prado Dam is approximately 250 square miles. Elevations in the basin downstream of the lake range from a high of 5,680 feet at Santiago Peak and to a low of about 550 feet at Prado Dam. Slopes range from about 450 feet per mile (8.5 percent) on some of the tributary streams drainage into Temescal Wash to less than 50 feet per mile (0.1 percent) in the subareas contributing to the Arlington Channel. The average slope of the basin is approximately 150 feet per mile (2.8 percent) measured along the longest watercourse.

3.2.3.2 Local Hydrology

3.2.3.2.1 Precipitation and Climate

- The City of Lake Elsinore gets approximately 12 inches of rain per year. The US average is 37. Snowfall is 0 inches. The maximum average precipitation occurs in February. The average US city gets 25 inches of snow per year. The number of days with any measurable precipitation is 33.

- On average, there are 270 sunny days per year in the City of Lake Elsinore, California. The July high is 97.7 degrees. The January low is 39.3. Comfort index, which is based on humidity during the hot months, is 78 out of 100, where higher is more comfortable. The US average on the comfort index is 54.

3.2.3.2.2 Surface Streams

The nearest major drainage course to the Project is the San Jacinto River, located just southeast of the project site.

3.2.3.2.3 Flood Plains

According to FEMA Flood Map Number 06065C2007G, the Project is located within a regulatory floodway and also mapped as Zone AE, which means that the area is subject to inundation by the 1-percent-annual-chance flood event with Base Flood Elevations (BFEs).

3.2.3.2.4 Municipal Supply

Elsinore Valley Municipal Water District (EVMWD) is the main water purveyor for the City of Lake Elsinore. EVMWD's water supply is a blend of local groundwater, surface water from Railroad Canyon Reservoir (Canyon Lake), and imported water. On average, half of EVMWD's supply is imported. Annual water production in the Elsinore Division is about 27,000 acre-feet.

3.2.3.3 Groundwater Hydrology

EVMWD's Elsinore Division currently has eight active municipal wells that provide quality drinking water from a deep aquifer. Several additional wells are planned in future years. Groundwater is disinfected with chlorine and chloramines at the wellhead and represents 40 – 50 percent of drinking water supplies in the Elsinore division. By early 2005, all water supplies to the Elsinore Division is disinfected by chloramines, which is a disinfectant commonly used in the United States.

Per EVMWD's 2015 Water Quality Report, TDS content of 456 ppm and 519 ppm of treated groundwater were observed for the "Elsinore Groundwater" and Temescal Groundwater", respectively.

3.2.4 Geology/Soils

3.2.4.1 Soil Erosion Potential

Per the Preliminary Geotechnical Report prepared by Group Delta Consultants, Inc. dated 2016, no signs of excessive erosion were noted on slopes within the Project area.

3.2.5 Biological Communities

3.2.5.1 Aquatic Habitat

No known aquatic habitat is to be adversely affected by the Project.

3.2.5.1.1 Special Status Species

Not applicable.

3.2.5.1.2 Stream/Riparian Habitats

Not applicable.

3.2.5.1.3 Wetlands

No wetlands exist within the vicinity of the Project.

3.2.5.1.4 Fish Passage

Fish passage is not applicable to the direct receiving waters of the Project.

3.3 Water Quality Objectives/standards and Beneficial Uses

3.3.1 Surface Water Quality Objectives/standards and Beneficial Uses

A beneficial use is one of the various ways that water can be used for the benefit of people and/or wildlife. Examples include drinking, swimming, industrial and agricultural water supply, and the support of fresh and saline aquatic habitats.

Section 303(d) of the federal Clean Water Act (33 U.S.C. § 1313) defines water quality standards as consisting of the uses of the surface (navigable) waters involved, the water quality criteria which are applied to protect those uses and an anti-degradation policy. Under the Porter-Cologne Water Quality Control Act (California Water Code, Division 7, Chapter 2 § 13050) the uses of waters and water quality criteria are separately considered as beneficial uses and water quality objectives. Beneficial uses and water quality objectives are to be established for all waters of the state, both surface and subsurface (groundwater).

The Project discharges to Temescal Creek Reach 5, and continues traveling to Reach 1a until discharging in the Prado Basin. According to the Santa Ana Region Basin Plan, each Reach of Temescal Creek has the following beneficial uses:

Temescal Creek (Reach 1a – Lincoln Avenue to Arlington Channel Confluence)

- REC2 (Noncontact Water Recreation)
- WARM (Warm Freshwater Habitat)
- WILD (Wildlife Habitat)

Temescal Creek (Reach 1b – Arlington Channel Confluence to 1400 feet upstream of Magnolia Avenue)

- REC2 (Noncontact Water Recreation)
- WARM (Warm Freshwater Habitat)
- WILD (Wildlife Habitat)

Temescal Creek (Reach 2 –1400 feet upstream of Magnolia Avenue to Lee Lake)

- AGR (Agricultural Supply)
- IND (Industrial Service Supply)
- GWR (Groundwater Recharge)
- REC1 (Water Contact Recreation)
- REC2 (Noncontact Water Recreation)
- WARM (Warm Freshwater Habitat)
- WILD (Wildlife Habitat)

Temescal Creek (Reach 3 – Lee Lake)

- AGR (Agricultural Supply)
- IND (Industrial Service Supply)
- GWR (Groundwater Recharge)
- REC1 (Water Contact Recreation)
- REC2 (Noncontact Water Recreation)
- WARM (Warm Freshwater Habitat)
- WILD (Wildlife Habitat)

Temescal Creek (Reach 4 – Lee Lake to Mid-Section Line of Section 17 near downstream end of freeway cut)

- AGR (Agricultural Supply)
- GWR (Groundwater Recharge)
- REC1 (Water Contact Recreation)
- REC2 (Noncontact Water Recreation)
- WARM (Warm Freshwater Habitat)
- WILD (Wildlife Habitat)
- RARE (Rare, Threatened or Endangered Species)

Temescal Creek (Reach 5 – Mid-Section Line of Section 17 near downstream end of freeway cut to Elsinore Ground-water Subbasin Boundary)

- AGR (Agricultural Supply)
- GWR (Groundwater Recharge)
- REC1 (Water Contact Recreation)
- REC2 (Noncontact Water Recreation)
- WARM (Warm Freshwater Habitat)
- WILD (Wildlife Habitat)
- RARE (Rare, Threatened or Endangered Species)

Temescal Creek (Reach 6 – Elsinore Ground-water Subbasin Boundary to Lake Elsinore Outlet)

- Intermittent GWR (Groundwater Recharge)
- Intermittent REC1 (Water Contact Recreation)
- Intermittent REC2 (Noncontact Water Recreation)
- Intermittent WARM (Warm Freshwater Habitat)
- Intermittent WILD (Wildlife Habitat)

3.3.2 Groundwater Quality Objectives/standards and Beneficial Uses

No applicable beneficial uses and objectives/and standards for groundwater quality for this Project.

3.4 Existing Water Quality

3.4.1 Regional Water Quality

Considerable sampling data have been collected to characterize ambient receiving water quality in the Region. Water quality assessments conducted by the Regional Board have identified a number of beneficial use impairments, due in part, to urban stormwater runoff. Section 305(b) of the CWA requires each of the regional boards to routinely monitor and assess the quality of waters of its region. If this assessment indicates that beneficial uses are not met, then that waterbody must be listed under Section 303(d) of the CWA as an impaired waterbody.

Federal regulations require that a total maximum daily load (TMDL) be established for each 303(d) listed waterbody for each of the pollutants causing impairment. The TMDL is the maximum amount of a pollutant that can be discharged into a water body from all sources (point and nonpoint) and still maintain water quality standards. A TMDL is the sum of the individual wasteload allocations (WLA) for point source inputs, load allocations (LA) for non-point source inputs and natural background, with a margin of safety. The TMDLs are one of the bases for limitations established in waste discharge requirements.

For 303(d) listed waterbodies without a TMDL, the Permittees are required to participate in the development and implementation of TMDLs and Watershed Action Plans. If a TMDL has been developed and an implementation plan is yet to be developed (e.g., when the USEPA has established the TMDL), the Permittees are required to develop constituent specific source control measures, conduct additional monitoring and/or cooperate with the development of an implementation plan.

3.4.2 List of Impaired Waters

Table 1: Temescal Creek Receiving Waterbody Impaired Waters

Water Body	Pollutant	303(d) listed?	TMDL Required?	Estimated TMDL Approval Date
Temescal Creek (Reach 1)	pH	Yes	Yes	2021
Temescal Creek	None Identified	-	-	-

(Reach 2, 3, 4, 5)				
Temescal Creek (Reach 6)	Indicator Bacteria	Yes	Yes	2021

3.4.3 Areas of Special Biological Significance (ASBS)

There are no areas of special biological significance located within the vicinity of the Project site.

4. ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

The Project will have minimal adverse effect on stormwater quality because impacts associated with the construction of the new bridge and roadway will be somewhat offset by the removal of the existing bridge and roadway. As such, both during-construction and post-construction BMPs will be installed and maintained to ensure local and regional stormwater quality is improved.

4.2 Potential Impacts to Water Quality

Biological, physical/chemical and human use constituents associated with the Project will not cause or contribute to the violation (i.e., be unable to meet) of water quality standards or water quality objectives and will not, therefore, have the potential to affect the beneficial use of the water body. Although the new bridge will be wider than the existing bridge, it is anticipated that there will be no significant change to the stormwater flow rates and volumes that discharge from the bridge into Temescal Wash. Therefore, hydromodification need not be analyzed.

4.2.1 Anticipated changes to the Physical/Chemical Characteristics of the Aquatic Environment

4.2.1.1 Substrate

Not applicable.

4.2.1.2 Currents, Circulation or Drainage Patterns

As per the existing condition, the Project will allow Temescal Wash to flow unimpeded and provide adequate conveyance for Temescal Wash. The Project will also allow bridge and roadway flows to discharge into Temescal Wash (no flow diversion). It is anticipated that there will be no significant increase in the flow, volume, rate, depth, or seasonal changes.

4.2.1.3 Suspended Particulates (Turbidity)

Not applicable.

4.2.1.4 Oil, Grease and Chemical Pollutants

Since the existing use is maintained (bridge and roadway), oil, grease, and chemical pollutants will generally remain the same. The aforementioned pollutants are considered to be common on project sites that accommodate vehicular and non-vehicular traffic.

4.2.1.5 Temperature, Oxygen, Depletion and Other Parameters

Not applicable. However, trash is always present at any time of project type, regardless of the land use.

4.2.1.6 Flood Control Functions

The bridge will provide adequate conveyance capacity for the 100-year flow in Temescal Wash. The Project will include minimal drainage improvements within Temescal Wash. Activities will include minor re-grading of the creek near the bridge and construction of concrete slope protection and cutoff wall to protect the bridge abutments from scour.

4.2.1.7 Storm, Wave and Erosion Buffers

Not applicable.

4.2.1.8 Erosion and Accretion Patterns

The surrounding area of the Project site is relatively flat and is pervious area. Potential for erosion and accretion due to the construction of the Project is unlikely and negligible.

4.2.1.9 Aquifer Recharge/Groundwater

The Project will not affect the existing conditions of the groundwater table nor have any adverse effect on aquifer recharge.

4.2.1.10 Baseflow

Baseflow will not be altered due to construction of the Project.

4.2.2 Anticipated Changes to the Biological Characteristics of the Aquatic Environment

4.2.2.1 Special aquatic sites

Not applicable.

4.2.2.2 Habitat for Fish and Other Aquatic Organisms

Not applicable.

4.2.2.3 Wildlife Habitat

Not applicable.

4.2.2.4 Endangered or Threatened Species

Not applicable.

4.2.2.5 Invasive Species

Not applicable.

4.2.3 Anticipated Changes to the Human Use Characteristics of the Aquatic Environment

4.2.3.1 Existing and Potential Water Supplies; Water Conservation

Not applicable.

4.2.3.2 Recreational or Commercial Fisheries

Not applicable.

4.2.3.3 Other Water Related Recreation

Not applicable.

4.2.3.4 Aesthetics of the Aquatic Ecosystem

Not applicable.

4.2.3.5 Parks, National and Historic Monuments, National Seashores, Wild and Scenic Rivers, Wilderness Areas, etc.

Not applicable.

4.2.3.6 Traffic/Transportation Patterns

Not applicable.

4.2.3.7 Energy Consumption of Generation

Not applicable.

4.2.3.8 Navigation

Not applicable.

4.2.3.9 Safety

Not applicable.

4.2.4 Short Term Impacts During Construction

4.2.4.1 Physical/Chemical Characteristics of the Aquatic Environment

Not applicable. No aquatic environment located within the vicinity of the Project site.

4.2.4.2 Biological Characteristics of the Aquatic Environment

Not applicable. No aquatic environment located within the vicinity of the Project site.

4.2.4.3 Human Use Characteristics of the Aquatic Environment

Not applicable. No aquatic environment located within the vicinity of the Project site.

4.2.5 Long-Term Impacts During Operation and Maintenance

4.2.5.1 Physical/Chemical Characteristics of the Aquatic Environment

Not applicable. No aquatic environment located within the vicinity of the Project site.

4.2.5.2 Biological Characteristics of the Aquatic Environment

Not applicable. No aquatic environment located within the vicinity of the Project site.

4.2.5.3 Human Use Characteristics of the Aquatic Environment

Not applicable. No aquatic environment located within the vicinity of the Project site.

4.3 Impact Assessment Methodology

The Project will pose the same potential pollutants in the during-construction phase, as well as the post-construction phase, as mentioned in the aforementioned sections. This Project is not unique in nature (i.e. replacement of an existing bridge and roadway).

4.4 Alternative-Specific Impact Analysis

Besides the No Project alternative and Alternative 1, no other project alternatives have been considered and discussed in this report.

4.5 Cumulative Impacts

There will be minimal addition of impervious area to the watershed. The area of the new bridge and roadway is miniscule in comparison to the total area that is tributary to the watershed. Other cumulative impacts such as temperature, nutrients, litter, and invasive species, are not applicable to the Project.

5. AVOIDANCE AND MINIMIZATION MEASURES

WQ-1: Education for Property Owners, Operators, Tenants, Occupants, or Employees
The City of Lake Elsinore will provide affected city personnel with general WQMP education materials from the Santa Ana River Region Stormwater Management Plan and/or California Regional Water Quality Control Board, Santa Ana River Basin Region, California Stormwater Quality Association BMP Handbook, or other appropriate sources. These educational materials shall include general housekeeping practices that prevent pollutant loading on-site stormwater runoff and other BMPs that eliminate or reduce pollutant loading during subsequent Project improvements.

WQ-2: Activity Restrictions
The types of activities allowed within the Project will be limited to and in accordance with the City of Lake Elsinore codes, regulations, and zoning ordinances. Activities such as staging or stockpiling construction and landscaping materials or wastes in areas where they can be discharged to storm drains will be prohibited. Activities associated with street and landscape maintenance, which can discharge pollutants (oil/grease, sediments, solvents, pesticides, herbicides, etc.) into Temescal Wash, will be prohibited. Additionally, vehicle maintenance and washing will be prohibited since it is not a feature of the Project or associated Project activities.

WQ-3: Common Area Litter Control
There is no common area proposed in the bridge Project. The Project is located in the street right-of-way crossing over Temescal Wash, which will be maintained by the City of Lake Elsinore. Windblown trash and littering are the primary anticipated source of litter. The City of Lake Elsinore will conduct street sweeping operation at the Project site on a regular basis to pick up any accumulated trash and debris on the street and bridge. The street and bridge will be inspected monthly and prior to the storm season (October 1st), and any accumulation of trash or debris will be removed. The landscaped areas of the site will be inspected during landscape maintenance and any accumulation of trash or debris will be removed.

WQ-4: Street Sweeping Public Street
Temescal Canyon Road (public street) will be swept once a month by the City of Lake Elsinore as a part of their street sweeping schedule.

WQ-5: Drainage Facility Inspection and Maintenance
The City of Lake Elsinore will be responsible for the inspection and maintenance of the drainage facilities. The drainage system on Temescal Canyon Road will be inspected at least once a year, preferably prior to the rainy season and following significant storm events. The filter insert BMPs should be inspected and maintained periodically for the proper and efficient operation of drainage system. The City shall maintain records of the inspection and maintenance activities.

Upon completion of the Project, the City of Lake Elsinore will conduct training sessions for City staff and associated contractors covering the requirements of the Source Control BMPs including, but not limited to the requirements of the Santa Ana River

Region Stormwater Management Plan and the Stormwater Discharge General Permit.

The City of Lake Elsinore will ensure that updated training materials are provided to city staff and service contractors annually. The City of Lake Elsinore will be responsible for providing BMP training and education programs to all affected new employees, including service contractors. A record of city staff and service contractors who were trained shall be maintained along with their respective training dates.

WQ-6: Project Slopes and Channels

All proposed slopes with slope gradient of 2:1 or flatter will be planted with deep rooted, drought tolerant erosion protection vegetation native to the area. Slopes steeper than 2:1 gradient will be lined with concrete for erosion protection and slope stability. Drainage ditches associated with slope construction that outlet into Temescal Wash, if any, will be lined with concrete and their outlets will incorporate energy dissipater devices, such as rip-rap pads. The Project slopes and graded area will be maintained by the City of Lake Elsinore.

6. REFERENCES

6.1 Works Cited

Caltrans Division of Design Stormwater homepage for guidance and tools (Project Risk Level, Estimating for CGP, Erosion Prediction software, etc.):
http://www.dot.ca.gov/hq/oppd/stormwtr/index.htm

Caltrans Division of Environmental Analysis Storm Water Homepage:
http://www.dot.ca.gov/hq/env/stormwater/

Caltrans Standard Environmental Reference (SER) Volume I

- For wetlands, hydromorphic method and water assessment information, see Chapter 15 - Waters of the U.S. and the State:
  http://www.dot.ca.gov/ser/vol1/sec3/natural/ch15wetland/ch15wetland.htm

- For hydraulic studies and floodplain encroachment information, see Chapter 17 - Floodplains: http://www.dot.ca.gov/ser/vol1/sec3/special/ch17flood/chap17.htm

- For Coastal Zone permits information, see Chapter 18 - Coastal Zone:
  http://www.dot.ca.gov/ser/vol1/sec3/special/ch18coastal/chap18.htm

- For Wild and Scenic Rivers information, see Chapter 19 - Wild and Scenic Rivers:
  http://www.dot.ca.gov/ser/vol1/sec3/special/ch19wsrivers/chap19.htm

Caltrans Storm Water Quality Handbook Project Planning and Design Guide (PPDG):
http://www.dot.ca.gov/hq/oppd/stormwtr/swdr2010/PPDG%20July%202010%20r2.pdf
Caltrans Stormwater Quality Practice Guidelines:
http://pd.dot.ca.gov/env/stormwater/html/practice_guidelines.htm

Caltrans Water Quality Planning Tool: http://www.water-programs.com/wqpt.htm

Regional Water Quality Control Board website and Basin Plans:
http://www.swrcb.ca.gov/plans_policies/

State Water Resources Control Board Storm Water Program, 2009-0009-DWQ Construction General Permit:
http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml

United States (U.S.) Environmental Protection Agency Section 404(b)(1) guidelines:
http://www.epa.gov/owow/wetlands/pdf/40cfrPart230.pdf

U.S. Department of Agriculture, Natural Resources Conservation Service, Web Soil Survey:
http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

City of Lake Elsinore, Water Quality Management Plan:
http://www.lake-elsinore.org/city-hall/city-departments/public-works/engineering/stormwater-national-pollutant-discharge-elimination-system/water-quality-managment-plan

City of Lake Elsinore, General Construction Permit:
http://www.lake-elsinore.org/city-hall/city-departments/public-works/engineering/stormwater-national-pollutant-discharge-elimination-system/general-construction-permit

Aguilar Consulting Inc. (November 2016); "Floodplain and Bridge Scour Study for Temescal Wash at the New Temescal Canyon Road Bridge and Roadway Project"

Aguilar Consulting Inc. (January 2017); "Santa Ana Region MS4 Permit Program; Preliminary Water Quality Management Plan (P-WQMP) for Low Impact Development: Transportation Projects; New Temescal Canyon Road Bridge and Roadway Project
Federal-Aid Project No. BRLO-5074 (015)".

6.2 Preparer(s) Qualifications

Prepared By:

Ceazar Aguilar, P.E.
President
Aguilar Consulting, Inc.
2155 Chicago Avenue, Suite 301
Riverside, CA 92507
Office: (951) 300-1431
Fax: (951) 300-1435

Mr. Aguilar has more than 30 years of civil engineering experience, most notably in the design of flood control structures, floodplain analysis, and stormwater quality assessment and mitigation techniques.

Appendix A – Conditions of Approval

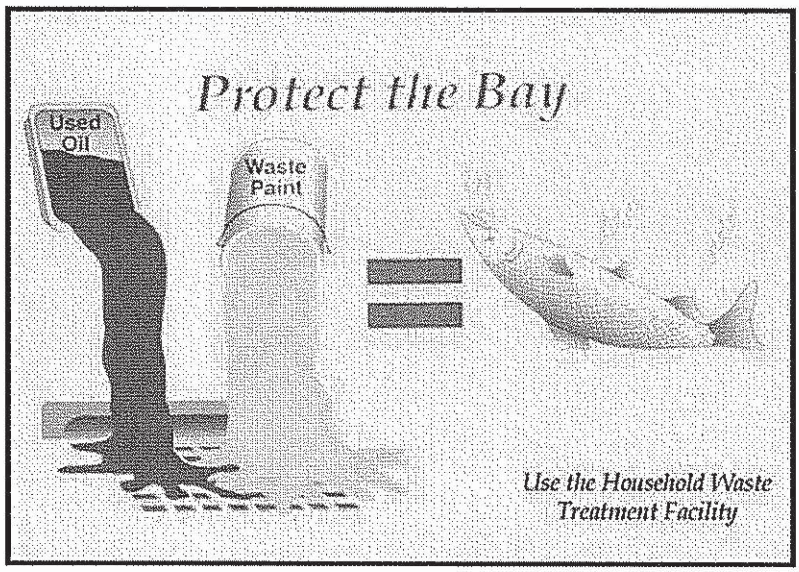
Conditions of Approval is not Applicable to this project.

Appendix B - Hydraulic Conditions of Concern (if applicable)

Project is not susceptible to hydromodification requirements.

Appendix C - Educational Materials

Non-Stormwater Discharges SC-10



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

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

Description

Non-stormwater discharges are those flows that do not consist entirely of stormwater. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing, air conditioner condensate, etc. However there are certain non-stormwater discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains. They can generally be detected through a combination of detection and elimination. The ultimate goal is to effectively eliminate non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of pollutants on streets and into the storm drain system and creeks.

Approach

Initially the industry must make an assessment of non-stormwater discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is in the elimination of non-stormwater discharges.

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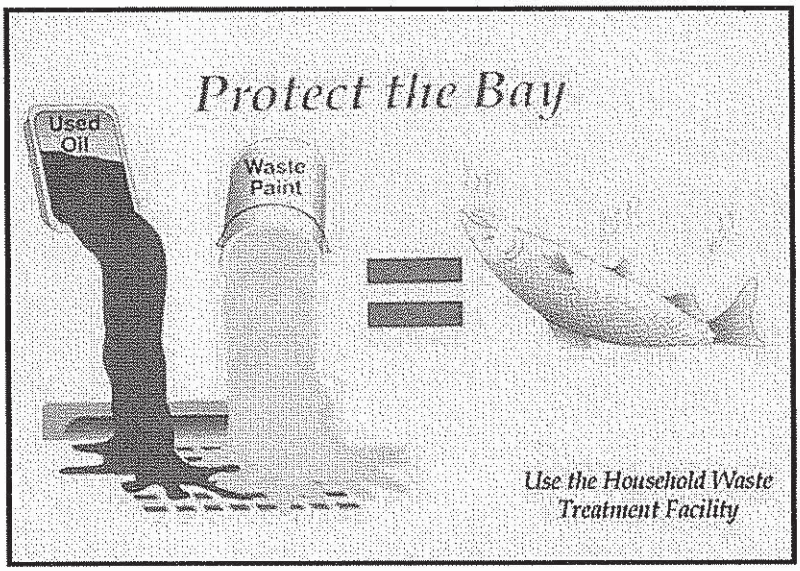
Non-Stormwater Discharges SC-10



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

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

Description

Non-stormwater discharges are those flows that do not consist entirely of stormwater. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing, air conditioner condensate, etc. However there are certain non-stormwater discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains. They can generally be detected through a combination of detection and elimination. The ultimate goal is to effectively eliminate non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of pollutants on streets and into the storm drain system and creeks.

Approach

Initially the industry must make an assessment of non-stormwater discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is in the elimination of non-stormwater discharges.

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Pollution Prevention

- Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented. Encourage litter control.

Suggested Protocols

Recommended Complaint Investigation Equipment

- Field Screening Analysis
  - pH paper or meter
  - Commercial stormwater pollutant screening kit that can detect for reactive phosphorus, nitrate nitrogen, ammonium nitrogen, specific conductance, and turbidity
  - Sample jars
  - Sample collection pole
  - A tool to remove access hole covers
- Laboratory Analysis
  - Sample cooler
  - Ice
  - Sample jars and labels
  - Chain of custody forms
- Documentation
  - Camera
  - Notebook
  - Pens
  - Notice of Violation forms
  - Educational materials

General

- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially those that are not classified as hazardous. These are often not responded to as effectively as they need to be.
- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled or demarcated next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

- See SC44 Stormwater Drainage System Maintenance for additional information.

Illicit Connections

- Locate discharges from the industrial storm drainage system to the municipal storm drain system through review of "as-built" piping schematics.
- Isolate problem areas and plug illicit discharge points.
- Locate and evaluate all discharges to the industrial storm drain system.

Visual Inspection and Inventory

- Inventory and inspect each discharge point during dry weather.
- Keep in mind that drainage from a storm event can continue for a day or two following the end of a storm and groundwater may infiltrate the underground stormwater collection system. Also, non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

- A review of the "as-built" piping schematic is a way to determine if there are any connections to the stormwater collection system.
- Inspect the path of floor drains in older buildings.

Smoke Testing

- Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two systems.
- During dry weather the stormwater collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the stormwater system.

Dye Testing

- A dye test can be performed by simply releasing a dye into either your sanitary or process wastewater system and examining the discharge points from the stormwater collection system for discoloration.

TV Inspection of Drainage System

- TV Cameras can be employed to visually identify illicit connections to the industrial storm drainage system.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, 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 a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Once a site has been cleaned:

- Post "No Dumping" signs with a phone number for reporting dumping and disposal.
- Landscaping and beautification efforts of hot spots may also discourage future dumping, as well as provide open space and increase property values.
- Lighting or barriers may also be needed to discourage future dumping.
- See fact sheet SC11 Spill Prevention, Control, and Cleanup.

Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Conduct field investigations of the industrial storm drain system for potential sources of non-stormwater discharges.
- Pro-actively conduct investigations of high priority areas. Based on historical data, prioritize specific geographic areas and/or incident type for pro-active investigations.

Reporting

- A database is useful for defining and tracking the magnitude and location of the problem.
- Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.
- Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.
- Document and report annually the results of the program.
- Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

Training

- Training of technical staff in identifying and documenting illegal dumping incidents is required.
- Consider posting the quick reference table near storm drains to reinforce training.
- Train employees to identify non-stormwater discharges and report discharges to the appropriate departments.

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Determine and implement appropriate outreach efforts to reduce non-permissible non-stormwater discharges.
- Conduct spill response drills annually (if no events occurred to evaluate your plan) in cooperation with other industries.
- When a responsible party is identified, educate the party on the impacts of his or her actions.

Spill Response and Prevention

- See SC11 Spill Prevention Control and Cleanup.

Other Considerations

- Many facilities do not have accurate, up-to-date schematic drawings.

Requirements

Costs (including capital and operation & maintenance)

- The primary cost is for staff time and depends on how aggressively a program is implemented.
- Cost for containment and disposal is borne by the discharger.
- Illicit connections can be difficult to locate especially if there is groundwater infiltration.
- Indoor floor drains may require re-plumbing if cross-connections to storm drains are detected.

Maintenance (including administrative and staffing)

- Illegal dumping and illicit connection violations requires technical staff to detect and investigate them.

Supplemental Information

Further Detail of the BMP

Illegal Dumping

- Substances illegally dumped on streets and into the storm drain systems and creeks include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. All of these wastes cause stormwater and receiving water quality problems as well as clog the storm drain system itself.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots

- Types and quantities (in some cases) of wastes
- Patterns in time of occurrence (time of day/night, month, or year)
- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people at the facility who are aware of the problem and who have the tools to at least identify the incident, if not correct it. Therefore, train field staff to recognize and report the incidents.

What constitutes a "non-stormwater" discharge?

- Non-stormwater discharges to the stormwater collection system may include any water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

- Facilities subject to stormwater permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The State's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

Performance Evaluation

- Review annually internal investigation results; assess whether goals were met and what changes or improvements are necessary.
- Obtain feedback from personnel assigned to respond to, or inspect for, illicit connections and illegal dumping incidents.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Spill Prevention, Control & Cleanup SC-11

Photo Credit: Geoff Brosseau

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

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

Description

Many activities that occur at an industrial or commercial site have the potential to cause accidental or illegal spills. Preparation for accidental or illegal spills, with proper training and reporting systems implemented, can minimize the discharge of pollutants to the environment.

Spills and leaks are one of the largest contributors of stormwater pollutants. Spill prevention and control plans are applicable to any site at which hazardous materials are stored or used. An effective plan should have spill prevention and response procedures that identify potential spill areas, specify material handling procedures, describe spill response procedures, and provide spill clean-up equipment. The plan should take steps to identify and characterize potential spills, eliminate and reduce spill potential, respond to spills when they occur in an effort to prevent pollutants from entering the stormwater drainage system, and train personnel to prevent and control future spills.

Approach

Pollution Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

- Develop a Spill Prevention Control and Countermeasure (SPCC) Plan. The plan should include:

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- Description of the facility, owner and address, activities and chemicals present
- Facility map
- Notification and evacuation procedures
- Cleanup instructions
- Identification of responsible departments
- Identify key spill response personnel

- Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of process materials that are brought into the facility.

Suggested Protocols (including equipment needs)

Spill Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

- If consistent illegal dumping is observed at the facility:
  - Post "No Dumping" signs with a phone number for reporting illegal dumping and disposal. Signs should also indicate fines and penalties applicable for illegal dumping.
  - Landscaping and beautification efforts may also discourage illegal dumping.
  - Bright lighting and/or entrance barriers may also be needed to discourage illegal dumping.

- Store and contain liquid materials in such a manner that if the tank is ruptured, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.

- If the liquid is oil, gas, or other material that separates from and floats on water, install a spill control device (such as a tee section) in the catch basins that collects runoff from the storage tank area.

- Routine maintenance:
  - Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.
  - Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area; and ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
  - Sweep and clean the storage area monthly if it is paved, *do not hose down the area to a storm drain.*

- Check tanks (and any containment sumps) daily for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.

- Label all containers according to their contents (e.g., solvent, gasoline).
- Label hazardous substances regarding the potential hazard (corrosive, radioactive, flammable, explosive, poisonous).
- Prominently display required labels on transported hazardous and toxic materials (per US DOT regulations).
- Identify key spill response personnel.

Spill Control and Cleanup Activities

- Follow the Spill Prevention Control and Countermeasure Plan.
- Clean up leaks and spills immediately.
- Place a stockpile of spill cleanup materials where it will be readily accessible (e.g., near storage and maintenance areas).
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, 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 a certified laundry (rags) or disposed of as hazardous waste. Physical methods for the cleanup of dry chemicals include the use of brooms, shovels, sweepers, or plows.
- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Chemical cleanups of material can be achieved with the use of adsorbents, gels, and foams. Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Reporting

- Report spills that pose an immediate threat to human health or the environment to the Regional Water Quality Control Board.
- Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).
- Report spills to local agencies, such as the fire department; they can assist in cleanup.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)

- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

Training

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills:
  - The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
  - Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Employees should be educated about aboveground storage tank requirements. Employees responsible for aboveground storage tanks and liquid transfers should be thoroughly familiar with the Spill Prevention Control and Countermeasure Plan and the plan should be readily available.
- Train employees to recognize and report illegal dumping incidents.

Other Considerations (Limitations and Regulations)

- A Spill Prevention Control and Countermeasure Plan (SPCC) is required for facilities that are subject to the oil pollution regulations specified in Part 112 of Title 40 of the Code of Federal Regulations or if they have a storage capacity of 10,000 gallons or more of petroleum. (Health and Safety Code 6.67)
- State regulations also exist for storage of hazardous materials (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the releases or threatened releases.
- Consider requiring smaller secondary containment areas (less than 200 sq. ft.) to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

Requirements

Costs (including capital and operation & maintenance)

- Will vary depending on the size of the facility and the necessary controls.
- Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil or water can be quite expensive.

Maintenance (including administrative and staffing)

- This BMP has no major administrative or staffing requirements. However, extra time is needed to properly handle and dispose of spills, which results in increased labor costs.

Supplemental Information

Further Detail of the BMP

Reporting

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the facility and the effectiveness of BMPs. A good record keeping system helps the facility minimize incident recurrence, correctly respond with appropriate cleanup activities, and comply with legal requirements. A record keeping and reporting system should be set up for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm sewer. These records should contain the following information:

- Date and time of the incident
- Weather conditions
- Duration of the spill/leak/discharge
- Cause of the spill/leak/discharge
- Response procedures implemented
- Persons notified
- Environmental problems associated with the spill/leak/discharge

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

- The date and time the inspection was performed
- Name of the inspector
- Items inspected
- Problems noted
- Corrective action required
- Date corrective action was taken

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

Aboveground Tank Leak and Spill Control

Accidental releases of materials from aboveground liquid storage tanks present the potential for contaminating stormwater with many different pollutants. Materials spilled, leaked, or lost from

tanks may accumulate in soils or on impervious surfaces and be carried away by stormwater runoff.

The most common causes of unintentional releases are:

- Installation problems
- Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves)
- External corrosion and structural failure
- Spills and overfills due to operator error
- Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Practices listed below should be employed to enhance the code requirements:

- Tanks should be placed in a designated area.
- Tanks located in areas where firearms are discharged should be encapsulated in concrete or the equivalent.
- Designated areas should be impervious and paved with Portland cement concrete, free of cracks and gaps, in order to contain leaks and spills.
- Liquid materials should be stored in UL approved double walled tanks or surrounded by a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain.
- For used oil or dangerous waste, a dead-end sump should be installed in the drain.
- All other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- Accumulated stormwater in petroleum storage areas should be passed through an oil/water separator.

Maintenance is critical to preventing leaks and spills. Conduct routine inspections and:

- Check for external corrosion and structural failure.
- Check for spills and overfills due to operator error.
- Check for failure of piping system (pipes, pumps, flanger, coupling, hoses, and valves).
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.

- Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Frequently relocate accumulated stormwater during the wet season.
- Periodically conduct integrity testing by a qualified professional.

Vehicle Leak and Spill Control

Major spills on roadways and other public areas are generally handled by highly trained Hazmat teams from local fire departments or environmental health departments. The measures listed below pertain to leaks and smaller spills at vehicle maintenance shops.

In addition to implementing the spill prevention, control, and clean up practices above, use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- Perform all vehicle fluid removal or changing inside or under cover to prevent the run-on of stormwater and the runoff of spills.
- Regularly inspect 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.
- Immediately drain all fluids from wrecked vehicles.
- Store wrecked vehicles or damaged equipment under cover.
- Place drip pans or absorbent materials under heavy equipment when not in use.
- Use adsorbent materials on small spills rather than hosing down the spill.
- Remove the adsorbent 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 contaminate 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 your 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

- Design the fueling area to prevent the run-on of stormwater and the runoff of spills:
  - Cover fueling area if possible.
  - Use a perimeter drain or slope pavement inward with drainage to a sump.
  - Pave fueling area with concrete rather than asphalt.
- If dead-end sump is not used to collect spills, install an oil/water separator.
- Install vapor recovery nozzles to help control drips as well as air pollution.
- Discourage "topping-off" of fuel tanks.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- Use adsorbent materials on small spills and general cleaning rather than hosing down the area. Remove the adsorbent materials promptly.
- Carry out all Federal and State requirements regarding underground storage tanks, or install above ground tanks.
- Do not use mobile fueling of mobile industrial equipment around the facility; rather, transport the equipment to designated fueling areas.
- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Train employees in proper fueling and cleanup procedures.

Industrial Spill Prevention Response

For the purposes of developing a spill prevention and response program to meet the stormwater regulations, facility managers should use information provided in this fact sheet and the spill prevention/response portions of the fact sheets in this handbook, for specific activities. The program should:

- Integrate with existing emergency response/hazardous materials programs (e.g., Fire Department)
- Develop procedures to prevent/mitigate spills to storm drain systems
- Identify responsible departments
- Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures
- Address spills at municipal facilities, as well as public areas

- Provide training concerning spill prevention, response and cleanup to all appropriate personnel

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

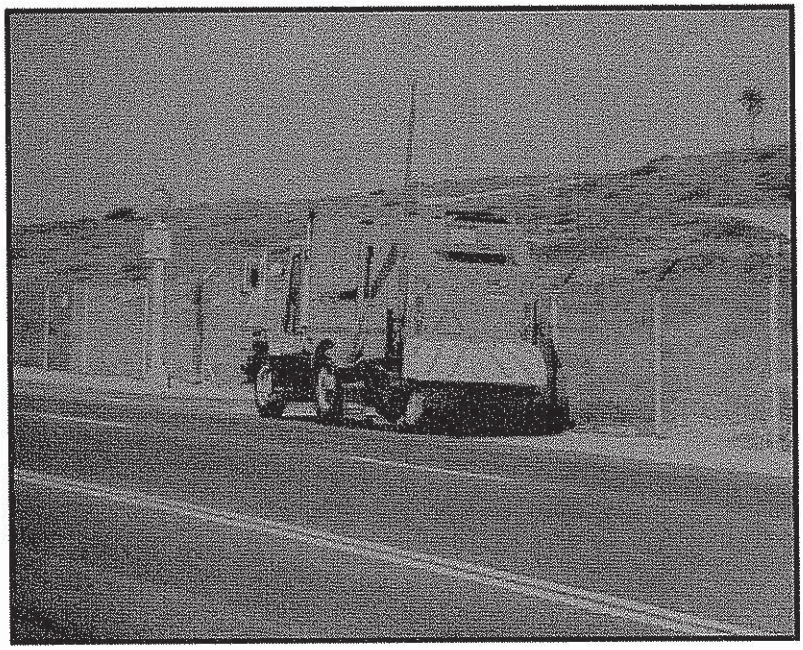
Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Stormwater Managers Resource Center http://www.stormwatercenter.net/

Road and Street Maintenance SC-70



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Description

Streets, roads, and highways are significant sources of pollutants in stormwater discharges, and operation and maintenance (O&M) practices, if not conducted properly, can contribute to the problem. Stormwater pollution from roadway and bridge maintenance should be addressed on a site-specific basis. Use of the procedures outlined below, that address street sweeping and repair, bridge and structure maintenance, and unpaved roads will reduce pollutants in stormwater.

Approach

Pollution Prevention

- Use the least toxic materials available (e.g. water based paints, gels or sprays for graffiti removal)
- Recycle paint and other materials whenever possible.
- Enlist the help of citizens to keep yard waste, used oil, and other wastes out of the gutter.

Suggested Protocols

Street Sweeping and Cleaning

- Maintain a consistent sweeping schedule. Provide minimum monthly sweeping of curbed streets.
- Perform street cleaning during dry weather if possible.

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- Avoid wet cleaning or flushing of street, and utilize dry methods where possible.
- Consider increasing sweeping frequency based on factors such as traffic volume, land use, field observations of sediment and trash accumulation, proximity to water courses, etc. For example:
  - Increase the sweeping frequency for streets with high pollutant loadings, especially in high traffic and industrial areas.
  - Increase the sweeping frequency just before the wet season to remove sediments accumulated during the summer.
  - Increase the sweeping frequency for streets in special problem areas such as special events, high litter or erosion zones.
- Maintain cleaning equipment in good working condition and purchase replacement equipment as needed. Old sweepers should be replaced with new technologically advanced sweepers (preferably regenerative air sweepers) that maximize pollutant removal.
- Operate sweepers at manufacturer requested optimal speed levels to increase effectiveness.
- To increase sweeping effectiveness consider the following:
  - Institute a parking policy to restrict parking in problematic areas during periods of street sweeping.
  - Post permanent street sweeping signs in problematic areas; use temporary signs if installation of permanent signs is not possible.
  - Develop and distribute flyers notifying residents of street sweeping schedules.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- If available use vacuum or regenerative air sweepers in the high sediment and trash areas (typically industrial/commercial).
- Keep accurate logs of the number of curb-miles swept and the amount of waste collected.
- Dispose of street sweeping debris and dirt at a landfill.
- Do not store swept material along the side of the street or near a storm drain inlet.
- Keep debris storage to a minimum during the wet season or make sure debris piles are contained (e.g. by berming the area) or covered (e.g. with tarps or permanent covers).

Street Repair and Maintenance

Pavement marking

- Schedule pavement marking activities for dry weather.

- Develop paint handling procedures for proper use, storage, and disposal of paints.
- Transfer and load paint and hot thermoplastic away from storm drain inlets.
- Provide drop cloths and drip pans in paint mixing areas.
- Properly maintain application equipment.
- Street sweep thermoplastic grindings. Yellow thermoplastic grindings may require special handling as they may contain lead.
- Paints containing lead or tributyltin are considered a hazardous waste and must be disposed of properly.
- Use water based paints whenever possible. If using water based paints, clean the application equipment in a sink that is connected to the sanitary sewer.
- Properly store leftover paints if they are to be kept for the next job, or dispose of properly.

Concrete installation and repair

- Schedule asphalt and concrete activities for dry weather.
- Take measures to protect any nearby storm drain inlets and adjacent watercourses, prior to breaking up asphalt or concrete (e.g. place san bags around inlets or work areas).
- Limit the amount of fresh concrete or cement mortar mixed, mix only what is needed for the job.
- Store concrete materials under cover, away from drainage areas. Secure bags of cement after they are open. Be sure to keep wind-blown cement powder away from streets, gutters, storm drains, rainfall, and runoff.
- Return leftover materials to the transit mixer. Dispose of small amounts of hardened excess concrete, grout, and mortar in the trash.
- 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.
- When making saw cuts in pavement, use as little water as possible and perform during dry weather. Cover each storm drain inlet completely with filter fabric or plastic during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the inlets. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site. Alternatively, a small onsite vacuum may be used to pick up the slurry as this will prohibit slurry from reaching storm drain inlets.
- Wash concrete trucks off site or in designated areas on site designed to preclude discharge of wash water to drainage system.

Patching, resurfacing, and surface sealing

- Schedule patching, resurfacing and surface sealing for dry weather.
- Stockpile materials away from streets, gutter areas, storm drain inlets or watercourses. During wet weather, cover stockpiles with plastic tarps or berm around them if necessary to prevent transport of materials in runoff.
- Pre-heat, transfer or load hot bituminous material away from drainage systems or watercourses.
- Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and maintenance holes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from covered maintenance holes and storm drain inlets when the job is complete.
- Prevent excess material from exposed aggregate concrete or similar treatments from entering streets or storm drain inlets. Designate an area for clean up and proper disposal of excess materials.
- Use only as much water as necessary for dust control, to avoid runoff.
- Sweep, never hose down streets to clean up tracked dirt. Use a street sweeper or vacuum truck. Do not dump vacuumed liquid in storm drains.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Equipment cleaning maintenance and storage

- Inspect equipment daily and repair any leaks. Place drip pans or absorbent materials under heavy equipment when not in use.
- Perform major equipment repairs at the corporation yard, when practical.
- If refueling or repairing vehicles and equipment must be done onsite, use a location away from storm drain inlets and watercourses.
- Clean equipment including sprayers, sprayer paint supply lines, patch and paving equipment, and mud jacking equipment at the end of each day. Clean in a sink or other area (e.g. vehicle wash area) that is connected to the sanitary sewer.

Bridge and Structure Maintenance

Paint and Paint Removal

- Transport paint and materials to and from job sites in containers with secure lids and tied down to the transport vehicle.
- Do not transfer or load paint near storm drain inlets or watercourses.

- Test and inspect spray equipment prior to starting to paint. Tighten all hoses and connections and do not overfill paint container.
- Plug nearby storm drain inlets prior to starting painting where there is significant risk of a spill reaching storm drains. Remove plugs when job is completed.
- If sand blasting is used to remove paint, cover nearby storm drain inlets prior to starting work.
- Perform work on a maintenance traveler or platform, or use suspended netting or tarps to capture paint, rust, paint removing agents, or other materials, to prevent discharge of materials to surface waters if the bridge crosses a watercourse. If sanding, use a sander with a vacuum filter bag.
- Capture all clean-up water, and dispose of properly.
- Recycle paint when possible (e.g. paint may be used for graffiti removal activities). Dispose of unused paint at an appropriate household hazardous waste facility.

Graffiti Removal

- Schedule graffiti removal activities for dry weather.
- Protect nearby storm drain inlets prior to removing graffiti from walls, signs, sidewalks, or other structures needing graffiti abatement. Clean up afterwards by sweeping or vacuuming thoroughly, and/or by using absorbent and properly disposing of the absorbent.
- When graffiti is removed by painting over, implement the procedures under Painting and Paint Removal above.
- Direct runoff from sand blasting and high pressure washing (with no cleaning agents) into a landscaped or dirt area. If such an area is not available, filter runoff through an appropriate filtering device (e.g. filter fabric) to keep sand, particles, and debris out of storm drains.
- If a graffiti abatement method generates wash water containing a cleaning compound (such as high pressure washing with a cleaning compound), plug nearby storm drains and vacuum/pump wash water to the sanitary sewer.
- Consider using a waterless and non-toxic chemical cleaning method for graffiti removal (e.g. gels or spray compounds).

Repair Work

- Prevent concrete, steel, wood, metal parts, tools, or other work materials from entering storm drains or watercourses.
- Thoroughly clean up the job site when the repair work is completed.
- When cleaning guardrails or fences follow the appropriate surface cleaning methods (depending on the type of surface) outlined in SC-71 Plaza & Sidewalk Cleaning fact sheet.

- If painting is conducted, follow the painting and paint removal procedures above.
- If graffiti removal is conducted, follow the graffiti removal procedures above.
- If construction takes place, see the Construction Activity BMP Handbook.
- Recycle materials whenever possible.

Unpaved Roads and Trails

- Stabilize exposed soil areas to prevent soil from eroding during rain events. This is particularly important on steep slopes.
- For roadside areas with exposed soils, the most cost-effective choice is to vegetate the area, preferably with a mulch or binder that will hold the soils in place while the vegetation is establishing. Native vegetation should be used if possible.
- If vegetation cannot be established immediately, apply temporary erosion control mats/blankets; a comma straw, or gravel as appropriate.
- If sediment is already eroded and mobilized in roadside areas, temporary controls should be installed. These may include: sediment control fences, fabric-covered triangular dikes, gravel-filled burlap bags, biobags, or hay bales staked in place.

Non-Stormwater Discharges

Field crews should be aware of non-stormwater discharges as part of their ongoing street maintenance efforts.

- Refer to SC-10 Non-Stormwater Discharges
- Identify location, time and estimated quantity of discharges.
- Notify appropriate personnel.

Training

- Train employees regarding proper street sweeping operation and street repair and maintenance.
- Instruct employees and subcontractors to ensure that measures to reduce the stormwater impacts of roadway/bridge maintenance are being followed.
- Require engineering staff and/or consulting A/E firms to address stormwater quality in new bridge designs or existing bridge retrofits.
- Use a training log or similar method to document training.
- Train employees on proper spill containment and clean up, and in identifying non-stormwater discharges.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Densely populated areas or heavily used streets may require parking regulations to clear streets for cleaning.
- No currently available conventional sweeper is effective at removing oil and grease. Mechanical sweepers are not effective at removing finer sediments.
- Limitations may arise in the location of new bridges. The availability and cost of land and other economic and political factors may dictate where the placement of a new bridge will occur. Better design of the bridge to control runoff is required if it is being placed near sensitive waters.

Requirements

Costs

- The maintenance of local roads and bridges is already a consideration of most community public works or transportation departments. Therefore, the cost of pollutant reducing management practices will involve the training and equipment required to implement these new practices.
- The largest expenditures for street sweeping programs are in staffing and equipment. The capital cost for a conventional street sweeper is between $60,000 and $120,000. Newer technologies might have prices approaching $180,000. The average useful life of a conventional sweeper is about four years, and programs must budget for equipment replacement. Sweeping frequencies will determine equipment life, so programs that sweep more often should expect to have a higher cost of replacement.
- A street sweeping program may require the following.
  - Sweeper operators, maintenance, supervisory, and administrative personnel are required.
  - Traffic control officers may be required to enforce parking restrictions.
  - Skillful design of cleaning routes is required for program to be productive.
  - Arrangements must be made for disposal of collected wastes.

- If investing in newer technologies, training for operators must be included in operation and maintenance budgets. Costs for public education are small, and mostly deal with the need to obey parking restrictions and litter control. Parking tickets are an effective reminder to obey parking rules, as well as being a source of revenue.

Maintenance

- Not applicable

Supplemental Information

Further Detail of the BMP

Street sweeping

There are advantages and disadvantages to the two common types of sweepers. The best choice depends on your specific conditions. Many communities find it useful to have a compliment of both types in their fleet.

Mechanical Broom Sweepers - More effective at picking up large debris and cleaning wet streets. Less costly to purchase and operate. Create more airborne dust.

Vacuum Sweepers - More effective at removing fine particles and associated heavy metals. Ineffective at cleaning wet streets. Noisier than mechanical broom sweepers which may restrict areas or times of operation. May require an advance vehicle to remove large debris.

Street Flushers - Not affected by biggest interference to cleaning, parked cars. May remove finer sediments, moving them toward the gutter and stormwater inlets. For this reason, flushing fell out of favor and is now used primarily after sweeping. Flushing may be effective for combined sewer systems. Presently street flushing is not allowed under most NPDES permits.

Cross-Media Transfer of Pollutants

The California Air Resources Board (ARB) has established state ambient air quality standards including a standard for respirable particulate matter (less than or equal to 10 microns in diameter, symbolized as PM10). In the effort to sweep up finer sediments to remove attached heavy metals, municipalities should be aware that fine dust, that cannot be captured by the sweeping equipment and becomes airborne, could lead to issues of worker and public safety.

Bridges

Bridges that carry vehicular traffic generate some of the more direct discharges of runoff to surface waters. Bridge scupper drains cause a direct discharge of stormwater into receiving waters and have been shown to carry relatively high concentrations of pollutants. Bridge maintenance also generates wastes that may be either directly deposited to the water below or carried to the receiving water by stormwater. The following steps will help reduce the stormwater impacts of bridge maintenance:

- Site new bridges so that significant adverse impacts to wetlands, sensitive areas, critical habitat, and riparian vegetation are minimized.

- Design new bridges to avoid the use of scupper drains and route runoff to land for treatment control. Existing scupper drains should be cleaned on a regular basis to avoid sediment/debris accumulation.
- Reduce the discharge of pollutants to surface waters during maintenance by using suspended traps, vacuums, or booms in the water to capture paint, rust, and paint removing agents. Many of these wastes may be hazardous. Properly dispose of this waste by referring to CA21 (Hazardous Waste Management) in the Construction Handbook.
- Train employees and subcontractors to reduce the discharge of wastes during bridge maintenance.

De-icing

- Do not over-apply deicing salt and sand, and routinely calibrate spreaders.
- Near reservoirs, restrict the application of deicing salt and redirect any runoff away from reservoirs.
- Consider using alternative deicing agents (less toxic, biodegradable, etc.).

References and Resources

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

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http://www.epa.gov/npdes/menuofbmps/poll_13.htm

Plaza and Sidewalk Cleaning SC-71

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Description

Pollutants on sidewalks and other pedestrian traffic areas and plazas are typically due to littering and vehicle use. This fact sheet describes good housekeeping practices that can be incorporated into the municipality's existing cleaning and maintenance program.

Approach

Pollution Prevention

- Use dry cleaning methods whenever practical for surface cleaning activities.
- Use the least toxic materials available (e.g. water based paints, gels or sprays for graffiti removal).

Suggested Protocols

Surface Cleaning

- Regularly broom (dry) sweep sidewalk, plaza and parking lot areas to minimize cleaning with water.
- Dry cleanup first (sweep, collect, and dispose of debris and trash) when cleaning sidewalks or plazas, then wash with or without soap.
- Block the storm drain or contain runoff when cleaning with water. Discharge wash water to landscaping or collect water and pump to a tank or discharge to sanitary sewer if allowed. (Permission may be required from local sanitation district.)

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- Block the storm drain or contain runoff when washing parking areas, driveways or drive-throughs. Use absorbents to pick up oil; then dry sweep. Clean with or without soap. Collect water and pump to a tank or discharge to sanitary sewer if allowed. Street Repair and Maintenance.

Graffiti Removal

- Avoid graffiti abatement activities during rain events.
- Implement the procedures under Painting and Paint Removal in SC-70 Roads, Streets, and Highway Operation and Maintenance fact sheet when graffiti is removed by painting over.
- Direct runoff from sand blasting and high pressure washing (with no cleaning agents) into a dirt or landscaped area after treating with an appropriate filtering device.
- Plug nearby storm drain inlets and vacuum/pump wash water to the sanitary sewer if authorized to do so if a graffiti abatement method generates wash water containing a cleaning compound (such as high pressure washing with a cleaning compound). Ensure that a non-hazardous cleaning compound is used or dispose as hazardous waste, as appropriate.

Surface Removal and Repair

- Schedule surface removal activities for dry weather if possible.
- Avoid creating excess dust when breaking asphalt or concrete.
- Take measures to protect nearby storm drain inlets prior to breaking up asphalt or concrete (e.g. place hay bales or sand bags around inlets). Clean afterwards by sweeping up as much material as possible.
- Designate an area for clean up and proper disposal of excess materials.
- Remove and recycle as much of the broken pavement as possible to avoid contact with rainfall and stormwater runoff.
- When making saw cuts in pavement, use as little water as possible. Cover each storm drain inlet completely with filter fabric during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the inlets. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site.
- Always dry sweep first to clean up tracked dirt. Use a street sweeper or vacuum truck. Do not dump vacuumed liquid in storm drains. Once dry sweeping is complete, the area may be hosed down if needed. Wash water should be directed to landscaping or collected and pumped to the sanitary sewer if allowed.

Concrete Installation and Repair

- Schedule asphalt and concrete activities for dry weather.

- Take measures to protect any nearby storm drain inlets and adjacent watercourses, prior to breaking up asphalt or concrete (e.g. place san bags around inlets or work areas).
- Limit the amount of fresh concrete or cement mortar mixed, mix only what is needed for the job.
- Store concrete materials under cover, away from drainage areas. Secure bags of cement after they are open. Be sure to keep wind-blown cement powder away from streets, gutters, storm drains, rainfall, and runoff.
- Return leftover materials to the transit mixer. Dispose of small amounts of hardened excess concrete, grout, and mortar in the trash.
- 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.
- Protect applications of fresh concrete from rainfall and runoff until the material has dried.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- Wash concrete trucks off site or in designated areas on site designed to preclude discharge of wash water to drainage system.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide litter receptacles in busy, high pedestrian traffic areas of the community, at recreational facilities, and at community events.
- Cover litter receptacles and clean out frequently to prevent leaking/spillage or overflow.
- Clean parking lots on a regular basis with a street sweeper.

Training

- Provide regular training to field employees and/or contractors regarding surface cleaning and proper operation of equipment.
- Train employee and contractors in proper techniques for spill containment and cleanup.
- Use a training log or similar method to document training.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Limitations related to sweeping activities at large parking facilities may include current sweeper technology to remove oil and grease.
- Surface cleaning activities that require discharges to the local sewering agency will require coordination with the agency.
- Arrangements for disposal of the swept material collected must be made, as well as accurate tracking of the areas swept and the frequency of sweeping.

Requirements

Costs

- The largest expenditures for sweeping and cleaning of sidewalks, plazas, and parking lots are in staffing and equipment. Sweeping of these areas should be incorporated into street sweeping programs to reduce costs.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

Community education, such as informing residents about their options for recycling and waste disposal, as well as the consequences of littering, can instill a sense of citizen responsibility and potentially reduce the amount of maintenance required by the municipality.

Additional BMPs that should be considered for parking lot areas include:

- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low concentrations.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.
- Structural BMPs such as storm drain inlet filters can be very effective in reducing the amount of pollutants discharged from parking facilities during periods of rain.

References and Resources

Bay Area Stormwater Management Agencies Association (BASMAA). 1996. Pollution From Surface Cleaning Folder http://www.basmaa.org

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

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Santa Clara Valley Urban Runoff Pollution Prevention Program. Maintenance Best Management Practices for the Construction Industry. Brochures: Landscaping, Gardening, and Pool; Roadwork and Paving; and Fresh Concrete and Mortar Application. June 2001.

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Plan. 2001. Municipal Activities Model Program Guidance. November.

Landscape Maintenance SC-73

Objectives

- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	
Oxygen Demanding	☑

Description

Landscape maintenance activities include vegetation removal; herbicide and insecticide application; fertilizer application; watering; and other gardening and lawn care practices. Vegetation control typically involves a combination of chemical (herbicide) application and mechanical methods. All of these maintenance practices have the potential to contribute pollutants to the storm drain system. The major objectives of this BMP are to minimize the discharge of pesticides, herbicides and fertilizers to the storm drain system and receiving waters; prevent the disposal of landscape waste into the storm drain system by collecting and properly disposing of clippings and cuttings, and educating employees and the public.

Approach

Pollution Prevention

- Implement an integrated pest management (IPM) program. IPM is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools.
- Choose low water using flowers, trees, shrubs, and groundcover.
- Consider alternative landscaping techniques such as naturescaping and xeriscaping.
- Conduct appropriate maintenance (i.e. properly timed fertilizing, weeding, pest control, and pruning) to help preserve the landscapes water efficiency.

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- Consider grass cycling (grass cycling is the natural recycling of grass by leaving the clippings on the lawn when mowing. Grass clippings decompose quickly and release valuable nutrients back into the lawn).

Suggested Protocols

Mowing, Trimming, and Weeding

- Whenever possible use mechanical methods of vegetation removal (e.g mowing with tractor-type or push mowers, hand cutting with gas or electric powered weed trimmers) rather than applying herbicides. Use hand weeding where practical.
- Avoid loosening the soil when conducting mechanical or manual weed control, this could lead to erosion. Use mulch or other erosion control measures when soils are exposed.
- Performing mowing at optimal times. Mowing should not be performed if significant rain events are predicted.
- Mulching mowers may be recommended for certain flat areas. Other techniques may be employed to minimize mowing such as selective vegetative planting using low maintenance grasses and shrubs.
- Collect lawn and garden clippings, pruning waste, tree trimmings, and weeds. Chip if necessary, and compost or dispose of at a landfill (see waste management section of this fact sheet).
- Place temporarily stockpiled material away from watercourses, and berm or cover stockpiles to prevent material releases to storm drains.

Planting

- Determine existing native vegetation features (location, species, size, function, importance) and consider the feasibility of protecting them. Consider elements such as their effect on drainage and erosion, hardiness, maintenance requirements, and possible conflicts between preserving vegetation and the resulting maintenance needs.
- Retain and/or plant selected native vegetation whose features are determined to be beneficial, where feasible. Native vegetation usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation.
- Consider using low water use groundcovers when planting or replanting.

Waste Management

- Compost leaves, sticks, or other collected vegetation or dispose of at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Place temporarily stockpiled material away from watercourses and storm drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Reduce the use of high nitrogen fertilizers that produce excess growth requiring more frequent mowing or trimming.

- Avoid landscape wastes in and around storm drain inlets by either using bagging equipment or by manually picking up the material.

Irrigation

- Where practical, use automatic timers to minimize runoff.
- Use popup sprinkler heads in areas with a lot of activity or where there is a chance the pipes may be broken. Consider the use of mechanisms that reduce water flow to sprinkler heads if broken.
- Ensure that there is no runoff from the landscaped area(s) if re-claimed water is used for irrigation.
- If bailing of muddy water is required (e.g. when repairing a water line leak), do not put it in the storm drain; pour over landscaped areas.
- Irrigate slowly or pulse irrigate to prevent runoff and then only irrigate as much as is needed.
- Apply water at rates that do not exceed the infiltration rate of the soil.

Fertilizer and Pesticide Management

- Utilize a comprehensive management system that incorporates integrated pest management (IPM) techniques. There are many methods and types of IPM, including the following:
  - Mulching can be used to prevent weeds where turf is absent, fencing installed to keep rodents out, and netting used to keep birds and insects away from leaves and fruit.
  - Visible insects can be removed by hand (with gloves or tweezers) and placed in soapy water or vegetable oil. Alternatively, insects can be sprayed off the plant with water or in some cases vacuumed off of larger plants.
  - Store-bought traps, such as species-specific, pheromone-based traps or colored sticky cards, can be used.
  - Slugs can be trapped in small cups filled with beer that are set in the ground so the slugs can get in easily.
  - In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of (pruning equipment should be disinfected with bleach to prevent spreading the disease organism).
  - Small mammals and birds can be excluded using fences, netting, tree trunk guards.
  - Beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seed head weevils, and spiders that prey on detrimental pest species can be promoted.
- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.

- Use pesticides only if there is an actual pest problem (not on a regular preventative schedule).
- Do not use pesticides if rain is expected. Apply pesticides only when wind speeds are low (less than 5 mph).
- Do not mix or prepare pesticides for application near storm drains.
- Prepare the minimum amount of pesticide needed for the job and use the lowest rate that will effectively control the pest.
- Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Calibrate fertilizer and pesticide application equipment to avoid excessive application.
- Periodically test soils for determining proper fertilizer use.
- Sweep pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Purchase only the amount of pesticide that you can reasonably use in a given time period (month or year depending on the product).
- Triple rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Dispose of empty pesticide containers according to the instructions on the container label.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.
- Inspect pesticide/fertilizer equipment and transportation vehicles daily.

Training

- Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution. Pesticide application must be under the supervision of a California qualified pesticide applicator.
- Train/encourage municipal maintenance crews to use IPM techniques for managing public green areas.
- Annually train employees within departments responsible for pesticide application on the appropriate portions of the agency's IPM Policy, SOPs, and BMPs, and the latest IPM techniques.

- Employees who are not authorized and trained to apply pesticides should be periodically (at least annually) informed that they cannot use over-the-counter pesticides in or around the workplace.
- Use a training log or similar method to document training.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a know in location
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- The Federal Pesticide, Fungicide, and Rodenticide Act and California Title 3, Division 6, Pesticides and Pest Control Operations place strict controls over pesticide application and handling and specify training, annual refresher, and testing requirements. The regulations generally cover: a list of approved pesticides and selected uses, updated regularly; general application information; equipment use and maintenance procedures; and record keeping. The California Department of Pesticide Regulations and the County Agricultural Commission coordinate and maintain the licensing and certification programs. All public agency employees who apply pesticides and herbicides in "agricultural use" areas such as parks, golf courses, rights-of-way and recreation areas should be properly certified in accordance with state regulations. Contracts for landscape maintenance should include similar requirements.
- All employees who handle pesticides should be familiar with the most recent material safety data sheet (MSDS) files.
- Municipalities do not have the authority to regulate the use of pesticides by school districts, however the California Healthy Schools Act of 2000 (AB 2260) has imposed requirements on California school districts regarding pesticide use in schools. Posting of notification prior to the application of pesticides is now required, and IPM is stated as the preferred approach to pest management in schools.

Requirements

Costs

Additional training of municipal employees will be required to address IPM techniques and BMPs. IPM methods will likely increase labor cost for pest control which may be offset by lower chemical costs.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

Waste Management

Composting is one of the better disposal alternatives if locally available. Most municipalities either have or are planning yard waste composting facilities as a means of reducing the amount of waste going to the landfill. Lawn clippings from municipal maintenance programs as well as private sources would probably be compatible with most composting facilities

Contractors and Other Pesticide Users

Municipal agencies should develop and implement a process to ensure that any contractor employed to conduct pest control and pesticide application on municipal property engages in pest control methods consistent with the IPM Policy adopted by the agency. Specifically, municipalities should require contractors to follow the agency's IPM policy, SOPs, and BMPs; provide evidence to the agency of having received training on current IPM techniques when feasible; provide documentation of pesticide use on agency property to the agency in a timely manner.

References and Resources

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Drainage System Maintenance SC-74

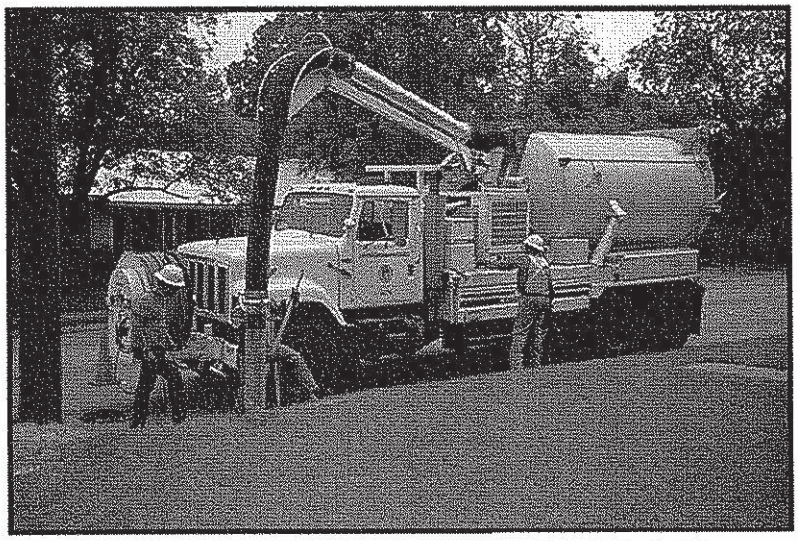

Photo Credit: Geoff Brosseau

Objectives

- Contain
- Educate
- Reduce/Minimize

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff that may contain certain pollutants. Maintaining catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis will remove pollutants, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Approach

Suggested Protocols

Catch Basins/Inlet Structures

- Municipal staff should regularly inspect facilities to ensure the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC-75 Waste Handling and Disposal).
- Clean catch basins, storm drain inlets, and other conveyance structures in high pollutant load areas just before the wet season to remove sediments and debris accumulated during the summer.

- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Record the amount of waste collected.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed of. Do not dewater near a storm drain or stream.
- Except for small communities with relatively few catch basins that may be cleaned manually, most municipalities will require mechanical cleaners such as eductors, vacuums, or bucket loaders.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect flushed effluent and pump to the sanitary sewer for treatment.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge from cleaning a storm drain pump station or other facility to reach the storm drain system.
- Conduct quarterly routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.
- Sample collected sediments to determine if landfill disposal is possible, or illegal discharges in the watershed are occurring.

Open Channel

- Consider modification of storm channel characteristics to improve channel hydraulics, to increase pollutant removals, and to enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies

(SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS

Illicit Connections and Discharges

- During routine maintenance of conveyance system and drainage structures field staff should look for evidence of illegal discharges or illicit connections:
  - Is there evidence of spills such as paints, discoloring, etc.
  - Are there any odors associated with the drainage system
  - Record locations of apparent illegal discharges/illicit connections
  - Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of up gradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
  - Once the origin of flow is established, require illicit discharger to eliminate the discharge.
- Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

- The State Department of Fish and Game has a hotline for reporting violations called Cal TIP (1-800-952-5400). The phone number may be used to report any violation of a Fish and Game code (illegal dumping, poaching, etc.).
- The California Department of Toxic Substances Control's Waste Alert Hotline, 1-800-69TOXIC, can be used to report hazardous waste violations.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Only properly trained individuals are allowed to handle hazardous materials/wastes.
- Train municipal employees from all departments (public works, utilities, street cleaning, parks and recreation, industrial waste inspection, hazardous waste inspection, sewer maintenance) to recognize and report illegal dumping.
- Train municipal employees and educate businesses, contractors, and the general public in proper and consistent methods for disposal.
- Train municipal staff regarding non-stormwater discharges (See SC-10 Non-Stormwater Discharges).

Spill Response and Prevention

- Refer to SC-11, Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Cleanup activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and disposal of flushed effluent to sanitary sewer may be prohibited in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Municipal codes should include sections prohibiting the discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.
- Private property access rights may be needed to track illegal discharges up gradient.

- Requirements of municipal ordinance authority for suspected source verification testing for illicit connections necessary for guaranteed rights of entry.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget. A careful study of cleaning effectiveness should be undertaken before increased cleaning is implemented. Catch basin cleaning costs are less expensive if vacuum street sweepers are available; cleaning catch basins manually can cost approximately twice as much as cleaning the basins with a vacuum attached to a sweeper.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary. Encouraging reporting of illicit discharges by employees can offset costs by saving expense on inspectors and directing resources more efficiently. Some programs have used funds available from "environmental fees" or special assessment districts to fund their illicit connection elimination programs.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.

- Identifying illicit discharges requires teams of at least two people (volunteers can be used), plus administrative personnel, depending on the complexity of the storm sewer system.

- Arrangements must be made for proper disposal of collected wastes.

- Requires technical staff to detect and investigate illegal dumping violations, and to coordinate public education.

Supplemental Information

Further Detail of the BMP

Storm Drain flushing

Sanitary sewer flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in sanitary sewer systems. The same principles that make sanitary sewer flushing effective can be used to flush storm drains. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as to an open channel, to another point where flushing will be initiated, or over to the sanitary sewer and on to the treatment facilities, thus preventing re-suspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. The deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to

cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce the impacts of stormwater pollution, a second inflatable device, placed well downstream, may be used to re-collect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to re-collect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75 percent for organics and 55-65 percent for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm drain flushing.

Flow Management

Flow management has been one of the principal motivations for designing urban stream corridors in the past. Such needs may or may not be compatible with the stormwater quality goals in the stream corridor.

Downstream flood peaks can be suppressed by reducing through flow velocity. This can be accomplished by reducing gradient with grade control structures or increasing roughness with boulders, dense vegetation, or complex banks forms. Reducing velocity correspondingly increases flood height, so all such measures have a natural association with floodplain open space. Flood elevations laterally adjacent to the stream can be lowered by increasing through flow velocity.

However, increasing velocity increases flooding downstream and inherently conflicts with channel stability and human safety. Where topography permits, another way to lower flood elevation is to lower the level of the floodway with drop structures into a large but subtly excavated bowl where flood flows we allowed to spread out.

Stream Corridor Planning

Urban streams receive and convey stormwater flows from developed or developing watersheds. Planning of stream corridors thus interacts with urban stormwater management programs. If local programs are intended to control or protect downstream environments by managing flows delivered to the channels, then it is logical that such programs should be supplemented by management of the materials, forms, and uses of the downstream riparian corridor. Any proposal for steam alteration or management should be investigated for its potential flow and stability effects on upstream, downstream, and laterally adjacent areas. The timing and rate of flow from various tributaries can combine in complex ways to alter flood hazards. Each section of channel is unique, influenced by its own distribution of roughness elements, management activities, and stream responses.

Flexibility to adapt to stream features and behaviors as they evolve must be included in stream reclamation planning. The amenity and ecology of streams may be enhanced through the landscape design options of 1) corridor reservation, 2) bank treatment, 3) geomorphic restoration, and 4) grade control.

Corridor reservation - Reserving stream corridors and valleys to accommodate natural stream meandering, aggradation, degradation, and over bank flows allows streams to find their own form and generate less ongoing erosion. In California, open stream corridors in recent urban developments have produced recreational open space, irrigation of streamside plantings, and the aesthetic amenity of flowing water.

Bank treatment - The use of armoring, vegetative cover, and flow deflection may be used to influence a channel's form, stability, and biotic habitat. To prevent bank erosion, armoring can be done with rigid construction materials, such as concrete, masonry, wood planks and logs, riprap, and gabions. Concrete linings have been criticized because of their lack of provision of biotic habitat. In contrast, riprap and gabions make relatively porous and flexible linings. Boulders, placed in the bed reduce velocity and erosive power.

Riparian vegetation can stabilize the banks of streams that are at or near a condition of equilibrium. Binding networks of roots increase bank shear strength. During flood flows, resilient vegetation is forced into erosion-inhibiting mats. The roughness of vegetation leads to lower velocity, further reducing erosive effects. Structural flow deflection can protect banks from erosion or alter fish habitat. By concentrating flow, a deflector causes a pool to be scoured in the bed.

Geomorphic restoration – Restoration refers to alteration of disturbed streams so their form and behavior emulate those of undisturbed streams. Natural meanders are retained, with grading to gentle slopes on the inside of curves to allow point bars and riffle-pool sequences to develop. Trees are retained to provide scenic quality, biotic productivity, and roots for bank stabilization, supplemented by plantings where necessary.

A restorative approach can be successful where the stream is already approaching equilibrium. However, if upstream urbanization continues new flow regimes will be generated that could disrupt the equilibrium of the treated system.

Grade Control - A grade control structure is a level shelf of a permanent material, such as stone, masonry, or concrete, over which stream water flows. A grade control structure is called a sill, weir, or drop structure, depending on the relation of its invert elevation to upstream and downstream channels.

A sill is installed at the preexisting channel bed elevation to prevent upstream migration of nick points. It establishes a firm base level below which the upstream channel can not erode.

A weir or check dam is installed with invert above the preexisting bed elevation. A weir raises the local base level of the stream and causes aggradation upstream. The gradient, velocity, and erosive potential of the stream channel are reduced. A drop structure lowers the downstream invert below its preexisting elevation, reducing downstream gradient and velocity. Weirs and drop structure control erosion by dissipating energy and reducing slope velocity.

When carefully applied, grade control structures can be highly versatile in establishing human and environmental benefits in stabilized channels. To be successful, application of grade control structures should be guided by analysis of the stream system both upstream and downstream from the area to he reclaimed.

Examples

The California Department of Water Resources began the Urban Stream Restoration Program in 1985. The program provides grant funds to municipalities and community groups to implement stream restoration projects. The projects reduce damages from streambank aid watershed instability arid floods while restoring streams' aesthetic, recreational, and fish and wildlife values.

In Buena Vista Park, upper floodway slopes are gentle and grassed to achieve continuity of usable park land across the channel of small boulders at the base of the slopes.

The San Diego River is a large, vegetative lined channel, which was planted in a variety of species to support riparian wildlife while stabilizing the steep banks of the floodway.

References and Resources

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United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line: http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Efficient Irrigation SD-12

Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

Designing New Installations

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

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

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

Redeveloping Existing Installations

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

Other Resources

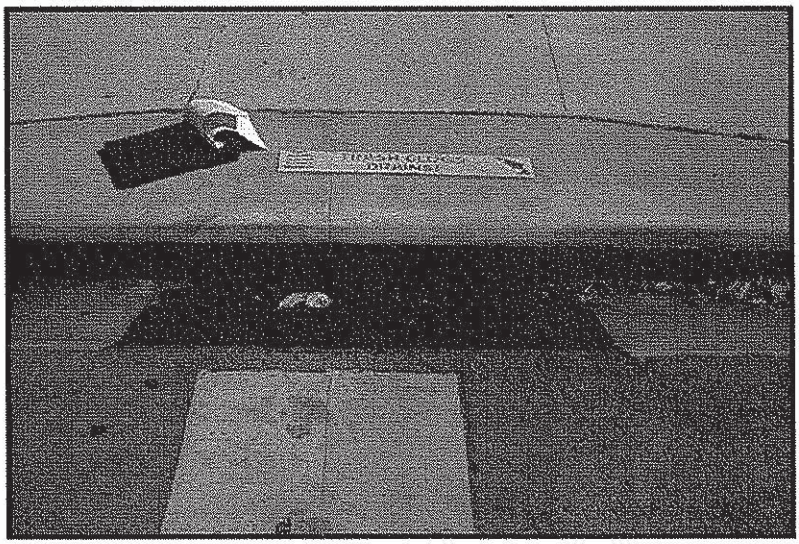
A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

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

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

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

Storm Drain Signage SD-13



Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

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

Designing New Installations

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

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

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

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

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

Redeveloping Existing Installations

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

Additional Information

Maintenance Considerations

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

Placement

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

Supplemental Information

Examples

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

Other Resources

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

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

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

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

Drain Inserts MP-52

Description

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

California Experience

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

Advantages

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

Limitations

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

Design and Sizing Guidelines

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

Design Considerations

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

Targeted Constituents

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

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

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

Construction/Inspection Considerations

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

Performance

Few products have performance data collected under field conditions.

Siting Criteria

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

Additional Design Guidelines

Follow guidelines provided by individual manufacturers.

Maintenance

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

Cost

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

References and Sources of Additional Information

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Interagency Catch Basin Insert Committee, Evaluation of Commercially-Available Catch Basin Inserts for the Treatment of Stormwater Runoff from Developed Sites, 1995

Larry Walker Associates, June 1998, NDMP Inlet/In-Line Control Measure Study Report

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