2012-2022 Stream Maintenance Program Manual

Sunny Williams
SCVWD
1/1/2012

2012 – 2022 STREAM MAINTENANCE PROGRAM MANUAL

Prepared by
Sunny Williams, Environmental Planner

Bill Smith
Devin Mody
Doug Padley
Janell Hillman
Joe Chavez
John Chapman
Judy Ingols
Kristen O'Kane
Linda Spahr
Lisa Porcella
Mark Wander
Melissa Moore
Michael Sanchez
Rick Austin
Scott Katric
Suzanne Remien

Table of Contents

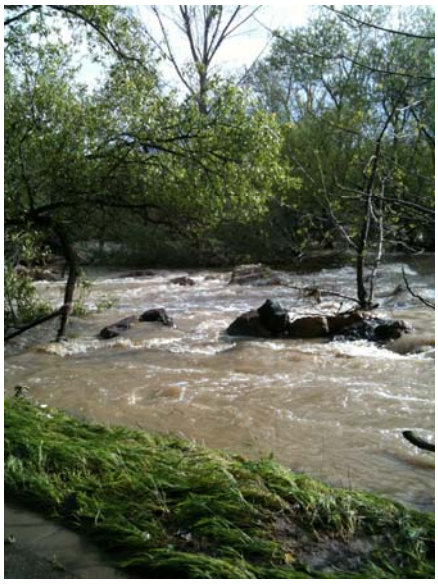
ATTACHMENTS

1. INTRODUCTION

The 2012 – 2022 Stream Maintenance Program (SMP) Program Manual describes the authorized work activities, calendar timing for the activities, Best Management Practices to be implemented while performing the work, work specific exclusions, and a description for calculating any necessary mitigation.

1.1. Purpose

The Stream Maintenance Program (SMP/Program) establishes an ongoing maintenance program for the Santa Clara Valley Water District's (District/SCVWD) streams, canals, and stream gauges. The SMP was first approved in 2001. Though the SMP is written as a long-term program, it also allows for periodic updates as necessary to meet new conditions or maintenance needs of the District. This document describes the 2012-2022 Santa Clara Valley Water District's Stream Maintenance Program. This is an update from the 2001 Program with more detailed descriptions for work locations and assessment, updated mapping tools and species listings. The SMP and Final Environmental Impact Report adopted in 2001 (2001 FEIR), used a 20-year planning time frame to evaluate cumulative impacts. This Program document covers the second 10-year period and wholly replaces documents that guided the SMP from its inception in 2001 until 2012. The 2012 FEIR will be the stand-alone environmental document for the updated program.



Program Goals

The SMP work activities are developed to meet two program goals.

1. Maintain the design flow conveyance capacity (or the appropriate capacity when no design capacity exists) of District facilities, and
2. Maintain the structural and functional integrity of District facilities.

Program Objectives

The following objectives will be used to meet these goals:

1. Remove sediment to maintain the hydraulic, safety, and habitat functions of the creek systems;
2. Manage vegetation to maintain the hydraulic, safety, and habitat functions of the creek systems, and to allow for levee inspections and maintenance access;
3. Stabilize beds and banks of creeks and canals to protect existing infrastructure, maintain public safety, reduce sediment loading, protect water quality, and protect habitat values; and
4. Avoid, minimize, or mitigate impacts on the environment by incorporating stream stewardship measures into maintenance activities.

1.2. SMP Principles

These principles have been developed to ensure that natural resources are protected to the furthest extent possible during routine stream maintenance projects. BMPs have been developed to implement these principles. The BMPs are included as Table 2-12, DSEIR Project Description. The principles in the SMP have been developed to guide decision-making for stream maintenance activities and projects. Principles are based on the SMP objectives and are a means to the District's Ends Policies (December 15, 2009).

Principle 1: The District will process all routine stream maintenance activities according to the process and protocols established in the Program.

Principle 2: Decisions regarding the necessity of routine sediment removal and vegetation management activities (to restore channel flow capacities) will be made following the thresholds established in the Maintenance Guidelines.

Principle 3: The District will implement measures to avoid and minimize impacts to native species and habitat.

Principle 4: All maintenance activities will be performed in a manner that has the least impact to the natural flora, fauna and aquatic resources while meeting the project objectives.

Ends Policies – Board of Directors Established

E-1 Mission and General Principles

The mission of the District is a healthy, safe, and enhanced quality of living in Santa Clara County through watershed stewardship and comprehensive management of water resources in a practical, cost-effective, and environmentally-sensitive manner for current and future generations.

Maintenance of the creeks under the SMP is an integral part of the mission, which combines work needed for comprehensive and efficient management within the context of environmental requirements.

E-2 Water Supply: There is a reliable, clean water supply for current and future generations.

Goal 2.1	Current and future water supply for municipalities, industries, agriculture and the environment is reliable
Objective 2.1.1	Aggressively protect groundwater basins from the threat of contamination and maintain the groundwater basins for reliability.
Objective 2.1.2	Protect, maintain and develop local water.

E-3 Natural Flood Protection: There is a healthy and safe environment for residents, businesses and visitors, as well as for future generations.

Goal 3.1	Natural flood protection for residents, businesses and visitors.
Objective 3.1.1	Balance environmental quality and protection from flooding in a cost effective manner.
Objective 3.1.2	Preserve flood conveyance capacity.

The SMP is intended to authorize routine work needed to preserve flood conveyance capacity.

E-4 Water Resources Stewardship: There is water resources stewardship to protect and enhance watersheds and natural resources and to improve the quality of life in Santa Clara County.

Goal 4.1	Healthy creek and bay ecosystems
Objective 4.1.1	Balance water supply, flood protection and environmental stewardship functions.
Objective 4.1.2	Improve watersheds, streams, and natural resources.
Objective 4.1.3	Promote awareness of creek and bay ecosystem functions.
Goal 4.2	Clean, safe water in creeks and bay.
Objective 4.2.1	Preserve or improve surface and ground water quality for beneficial uses.
Objective 4.2.2	Promote awareness of water quality and stream stewardship.
Goal 4.3	Improved quality of life in Santa Clara County through trails, open space and water resources management.
Objective 4.3.1	Support additional trails, parks and open space along creeks and in the watersheds when reasonable and appropriate.
Objective 4.3.2	Reduce greenhouse gas emissions when reasonable and appropriate.

The SMP integrates the principal of resource management into the work. Program elements are designed to avoid, minimize or mitigate potential impacts in balance with the need to conduct work in streams to carry out the District's mission.

1.3. General Applicability

The SMP applies to all of the District's routine stream and canal maintenance activities that can be grouped into five categories: vegetation management, sediment removal, bank stabilization, management of animal conflicts, and minor maintenance activities. Routine maintenance is defined as the work activities described in this plan that occur in the course of standard maintenance work or procedures and are performed regularly, and often repeated. These activities can occur within the SMP program area below the 1000-foot elevation contour, and along approximately 800 miles of creek, 41 miles of 11 canals, and related facilities. Stream gauge maintenance activities are covered in the SMP through the appropriate work activity projections.

Future maintenance work projections for the program period 2012-2022 were developed by an interdisciplinary team familiar with and responsible for conveyance requirements of the creeks. Work projections were made to describe the estimated

location and work area percentage for Program work activities. These projections were used to perform the environmental impacts analysis in the 2012 SMP FEIR. Maintenance activities are permitted throughout the program area as long as they do not result in significant environmental effects substantially different than those evaluated for the Program as a whole. Work that is conducted in areas not originally projected in 2002, will require mitigation as described in the Mitigation Approach Memorandum, Appendix C, 2012 SMP FSEIR. Work projected in the 2002 SMP has been mitigated for in perpetuity.

1.4. General Exclusion

The SMP does not include the following activities (2012 SMP FEIR):

1. Emergency repair work;
2. Work that would increase the flow conveyance or water supply capacity of a facility;
3. Maintenance work in stream reaches that are above the 1,000-foot elevation contour (areas typically above the reservoirs);
4. Maintenance work of dams, reservoirs and other water supply facilities, such as pipelines outside of stream corridors, groundwater percolation ponds, and in-stream summer dams;
5. Installation of new or major modification of fish ladders;
6. Hazard tree removals;
7. Work conducted on private property by owners or other agencies;
8. Work performed by other agencies;
9. Large construction projects or capital improvement projects;
10. Area-wide, intensive maintenance, or rehabilitation of large [>0.05 acre] mitigation projects installed as part of Capital Improvement Projects and which have persisted beyond the Establishment Period; ~~and~~
11. Continued implementation of the 2002 SMP mitigation, monitoring and reporting program, and
12. Work activities specifically excluded in the Program.

1.5. Capital Improvement Projects

Large construction projects and Capital Improvement Projects (CIP) are not considered routine stream maintenance and are not addressed through the SMP. Future CIPs will analyze and account for long-term maintenance impacts under their own environmental review documents. The analysis of long term maintenance for a CIP is expected to follow a systematic process, evaluating the design for the least amount of

maintenance and then determining whether the needed maintenance is already included in the SMP.

Step 1: Compare new project maintenance needs to Permanent Mitigation.
Analyze the required future maintenance of the new project against the Permanent Mitigation Areas (PMA) (defined as the 2002 projections plus any changes made since 2002: adding CIP reaches, swapping out work never conducted in 2002-2012 to provide unaccounted for mitigation that is now available to apply toward other work activities, and new work areas that have provided mitigation in perpetuity).

Any environmental effects from ~~of~~ required new future maintenance of CIPs or other new projects will be compared to the Permanent Mitigation Areas for that reach of creek. Mitigation for CIPs will only be required if there are future maintenance needs from the capital project that are not in the Permanent Mitigation Areas. It is presumed that some of the maintenance needs will be projected in the Permanent Mitigation Areas, but not necessarily to the scale that will be needed once the CIPs are complete.

If all of the future maintenance needs are not in the Permanent Mitigation Areas, then proceed to Step 2.

Step 2: Include new project maintenance needs not in Permanent Mitigation Areas into the new project environmental document.
To the extent that future maintenance work requirements are not covered by the Permanent Mitigation Areas of the 2002 SMP and incorporated projects, the long-term incremental maintenance needs, including the scale and frequency of work needed, must be analyzed and accounted for under the CIP/other new project. The mitigation required for those impacts must be included in the CIP environmental document and will need to provide up front permanent mitigation for repeated maintenance impacts in perpetuity. Only then will those incremental future maintenance activities be added to the SMP Permanent Mitigation Area projections.

1.6. Work Projections

1. Management

The routine maintenance activities conducted by the District and described in this Manual exhibit consistent attributes and patterns. However, projections of future stream maintenance activities for the SMP and Program FEIR cannot represent the exact extent of work that will occur. Actual stream maintenance activities can vary from year-to-year.

Therefore, work projections were made to describe the estimated location and work area percentage for Program activities for the 2012-2022 period. These projections were used to perform the environmental impacts analysis in the 2012 SMP FEIR; and thereby determine potential impacts, and the necessary associated Best Management Practices (BMPs) and mitigation measures. Maintenance activities are permitted throughout the program area as long as they do not result in significant environmental effects substantially different than those evaluated for the Program as a whole.

Work is considered included in the SMP if the work is consistent with the District's Maintenance Guidelines or the work is needed to maintain the flow conveyance capacity of a facility but does not increase the design flow conveyance capacity. Work areas must be managed for the entire Program area to ensure that the maximum work covered by the Program, FEIR and regulatory permits, is not exceeded. Work activity impacts in areas not projected in 2002 are calculated on an annual basis, in conjunction with any resulting required mitigation. Work areas projected in the 2002 SMP have been mitigated for in perpetuity, will continue to have work performed in these areas, and will not need to calculate impacts annually.

In addition, the Program supports site specific assessments to determine the most effective method to achieve the maintenance goal. If it is determined that a lower impact work activity method is viable for the site, the new work activity will be proposed through either the Notice of Proposed Work (NPW) process or in consultation with the regulatory agencies involved. This will support an assessment for work activity modification that could result in a more benign method being used than was originally projected.

Permanent Mitigation Areas

Maintenance areas that have dedicated mitigation provided in perpetuity will be referred to as Permanent Mitigation Areas (PMAs). The PMAs will be a set of work areas that are mitigated for in perpetuity. These areas will grow as new work areas are mitigated through the land acquisition and enhancement process. When mitigation lands are acquired, the District will identify which of the “new work areas” now identified under the 2012 SMP would be mitigated for (in perpetuity) by the acquired lands. Similar to providing mitigation for new work areas, this same process of acquiring lands to be applied as mitigation can be used to provide mitigation for other work areas that were not projected. Such “not projected but worked” areas from the 2002-2012 period can be added to

the pool of Permanent Mitigation Areas (PMAs) that are mitigated for in perpetuity, if appropriate mitigation lands are acquired and they provide a good match for such lands.

Additionally, some areas may be removed from the PMA if work has never been performed in that area, and no need for future work in that area is anticipated. Under such a scenario, the projected work area (and its impacts) that are no longer necessary would be removed from the PMA program. The compensatory mitigation that had already been provided would remain, but would no longer be allocated towards a particular work activity and location. Work areas and activities that are not previously covered, as being included in the PMA, can be added to the PMA by applying this unallocated mitigation. In this way, unallocated mitigation-in-perpetuity from the 2002 Program may now be applied to alternative work areas.

Any inclusion of such work areas into the PMA pool of work areas mitigated for in perpetuity would be reviewed by participating regulatory agencies.

2. Ownership

The District performs work where it owns property in fee title or has an easement. The Board of Directors may also approve work to be performed on private property if it is determined that the erosion, scour or other maintenance needs are negatively affecting the flow conveyance and bank stability of the creek system. Due to the skill and knowledge necessary to maintain the function of the creek system, it may become necessary for the District to work on private property in order to provide general public safety.

The District has also projected work for areas where there are not current fee or easement property rights, but where it is determined that there may be maintenance needs over the life of this Program. The District may acquire new property rights through purchase in fee title or easement to: provide creek access, prevent encroachment of development into flood plains, and meet the goals and objectives of this Program.

3. Locations

Work is identified by work activity and location. Location identification begins at the center of the creek and extends outward. Cross sectional areas include: in-stream and bank/bench, which may include a maintenance road; and

where there is a levee, levee inboard – top of levee – levee outboard.

1.7. Description per Work Activity

1. Vegetation Management

   Vegetation work impacts in new areas are assessed annually, calculating necessary mitigation per the requirements in the Mitigation Approach Memorandum, Appendix C FSEIR. Tree and shrub removals 6-12 inches diameter at breast height (dbh) may occur on a project specific basis per the criterion and mitigation described in Attachment C this manual. Work projected in the 2002 SMP has been mitigated for in perpetuity, will continue to have work performed in these areas, and will not need to calculate impacts annually.

2. Sediment Removal

   Sediment removal impacts in new areas are assessed annually, calculating necessary mitigation per the requirements in the Mitigation Approach Memorandum, Appendix C FSEIR. Work projected in the 2002 SMP has been mitigated for in perpetuity, will continue to have work performed in these areas, and will not need to calculate impacts annually. Sediment removal can be performed in any stream within the SMP program area.

3. Bank Stabilization

   Bank stabilization work can be performed in any creek under District jurisdiction (fee title, easement, or directed by the Board of Directors) unless specifically excluded by this Program. Bank stabilization work is assessed per project site as it cannot be pre-determined where a site will need repair. The District has made a commitment that no more than half of the bank repairs will consist of impervious hardscape bank stabilization work (all watersheds combined) each year.

4. Management of Animal Conflicts

   The District manages animal damage and conflicts in District creeks and canals. Animals may damage District facilities by burrowing into levees, banks and along canals, forage on mitigation sites, and interfere with work activities.

To avoid compromising District facilities and to reduce conflicts with species living in or protecting sites where work is needed, the management of animal conflicts may be undertaken.

5. Minor Maintenance

   Minor Maintenance activities (fence repair, graffiti removal, access road maintenance, etc.) are not a projected work activities and may occur anywhere within the SMP program area.

6. Canal Maintenance

   The primary function of District canals are to serve as water supply transport facilities, though they also provide incidental flood protection by capturing surface runoff. Canal maintenance activities include all the work activities discussed above.

1.8. Work Window

A. Work Window Extensions

Requests for work window extensions must be submitted to the regulatory agencies by October 1st, listing the creek names and reaches where a work extension will occur. Work extensions vary per work activity. The agencies will provide a single response within one week. Significant rainfall applies after October 15.

B. Vegetation Management

Woody Vegetation Management activities may occur based on the following:

1. In-stream (wetted area) hand pruning and hand removal may occur year round, except:
   a) where mechanized equipment would need to access the site by crossing a creek or otherwise affect water quality, or
   b) in steelhead creeks, where work is only permitted until December 31 or until local rainfall of 0.5 inches or greater falls within the subject watershed within a 24-hour period, whichever transpires first.

2. Vegetation management outside the bankfull channel (see section 2.1.6 for definition) may be performed year round.
    a) Year round work opportunities do not apply to areas where mechanized equipment would need to access the site by crossing a creek or otherwise affect water quality.
3. Due to separate project permits and/or CEQA/NEPA requirements, individual sites may have additional limitations on work types and work windows. Where these modified conditions occur they will be incorporated into the SMP.

Herbicide Vegetation Management activities may occur based on the following and per the MSDS and label:

1. In-stream herbicide use is a projected work activity and may occur between June 15 - October 15.
2. In-stream work may continue until December 31 or until local rainfall greater than 0.5 inches falls within the subject watershed within a 24-hour period, whichever occurs first.
3. Non-instream (bank/bench) herbicide work may occur year round, weather permitting.

C. Sediment Removal

Sediment removal may occur during the work window of June 15 – October 15. Water quality monitoring shall be performed per the Water Quality Monitoring Plan and all excavated sediment shall be tested per the Sediment Characterization Plan.

1. Extended Work Window.
    a. Creeks supporting anadromous fish:
    An extended work window may occur from October 15 through October 31, or until local rainfall of 0.5 inches or greater falls within the subject watershed within a 24-hour period, whichever occurs first.
    b. Creeks not supporting anadromous fish:
    An extended work window may occur from October 15 through November 30th**,** or until local rainfall of 0.5 inches or greater falls within the subject watershed within a 24-hour period, whichever occurs first.

2. Extended Work Window in Lower Quality Areas:
    a. Work may occur until December 31.
    b. Work areas will be included in the annual NPW.

c. Work will only occur within Berryessa Creek (0-88+80; 232+70-236+00; 284+30-288+00), Lower Silver Creek (Reach 3 between Stations 37+40 and 381+19~~)~~), Thompson Creek (0+00-10+00), Canoas Creek (0+00-390+00), Ross Creek (0+00-86+30), Calabazas Creek (35+00-105+00), and San Tomas Aquino Creek (80+00-100+00), if:
   1) a preconstruction biological survey is performed and clearance provided,
   2) site conditions are dry and access for all construction equipment and vehicles will not impact roadways,
   3) water diversions will not be allowed,
   4) all work will stop if any rainfall event is forecast three (3) days into the future, and
   5) sites must be maintained in a winterized state. (See section 4. Bank Stabilization, I. for a definition of winterization.)

d. Work may occur after a significant rainfall event but no later than December 31.

D. Bank Stabilization

Bank stabilization work is allowed during the work window of June 15 – October 15. If a work extension is granted, it may continue until the approved date stated below, or until the first 72-hour forecast that includes significant rainfall. Significant rainfall is local rainfall 0.5 inches or greater that falls within a 24-hour period in the subject watershed.

1. In Creeks Supporting Anadromous Fish
   An extended work window may occur until October 31st for bank stabilization projects that will be 50% complete by October 15th.

2. In Creeks Not Supporting Anadromous Fish
   a. An extended work window may occur until November 30th for projects that will be 50% complete by October 15th or until significant rainfall.
   b. An extended work window may occur until November 30th for new bank stabilization projects that will be completed in five (5) days or less, or until significant rainfall.

E. Management of Animal Conflicts

Management of animal conflicts may occur year round. The method of control used will be based on the seasonal efficacy of the animal's life cycles and in compliance with the protection of special-status species.

F. Minor Maintenance

Minor Maintenance activities may be performed year round or within the Work Window for specified Work Activities. Minor sediment or vegetation work must comply with the Work Windows specific to those work activities, even when they are Minor Maintenance activities.

G. Canal Maintenance

Canal Maintenance activities may be performed as defined by the work activity and per the description of annual work maximums in the Canal Maintenance section of this Manual.

1.8.1 Work Window Tables

Instream Work Window In Creeks Supporting Anadromous Fish

Work Activity	June 15 – Oct 15	Oct 15 – Oct 31 No work once significant rainfall (0.5" within 24-hr within watershed)	Oct 15 – Dec 31 No work once significant rainfall (0.5" within 24-hr within watershed)
Instream hand pruning	X		X
Instream hand removal	X		X
Herbicide	X[1,2]		X[1,2]
Sediment Removal	X	X	
Bank Stabilization	X	X, if at least 50% complete on October 15	

[1] Surfactant use on the 14 steelhead streams is permitted when the stream is dry in the immediate work location and no rain is forecast for the next 24 hours.

[2] Aquatic herbicide can only be used in California red-legged frog and California tiger salamander SMP mapped areas when the creek is dry and no rain is forecast for the next 48 hours.

After October 15th, seventy-two-hour look-ahead weather forecasts from the National Weather Service (or local vendor such as the Western Weather Group) are

consulted to prepare for possible winterization measures. If a significant rainfall is forecast within the coming 72-hr forecast window, then maintenance work that may result in sediment runoff to the stream shall be stopped, to allow adequate time to complete erosion control measures. Winterization materials will be available and on-site when rain falls.

Instream Work Window In Creeks Not Supporting Anadromous Fish

Work Activity	June 15 – Oct 15	Oct 15 – Nov 30 No work once significant rainfall (0.5" within 24-hr within watershed)	Oct 15 – Dec 31 No work once significant rainfall (0.5" within 24-hr within watershed)	June 15 – Dec 31 Work even after significant rainfall (0.5" within 24-hr within watershed)	Year Round, except where mechanized equipment crosses a creek or otherwise affecting water quality
Instream hand pruning	X				X
Instream hand removal	X				X
Herbicide	X		X		
Sediment Removal	X	X		X, specific reaches of Berryessa, Lower Silver, Thompson, Canoas, Ross, Calabazas, San Tomas Aquino	
Bank Stabilization	X	X a) if at least 50% complete on October 15 b) new projects that will be completed in five (5) days or less			

Significant rainfall applies after October 15. After October 15th, seventy-two-hour look-ahead weather forecasts from the National Weather Service (or local vendor such as the Western Weather Group) are consulted to prepare for possible

winterization measures. If a significant rainfall is forecast within the coming 72-hr forecast window, then maintenance work that may result in sediment runoff to the stream shall be stopped, to allow adequate time to complete erosion control measures. Winterization materials will be available and on-site when rain falls.

Non-Instream Work Window

Work Activity	Year Round, except where mechanized equipment crosses a creek or otherwise affecting water quality	Time Specific
Vegetation Management	X	
Herbicide	X per MSDS label	
Large Woody Debris	X See Management of LWD guidelines	
Mowing		Feb 1 – Nov 30
Discing		Feb 1 – Oct 15
Flaming	X	
Grazing	X	
Management of Animal Conflicts	X Per special status species and pesticide requirements	
Minor Maintenance	X Instream work follows activity specific work windows	

1.9. Best Management Practices (BMPs)

Best Management Practices (BMPs) have been incorporated into the project activities to avoid and minimize environmental impacts. General BMPs apply to all work. Other BMPs are applicable to specific work activities. See Table 2-12, DSEIR Project Description.

1.10. Process Overview

1. District Work Process

The District's stream maintenance planning, implementation, and reporting process occurs in three phases: 1) program development and documentation; 2) implementation of annual routine stream maintenance work; and 3) annual reporting. Maintenance work can be proposed either as part of the Annual Work Plan through the "Notice of Proposed Work" (NPW) or as other identified work throughout the year via individual work orders. All stream maintenance activities will follow the Resource Protection Protocols as described below.

The District uses work orders to describe and implement stream maintenance projects. Work orders provide a description of the project, schedule of implementation, estimated costs, permit requirements and other special conditions. Work orders will continue to be the primary vehicle for the implementation of maintenance projects.

As maintenance work is proposed, it will be evaluated to determine if the work is addressed under the SMP. If not, the work will follow the appropriate project development process, which may include individual CEQA review and individual regulatory permits or clearances. An example of this type of work would be the removal of a drop structure in a stream.

The proposed work is also evaluated under the requirements of the individual creek Maintenance Guidelines to ensure that the maintenance activity meets pre-established engineering requirements. For example, if a sediment removal project is proposed, the Maintenance Guidelines provide the information on the allowable depth of sediment for a reach that will still provide the designed flow conveyance. Maintenance Guidelines are updated as new CIPs are completed, as better maintenance methods are developed, or as refinements are made to the level of maintenance required in a reach of creek.

2. SMP Compliance Verification

Work is proposed in the Annual Work Plan through the Notice of Proposed Work or as individual work orders identified throughout the year. Work will be evaluated for compliance with the Program. Work that does not meet the requirements and parameters of the SMP cannot be covered. In these cases, other CEQA and regulatory coverage will need to be obtained.

Work that may be covered by the Program will be reviewed to verify that it is covered under the long-term regulatory clearances provided in conjunction with the Stream Maintenance Program. Appropriate resource protection measures and BMPs will be identified and added to the work order package. Pre-work conferences will be held with staff necessary to perform the work, including the appropriate staff from Watershed Program Support Units, Field Operations, Vegetation Management and Stream Stewardship to discuss site-specific requirements, environmental constraints, and BMPs.

Work order requests will follow the District's QEMS document WQ75101 – Field Operations Work Order Process. A clearinghouse of experienced and SMP competent staff will assess, develop, and authorize work, compliant with the 2012-2022 SMP, BMPs, required mitigation, and other natural resource protection protocols.

1.11. Process for Program Improvement

An annual "Lessons Learned" meeting between the District and regulatory agency staff will occur, usually in February, to evaluate the effectiveness of both resource protection and maintenance methods used in the preceding maintenance year. The information and assessments will be used to update BMPs, and Stream Maintenance Program processes to create a greater understanding of how to accomplish environmentally-sensitive, fiscally sound maintenance work.

1.12. Regulatory Framework

The SMP applies to all work necessary for the: maintenance of flow conveyance capacity of the canals, creeks and rivers; protection of the banks adjacent to those facilities; proper operation of stream gauges; and to promote the ecological stewardship of the riparian system. It may be necessary to obtain additional permits or authorizations for work within the SMP area that is not covered by this Program.

Regulatory agencies with jurisdictional authority in the SMP area and from which permits are obtained include the: Bay Conservation and Development Commission (BCDC), California Department of Fish and Game (CDFG), U.S. Army Corps of Engineers (USACE), National Oceanic Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (FWS) and the Regional Water Quality Control Boards (RWQCBs) – San Francisco Bay and Central Coast). The following is a description of each regulatory agency and their jurisdiction within the SMP.

1. Bay Conservation and Development Commission (BCDC)

BCDC has regulatory responsibility over development in San Francisco Bay and along the Bay's nine-county shoreline. BCDC works with its federal, state and local partners in the Long Term Management Strategy (LTMS) for the Placement of Dredged Material in the San Francisco Bay Region to manage dredging and disposal activities in the Bay Area. Formed in 1990, the LTMS Program is a collaborative partnership involving the regulatory agencies, resource agencies and stakeholders working together to maximize beneficial reuse of dredged material and minimize disposal in the Bay.

It is necessary to obtain a BCDC permit prior to undertaking most work in the Bay or within 100 feet of the shoreline, including filling, dredging, shoreline development and other work.

2. California Department of Fish and Game

a) Lake and Streambed Alteration program

The Department of Fish and Game (DFG) is responsible for conserving, protecting, and managing California's fish, wildlife, and native plant resources. To meet this responsibility, the Fish and Game Code (Section 1602) requires an entity to notify DFG of any proposed activity that may substantially modify a river, stream, or lake.

Notification is required by any person, business, state or local government agency, or public utility that proposes an activity that will:

1) substantially divert or obstruct the natural flow of any river, stream or lake;
2) substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake; or

3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

If DFG determines that the activity may substantially adversely affect fish and wildlife resources, a Lake or Streambed Alteration Agreement will be prepared. The Agreement includes reasonable conditions necessary to protect those resources and must comply with the California Environmental Quality Act (CEQA).

b) California Endangered Species Act

The California Endangered Species Act (CESA) allows DFG to authorize project proponents to take state-listed threatened, endangered, or candidate species if certain conditions are met. DFG administers the incidental take provisions of CESA to ensure regulatory compliance and statewide consistency.

This act aims to protect species of fish, wildlife, and plants that are in danger of, or threatened with, extinction because their habitats are threatened with destruction, adverse modification, or severe curtailment, or because of overexploitation, disease, predation, or other factors.

3. U.S. Army Corps of Engineers 404 Permit

Section 404 of the Clean Water Act regulates the discharge of dredged, excavated, or fill material in wetlands, streams, rivers, and other U.S. waters. The USACE is the federal agency authorized to issue Section 404 Permits for certain activities conducted in wetlands or other U.S. waters. Depending on the scope of the project and method of construction, certain farming activities may require this permit. Examples include ponds, embankments, and stream channelization.

a) Jurisdiction

1) <u>Tidal Waters of the U.S.</u> The landward limits of jurisdiction in tidal waters:
Extends to the high tide line, or when adjacent non-tidal waters of the United States are present, the jurisdiction extends to the limits identified for Non-Tidal Waters of the U.S.

2) Non-Tidal Waters of the United States. The limits of jurisdiction in non-tidal waters:
In the absence of adjacent wetlands, the jurisdiction extends to the ordinary high water mark, or when adjacent wetlands are present, the jurisdiction extends beyond the ordinary high water mark to the limit of the adjacent wetlands. When the water of the United States consists only of wetlands the jurisdiction extends to the limit of the wetland.

b) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) prohibits the obstruction or alteration of navigable waters of the United States without a permit from the Corps of Engineers. All Structures and Work - dredging, marinas, piers, wharves, floats, intake/outtake pipes, pilings, bulkheads, ramps, fills, overhead transmission lines, etc.

4. U.S Environmental Protection Agency

The USACE jointly administers Section 404 authority with the USEPA, the administering agency for the entire CWA, and receives oversight support from the USFWS. Under a Memorandum of Agreement (MOA) between the USEPA and the Department of Defense (DOD), the USACE is given sole responsibility for making final permit decisions pursuant to Section 404 and, "conducts jurisdictional delineations associated with the day-to-day administration of the Section 404 program" (U.S. Department of Agriculture 1996). The USEPA retains the authority to enforce compliance with Section 404 and maintains the power to overrule USACE decisions on the issuance or denial of permits (U.S. Environmental Protection Agency 1995). If there is a dispute about whether an area can be regulated, the USEPA has the ultimate authority to determine the actual geographic scope of waters of the United States subject to jurisdiction under all sections of the CWA, including the Section 404 regulatory program (U.S. Department of Agriculture 1996).

5. NOAA-NMFS

CWA Section 404. The Act provides NOAA authority to comment on permit applications for the purpose of avoiding, minimizing, and mitigating the destruction and degradation of aquatic resources, including wetlands.

Endangered Species Act (ESA). The ESA provides for the designation and protection of invertebrates, wildlife, fish, and plant species that are in danger of becoming extinct and conserves the ecosystems on which such species depend. The National Marine Fisheries Service (NMFS) deals with actions affecting marine species. Section 7 of the ESA requires Federal agencies to consult with NMFS to insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or adversely modify or destroy designated critical habitat. Following consultation under Section 7, a biological opinion is issued.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA). The 1996 amendments to the MSA established a new mandate for the NMFS, regional fishery management councils (FMC), and other Federal agencies to identify and protect important marine and anadromous fish habitat (Essential Fish Habitat or EFH), including wetlands. The EFH provisions of the MSA support one of the Nation's overall marine resource management goals - maintaining sustainable fisheries. Federal action agencies which fund, permit, or carry out activities that may adversely impact EFH are required to consult with NMFS regarding the potential effects of their actions on EFH. When NMFS finds that an action may adversely affect EFH, NMFS is required to provide the action agency with conservation recommendations to protect EFH.

6. US Fish and Wildlife Service (FWS)

The ESA provides for the designation and protection of invertebrates, wildlife, fish, and plant species that are in danger of becoming extinct and conserves the ecosystems on which such species depend. ESA Section 7 requires Federal agencies to insure that any action authorized, funded or carried out by them is not likely to jeopardize the continued existence of listed species or modify their critical habitat.

Migratory Bird Treaty Act (MBTA). The MBTA provides that it is unlawful to pursue, hunt, take, capture, kill, possess, sell, purchase, barter, import, export, or transport any migratory bird, or any part, nest, or egg or any such bird, unless authorized under a permit issued by the Secretary of the Interior. Some regulatory exceptions apply. Take is defined in regulations as: "pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot,

wound, kill, trap, capture, or collect." The MBTA protects over 800 species of birds that occur in the U.S.

Bald and Golden Eagle Protection Act (1940) protects eagles from commercial exploitation and safeguards their continued survival in the United States. This law provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds.

7. Regional Water Quality Control Board (RWQCB)

The Water Board is a State agency with regional jurisdiction over the bed and banks of stream channels, their riparian corridors and the beneficial uses. Santa Clara County is under the jurisdiction of the San Francisco Bay and Central Coast Regions. The RWQCB's purpose is to protect and improve the quality of the natural water resources in the region. Regional resources include San Francisco and Tomales Bays, the Ocean, streams that flow into the Bays and Ocean, and groundwater throughout the region. Protecting water quality is achieved by regulating discharges to the waters and by requiring cleanups of unplanned or illegal discharges. The regulating of discharges is done through a variety of permits. Permits issued by the Water Board put restrictions on discharges of wastes, such as concentrations of certain pollutants, or the amount of flow. Permits can also require dischargers to take certain kinds of actions; for example, installing certain technologies to treat or contain wastes, or implementing practices to manage stormwater.

The Porter-Cologne Act also assigns responsibility for implementing CWA Sections 303, 401, and 402 to the SWRCB and RWQCBs. Under Section 303, the RWQCBs, in conjunction with USEPA, are responsible for developing and implementing TMDLs to address water quality impairments.

1.13. Reference Documents

Detailed information of the SMP and permit conditions can be found in the following documents:

1. Final Environmental Impact Report (FEIR) for the 2012 Stream Maintenance Program, *date*.
2. San Francisco Bay Regional Water Quality Control Board (RWQCB-SF) Order ---------- specifying Waste Discharge Requirements and Clean Water Act Section 401 Water Quality Certification *dated*.
3. Central Coast Region Regional Water Quality Control Board (RWQCB-CC) Order ---------- specifying Waste Discharge Requirement and Clean Water Act Section 401 Water Quality Certification *dated*.
4. 2012 Stream Maintenance Program Biological Assessment, Santa Clara Valley Water District, *date*.
5. Sediment Characterization Plan for the San Francisco Bay Region 2012 Stream Maintenance Program, *date*.
6. Water Quality Sampling Plan For the San Francisco Bay Area Region, 2012 Stream Maintenance Program, *date*.
7. Sediment Characterization Plan for the Central Coast Region 2012 Stream Maintenance Program, *date*.
8. Water Quality Sampling Plan for Central Coast Region, 2012 Stream Maintenance Program, *date*.

2. VEGETATION MANAGEMENT

The Vegetation Management Program is designed to maintain the hydraulic and safety functions of the District's creek and canal systems, and stream gauges; through the control and management of vegetation, while improving creek ecosystems. (Please see the Canal Maintenance chapter for the description of additional work in canals.)

Vegetation management is necessary to achieve various facility management goals. Specifically, vegetation has the ability to: restrict hydraulic capacity and impede flow conveyance, negatively impact water quality, and create fire hazards due to high fuel loads. Non-native vegetation may also have negative ecological impacts as it can out-compete more desirable native species, resulting in habitat alteration and reduced biodiversity. The District uses an integrated approach for vegetation management to ensure the most effective technique is used in a manner that minimizes impacts to the environment.

This chapter describes specific types of vegetation management that are considered to be routine maintenance activities. The program is separated between woody and herbaceous vegetation management, though there are overlaps. For simplicity, the words "woody" and "tree" will refer to both trees and shrubs.

There are five projected vegetation management activities that are described for the program period 2012-2022. These include pruning, hand removal, herbicide, mowing, and discing activities. Multiple work activities can be used to achieve any one purpose of the program depending upon the location, time of season, goal to be accomplished, and sensitivity of the resources.

Work activities are permitted throughout the program area. SMP 2002 projected areas have been mitigated for in perpetuity. All other "new" work area impacts will be assessed annually, calculating the necessary mitigation per the requirements in the Mitigation Approach Memorandum, Appendix C FSEIR.

The Vegetation Management chapter has the following sub-sections:

2.1.6 Large Woody Debris

2.2 Herbicide and Mechanical
- 2.2.1 Herbicide
- 2.2.2 Mowing
- 2.2.3 Discing
- 2.2.4 Flaming
- 2.2.5 Grazing

2012 Projected Vegetation Management Work Type by Watershed (in miles)

Watershed	Hand Removal	Herbicide	Pruning	Mowing	Discing
Santa Clara Basin					
Lower Peninsula	2.5	47.8	22.7	3.8	0
West Valley	3.2	146	61.7	32.6	0
Guadalupe	6.9	277.7	211.6	146.8	.4
Coyote	88.6	213.4	159.5	58.3	.5
Pajaro Basin					
Pajaro	49.7	162	156.6	45.9	.9
Total	150.9 miles	846.9 miles	612.1miles	287.4 miles	1.8 miles

Note:
1. Miles are shown for the total projection of each work activity type. This includes acreages for overlapping work activities at the same location, so potential impacts are over represented.
2. Miles incorporate the work area percentage estimate to account for varying work amounts within a reach.

Channel Access and Staging

Access to maintenance sites will occur via existing, adjacent access roads where present. Most SCVWD-maintained channels have at least one existing access road running along the top-of-bank on one side of the channel. Some channels have an access road on either side of the channel; and others may have a lower maintenance road along the lower level banks. When the channel shape, bank height, or the presence of mature vegetation prevents the use of the top-of-bank access roads,

equipment can move down the channel slope via existing access ramps, or forge a new temporary access route. Selective clearing of shrubs or trees may be necessary on the banks to provide equipment access to the channel bed.

Access to vegetation maintenance sites typically occurs via the adjacent access road to the general location, if present, and by foot into the channel or other areas without access roads. Staging for maintenance activities will occur to the extent possible on adjacent access roads and lands, if available.

Revegetation

The District assesses each revegetation site with a long-term strategy for self sufficiency. Species palette's, soil conditions, water availability, aspect, etc. are incorporated into the planting approach. The structure of species and distance relationship to various creek flows guides the revegetation specialist to choose the appropriate species for the site, considering long-term maintenance requirements both for the vegetation and for creek capacity.

ROUTINE PRUNING

2.1. WOODY VEGETATION MANAGEMENT

2.1.1. Routine Pruning

A. Purpose

Pruning of trees and shrubs is a routine activity necessary to provide access to District facilities, improve visibility to inspect District facilities, protect District infrastructure, and maintain the designed hydraulic capacity of the creek systems. Pruning is also used to maintain the facility per the facilities' O&M Guidelines. Providing an increase in design flow capacity is not permitted under this Program.

Typical woody vegetation pruning takes place along maintenance roads, fences and levee slopes. The District may trim vegetation to reduce or prevent fire hazards, in compliance with local fire codes. Tree pruning may include thinning the canopy of an individual tree or shrub. For simplicity, the term "tree" or "trees" will refer to both trees and woody shrubs.

Definitions

1. Pruning is the cutting of a branch ≤ 4" in diameter.
2. Herbaceous - non-woody vegetation includes grasses, broadleaf weeds, cattails, and bulrush; and annuals, biennials, and perennials.
3. Shrub - woody plant smaller in height than a tree (< 15 feet [4.6 meters] at maturity), often formed by a number of vertical or semi-upright branches arising close to the ground.
4. Tree - a species of woody perennial that typically has one dominant vertical trunk and a height greater than 15 feet (4.6 meters) in its natural, mature form. There are some tree species exceptions.

B. Work Activity

Pruning is the partial removal of any individual plant and includes cutting of tree branches, woody and herbaceous vegetation, and is conducted with mechanized and non-mechanized hand tools. Pruning may occur in in-stream and along bank bench areas.

C. Work Projections

Pruning is a projected activity. Work that is conducted in areas not originally projected as "upland over hanging growth (OHG)" in 2002, will require mitigation as described in the 2012 SMP FSEIR, and included in the Mitigation Approach Memorandum, Appendix C FSEIR. Pruning impacts will not exceed 40 acres over the 10-year Program period. Work projected in the 2002 SMP has been mitigated for in perpetuity, will continue to have work performed in these areas, and will not need to calculate impacts annually.

D. Work Window

Vegetation management activities may occur:

1. In-stream (wetted area) hand pruning and hand removal may occur year round, except:
   a) Where mechanized equipment would need to access the site by crossing a creek or otherwise affect water quality, or
   b) In steelhead streams, where work is only permitted until December 31 or until signficant rainfall greater than 0.5 inches falls within the

subject watershed within a 24-hour period, whichever transpires first.

2. Vegetation management outside the bankfull channel (see section 2.1.6 for definition) may be performed year round.
   a) Year round work opportunities do not apply to areas where mechanized equipment would need to access the site by crossing a creek or otherwise affect water quality.
3. Due to separate project permits and/or CEQA/NEPA requirements, individual sites may have additional limitations on work types and work windows. Where these modified conditions occur they will be incorporated into the Stream Maintenance Program.

E. Requirements

Pruning can invigorate trees and stimulate new growth. Improperly pruning a tree or shrub can create more work the following year(s); e.g. as when multiple, weakly attached stems sprout from a stub cut.

The following pruning standards should be used:

1. Pruning will be done by qualified staff in a manner that will achieve the maintenance goals of the facility while preserving the short and long term health of the vegetation.
2. Pruning standards should be performed according to national American National Standards Institute (ANSI) A300 (Part 1) 2008 Pruning, ANSI Z133.1 – 2000 Safety Requirements and International Society of Arboriculture (ISA) Best Management Practices Tree Pruning (revised 2008) or the most current updates.
3. Limbs ≤ 4” in diameter may be removed as routine work under the SMP.
4. Limbs > 4” may also require removal due to access for bank stabilization and sediment projects, to reduce debris accumulation, and to minimize potential flooding. There are occasions whereby removing limbs from a fallen tree may be sufficient to maintain flow conveyance in lieu of complete tree removal.

   a) The following criteria will be used for lateral pruning:

      Pruning will be prescribed and marked by an ISA Certified Arborist or those experienced and knowledgeable in ISA pruning standards.

5. When possible, pruning should be done during the winter when vegetation is dormant.

F. Applicable BMPs

Vegetation Management BMPs are listed in Attachment F. These BMPs may be revised on an annual basis based on actual experience and site conditions.

CORRECTIVE PRUNING

2.1.2. Corrective Pruning

A. Purpose

Corrective pruning is performed to promote long-term woody vegetation and tree health. Corrective pruning may occur to address defects that would eventually result in whole tree failure such as: co-dominant leaders; decayed or diseased limbs; extensive branch dieback; incorrect past pruning; or injury due to storm or mechanical damage. Corrective pruning may occur where a potential hazard exists yet complete removal of a tree is unwarranted. It may also be used to adhere to proper pruning standards. For example, in order to avoid leaving a large stub and promoting unwanted re-sprouting, pruning a lateral branch away from a maintenance road may be extended to the trunk of the tree. Correcting and pruning lateral branches is also important to reduce the risk of debris trapping in the channel, particularly near the active bankfull channel (see section 2.1.6 for definition).

Corrective pruning should not be used as justification to do more work than is necessary or would otherwise be permitted. In some cases, cutting a lateral mid-way may be an appropriate place to support or regenerate growth upward.

B. Work Activity

Corrective pruning is the partial removal of any individual plant and includes cutting of tree branches, woody and herbaceous vegetation, and is conducted with mechanized and non-mechanized hand tools. Unlike routine pruning, corrective pruning is striving to correct an injury, disease, past damage, or preventative measures of future damage to facilities.

Pruning may occur in in-stream and along bank bench areas.

C. Work Projections

Corrective pruning is not a projected work activity and may occur throughout the SMP program area; although all corrective pruning must be prescribed by an ISA Certified Arborist.

D. Work Window

Vegetation management activities may occur:

1. In-stream (wetted area) hand pruning and hand removal may occur year round, except:
   a) Where mechanized equipment would need to access the site by crossing a creek or otherwise affect water quality, or
   b) In steelhead streams, where work is only permitted until December 31 or until significant rainfall greater than 0.5 inches falls within the subject watershed within a 24-hour period, whichever transpires first.

2. Vegetation management outside the bankfull channel (see section 2.1.6 for definition) may be performed year round.
   a) Year round work opportunities do not apply to areas where mechanized equipment would need to access the site by crossing a creek or otherwise affect water quality.

3. Due to separate project permits and/or CEQA/NEPA requirements, individual sites may have additional limitations on work types and work windows. Where these modified conditions occur they will be incorporated into the Stream Maintenance Program.

E. Requirements

1. All corrective pruning is performed according to national ANSI A300 (Part 1) 2008 Pruning, ANSI Z133.1 – 2000 Safety Requirements and International Society of Arboriculture (ISA) Best Management Practices Tree Pruning (revised 2008) or the most current updates.

2. Corrective pruning will be prescribed and marked by an ISA Certified Arborist or those experienced and knowledgeable in ISA pruning standards and successful corrective pruning.

3. In general, no more than 25% of an individual tree would be removed in one season. Rare cases may occur, however, such as the removal of a co-dominant leader.

4. Removal of limbs greater than 4" diameter may be necessary, and arboricultural justification will be provided.

5. Whenever possible, corrective pruning should be done during the winter when vegetation is dormant.

F. Applicable BMPs

Vegetation Management BMPs are listed in Attachment F. These BMPs may be revised on an annual basis based on actual experience and site conditions.

COPPICING

2.1.3. Coppicing

A. Coppicing Purpose

Coppicing creates annual "sucker" growth that may be desirable as cutting material for direct installation in mitigation projects. Willow species, mulefat and coyote brush are typically chosen. The trees that are chosen are trees that would normally be targeted for complete removal. After cutting the tree back to the ground, rather than treat the remaining stump with herbicide, the tree is instead left to re-sprout and provide an ongoing cutting source for individual watersheds. Select individuals within each of the major watersheds can be dedicated to this activity.

B. Work Activity

Coppicing of trees or shrubs entails severely pruning an

entire woody plant near the ground to promote multi-stemmed re-growth. This action will change the plant form from a tree to a shrub, thus, increasing variability of canopy architecture and age. Coppicing typically uses hand-held and small mechanical tools. Larger equipment may be necessary to remove the vegetation from the channel, to then be hauled away.

C. Work Projections

Coppicing is not a projected activity and may occur throughout the program area.

D. Work Window

Vegetation management activities may occur:

1. In-stream (wetted area) hand pruning and hand removal may occur year round, except:
   a) Where mechanized equipment would need to access the site by crossing a creek or otherwise affect water quality, or
   b) In steelhead streams, where work is only permitted until December 31 or until significant rainfall greater than 0.5 inches falls within the subject watershed within a 24-hour period, whichever transpires first.

2. Vegetation management outside the bankfull channel (see section 2.1.6 for definition) may be performed year round.
   a) Year round work opportunities do not apply to areas where mechanized equipment would need to access the site by crossing a creek or otherwise affect water quality.

3. Due to separate project permits and/or CEQA/NEPA requirements, individual sites may have additional limitations on work types and work windows. Where these modified conditions occur they will be incorporated into the Stream Maintenance Program.

E. Requirements

Trees that would otherwise need to be removed may be good candidates to be coppiced. All work is done after appropriate pre-

construction biological surveys have been performed and appropriate regulatory clearances obtained.

F. Applicable BMPs

Vegetation Management BMPs are listed in Attachment F. These BMPs may be revised on an annual basis through the Lessons Learned meetings, based on actual experience and site conditions.

HAND REMOVAL

2.1.4. Hand Removal

A. Purpose

Live, standing trees and shrubs may be removed from District facilities to meet one of the following program objectives: maintain design flow conveyance capacity, provide facility inspection and access, maintain the structural integrity of District facilities, and to promote overall ecological health. For simplicity, the term "tree" or "trees" will refer to both trees and woody shrubs.

Tree removals may occur anywhere in the creek cross section, including but not limited to, streams and their immediate overstory, stream banks, canals, levees, access roads and pedestrian paths, outboard areas and at bridges and culverts.

Stump treatment of removed trees is included under Hand Removal and is not defined as Herbicide work. All tree removals will assume a stump treatment with herbicide, unless otherwise noted in the Program document. Biological clearances will assume herbicide treatment unless otherwise noted on the Work Order.

1. Maintenance. Tree removals may be necessary to retain design flow conveyance capacity and to maintain creek channels. This condition usually occurs when trees on the bank have fallen into the stream or moved in such a way that the tree's new orientation impedes flows or causes debris blockages, resulting in an increased flood risk. Fallen trees also can divert streamflows into the opposite streambank increasing the erosion and flood risk. Although locations of downed trees is not predictable, this work

should be considered "anticipated" due to its natural and regular occurrence.

Trees also exist in locations where their roots or branches may interfere with or undermine the integrity of District facilities. These facilities include, but are not limited to concrete linings, concrete wing walls, gabions, sacked concrete walls, streamflow gauges, storm drain outfalls, culverts, and pipes. Trees removed in these areas would likely be stump-treated with herbicide to prevent recovery and re-establishment.

Trees < 6" dbh may be routinely removed from creeks to reduce the accumulation of debris and potential flooding. Trees within 100 feet of bridges are also removed to prevent accumulation of debris on pier noses and bridge footings.

Trees < 6" dbh that are located within the 2002 SMP projections, have already been mitigated for through the 2002 SMP programmatic mitigation. Tree removals in "new" areas, will need to be assessed per project site, and mitigated for according to the requirements in the Mitigation Approach Memorandum, Appendix C FSEIR.

Trees < 6" dbh in "new" work areas will be accounted for per the requirements in the Mitigation Approach Memorandum, Appendix C FSEIR. Trees and shrubs 6-12" dbh will be assessed on a project specific basis per a "pay-as-you-go" program. (See Attachment C, Tree Scoring for Removal of Trees and Shrubs 6 - 12"dbh - April, 2011)

2. Bank Stabilization. Bank stabilization projects often require the installation of temporary roads and ramps to access the work area. Tree removals may be required under these circumstances when pruning will not suffice to provide clearance for maintenance vehicles and heavy equipment. An effort is made to target non-native trees where tree removal for vehicle access is required and to select an access route that avoids mature, native trees. Removal of large branches from mature trees for equipment access is evaluated carefully and avoided whenever possible.

Tree removals will follow the requirements in the Mitigation Approach Memorandum, Appendix C FSEIR and summarized above. Trees and shrubs 6-12" dbh will be assessed on a project specific basis per a "pay-as-you-go" program. (See Attachment C, Tree Scoring for Removal of Trees and Shrubs 6 - 12"dbh- April, 2011)

3. Ecological Health/Stewardship. In the interest of stream and land stewardship, efforts may be made to improve the health and vigor of trees on District properties through proper arboricultural and vegetation management techniques. Early detection of plant diseases and pathogens such as Sudden Oak Death and Western bark beetles, supported by BMP's that prevent movement of infected materials to additional locations, will be implemented through this Program. Removal of infected trees may be necessary to guarantee the ecological health of the greater area.

   Trees may be removed or pruned to improve both aquatic and terrestrial habitat quality by achieving the following objectives:

   To promote water resources stewardship, efforts will be made to improve the ecological health of riparian and upland woodlands on District facilities. Trees with structural defects, insect infestation, or pathogens that threaten the ecological health of the tree or woodland may be removed. Woodlands with stunted growth as a result of competition for resources may be thinned to facilitate normal growth. Prior to removal or stand thinning of trees, an assessment of the ecological health of the riparian and/or upland woodlands will be conducted and documented with written recommendations by biological or experienced ecological staff for management.

B. Work Activity

Complete removal of above ground portions of any individual plant using mechanized or non-mechanized hand tools. This category includes herbicide stump treatment, called 'cut stump' which is follow-up work from the removal of vegetation. Cut stump treatment is a paired activity to Hand Removal. Stump treatment is assumed to occur unless noted otherwise on the work order.

Hand Removal may occur where herbicide treatments have been applied to woody vegetation.

Hand removal uses small hand tools or mechanized tools such as chainsaws to cut vegetation. Cut vegetation will be transported from the channel bed to the access road by hand or by mechanical equipment such as an excavator or loader. Vegetation is chipped on site and hauled away in dump trucks/compactors. The herbicide application portion of this work activity is performed using tools such as drip cans, a spray bottle, or a paintbrush to do a topical treatment.

C. Work Window

Vegetation management activities may occur:

1. In-stream (wetted area) hand pruning and hand removal may occur year round, except:
   a) Where mechanized equipment would need to access the site by crossing a creek or otherwise affect water quality, or
   b) In steelhead streams, where work is only permitted until December 31 or until local rainfall greater than 0.5 inches falls within the subject watershed within a 24-hour period, whichever occurs first.

2. Vegetation management outside the bankfull channel (see section 2.1.6 for definition) may be performed year round.
   a) Year round work opportunities do not apply to areas where mechanized equipment would need to access the site by crossing a creek or otherwise affect water quality.
   b) Except mowing, which may occur between February 1 and November 30, and discing which may occur between February 1 and October 15.

3. Due to separate project permits and/or CEQA/NEPA requirements, individual sites may have additional limitations on work types and work windows. Where these modified conditions occur they will be incorporated into the Stream Maintenance Program.

D. Requirements

1. All tree removals require a biological survey and must be verified for compliance by the watershed environmental planner. In certain circumstances, the work may need to be supervised by a qualified horticultural specialist or Certified Arborist.

2. Tree removals must meet one of the purposes stated above in III, A, 1.

3. All tree removals must be coordinated with local tree ordinances.

E. Removal Criteria

Criteria for removal of trees is not based solely on whether they are native, non-native, or invasive. Non-native trees, including invasives, often provide valuable habitat functions in the absence of more desirable native vegetation. Removal of any of these trees would be evaluated using the following criteria. Please refer to Attachment C, Tree Scoring for Removal of Trees and Shrubs 6 -≤ 12 " dbh for implementation.

1. Presence or absence of adjacent vegetation of similar stature providing equivalent habitat functions such as roosting, nesting, perching, SRA, etc. Retention of non-natives (invasive or not) will be given a higher priority if other vegetation is not available to provide alternative habitat.

2. Current or documentable use by wildlife that is unlikely to be offset if the vegetation is removed. Such use would include raptor nests, evidence of use by cavity nesting species, evidence of a rookery, and similar wildlife uses.

3. Instances where the tree is providing vegetative structure (root system) to a stream bank that is likely to result in erosion if the tree is removed will be considered for pruning or thinning to retain the soil stability function.

F. Applicable BMPs

Vegetation Management BMPs are listed in Attachment F. These BMPs may be revised on an annual basis through the Lessons Learned meetings, based on actual experience and site conditions.

G. Requirements

Tree removals are a regular work occurrence and are necessary to maintain the proper function of District facilities, maintain conveyance capacity, remove debris accumulation and improve the riparian system. There are also different criteria for tree removals based on species type and location within the creek systems.

Native trees are given a higher level of consideration for preservation than non-native trees. Native tree species are more desirable and their presence is encouraged over non-native species. Non-native species and invasive non-natives especially, are less desirable. (Please see the Invasive Plant Removal section for a description of a program designed to comprehensively address these species.) Trees, native or non-native, located within a creek channel, channel bank, or levee may require removal if flow conveyance capacity is reduced, the structural integrity is compromised, and where needed for visual inspection of levees.

Trees may be removed and accounted for on a project specific, pay-as-you-go basis. Trees < 6" dbh in "new" work areas will be accounted for per the requirements in the Mitigation Approach Memorandum, Appendix C FSEIR. Trees and shrubs 6-12" dbh will be assessed on a project specific basis per a "pay-as-you-go" program. (See Attachment C, Tree Scoring for Removal of Trees and Shrubs 6 - 12"DBH - April, 2011.) This document provides a specific tree appraisal and evaluation protocol to determine how replacement planting occurs. The protocol in the Attachment C involves carefully assessing targeted tree removals for their existing conditions and functions, including their canopy cover, local area value, ecosystem benefits, and ecosystem detriments. Due to the sensitive habitats of native oaks and sycamores, these species will be mitigated with in-kind species.

1. Trees < 6" dbh that are located within the 2002 SMP projections.
   These trees have already been mitigated for through the 2002 SMP programmatic mitigation.

2. Trees < 6" dbh in "new" work areas.
   Tree removals in "new" areas, will need to be assessed per project site, and mitigated for according to the requirements in the Mitigation Approach Memorandum, Appendix C FSEIR.

3. Trees and shrubs 6-12" dbh will be assessed on a project specific basis per a "pay-as-you-go" program. (See Tree Scoring for Removal of Trees and Shrubs 6 - 12"DBH - April, 2011)

H. Definitions

Multi-stem: A tree or shrub with a root ball and multiple trunks or stems. This may occur at ground level or several feet above ground. The dbh of trees with multiple stems will be calculated by adding the diameters of the individual stems at 4.5 feet above ground. Individuals with greater than seven (7) stems at dbh will be assessed by their canopy cover, per the Tree Scoring for Removal of Trees and Shrubs 6 - 12"DBH - April, 2011.

2.1.5. Invasive Plant Management Plan (IPMP)

Invasive plant species are frequently found during routine SMP work activities (i.e., bank repair sites, sediment removal sites and/or routine vegetation maintenance work). In these instances, opportunistic control and/or removal of invasive plants could enhance habitat quality and benefit the larger watershed landscape.

Mitigation may be acquired, on a case by case basis, for the removal of invasive non-native plant species at SMP work sites, provided the removals will enable regeneration of native plant species and/or improve the ecological

function of the habitat. Mitigation credit from invasive plant removal can be used to compensate for loss of native plant species during routine maintenance activities.

Removal of herbaceous invasive species will be quantified as acreage or area removed, whereas removal of woody tree or shrub species will be determined based upon the number of stems, diameter rank (class), invasiveness of target species, and the ecological value provided by target species at the proposed work location.

See the IPMP Attachment D of this Manual for detailed information.

2.1.6. Large Woody Debris (LWD)

Large woody debris is recruited to the stream channel throughout the year by a variety of natural processes including bank erosion, landslides, windstorms, and tree mortality. The LWD evaluation and implementation program includes an assessment of the ecological, geomorphic and hydraulic effects (creek, canal and stream gauge functions) of LWD in the creeks of Santa Clara County. The evaluation and implementation program will balance flood protection objectives while maintaining the ecological integrity of our local streams.

The LWD program pertains to the in-stream area which is defined as the stream channel within ordinary high water discharge demarcations. The term ordinary high water is defined by the ACOE as that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

A. Purpose

LWD provides an important ecological role in Santa Clara County creeks. It can also create areas of debris accumulation if not properly managed. A LWD program will be prepared to retain woody debris in

streams throughout Santa Clara County in order to preserve the physical and biological processes associated with the natural recruitment of wood to waterways. This process will alter urban streams so that their behavior corresponds as closely as possible with that of natural streams while retaining the District's ability to provide flood protection.

B. Work Activity

In order to effectively manage large woody debris in streams within the urban landscape of Santa Clara County, the District will use a four tiered, multi-disciplined approach for addressing LWD. The four tiers are: 1) Retain LWD in the channel, 2) modify LWD, 3) remove LWD and replace, and 4) remove LWD. LWD management may use an excavator, material handler, and/or crane to modify placement.

C. Work Projections

Large woody debris is not a projected work activity.

D. Work Window

LWD management will follow the same work windows as for vegetation management. Modification of these requirements may be made through the Biological Opinion of the National Marine Fisheries Service.

E. Requirements

The full requirements are described in the LWD Program document, Attachment E and the Mitigation Approach Memorandum, Appendix C FSEIR. Please refer to those documents for implementation. Once a determination is made and implemented, the LWD will be tagged and monitored. This information will be inputted and tracked in the District database. Mitigation for LWD is only required in creeks that support anadromous fish; though management of LWD is desired in all Santa Clara creeks.

F. Applicable BMPs

Vegetation Management BMPs are listed in Attachment F. These BMPs may be revised on an annual basis based on actual experience and site conditions.

2.2. HERBICIDE and MECHANICAL

The District's Vegetation Management Program uses an integrated approach of chemical, mechanical, cultural, and some limited biological methods to manage vegetation on its facilities. Herbicides are used in conjunction with mechanical and hand vegetation suppression to support hydraulic, fire safety, and ecosystem functions. Herbicides are used in a manner that is least disruptive to existing or potential biological resources.

Control of herbaceous vegetation in the SMP area is done for many of the same reasons as management of woody species. Herbaceous vegetation has the ability to impede flow conveyance, and create fire hazards in non-instream areas outside of the channel bottom. Herbaceous vegetation may also have negative ecological impacts as it can out-compete more desirable native species, resulting in habitat degradation. For the purposes of the SMP, herbaceous vegetation is non-woody vegetation which includes grasses, broadleaf weeds, cattails, and bulrush. Herbaceous vegetation includes annual, biennial, and perennial plant types.

Herbaceous vegetation control is performed to limit weed growth, seeding and expansion into new areas, to reduce weeds in areas of special management (mitigation sites), maintain road right-of-ways and firebreaks along top of bank, prevent vegetation encroachment by herbaceous plants, maintain vegetation free areas as buffers, and to provide localized treatments needed to protect facilities and resources.

Guiding Principles

The goal of SMP vegetation management is to achieve the desired control while balancing environmental and economic considerations. Herbicides, while often the most effective economically, are routinely dismissed for some applications due to other factors that make their use in a given situation inappropriate. In the same context, herbicides used appropriately are, in many cases, the most environmentally desirable method for achieving the desired level of vegetation control. The selection of an approved herbicide, coupled with the use of an appropriate surfactant per

label recommendations can provide a higher level of control which may reduce the frequency needed to service an area, while also minimizing physical impacts to the site. Targeted use of herbicides may eliminate the need to bring in heavy mowing equipment or large hand crews that can be more disruptive to on-site biological resources. For example, rather than coming in annually to control a specific area, you may be able to reduce the return time to every two years.

2.2.1. Herbicide

A. Purpose

Herbicides are applied in areas where the presence of the herbaceous vegetation is in conflict with the maintenance standards of the facility. Herbicides are also routinely used to treat cut stumps after Hand Removal activities to prevent re-sprouting (described above). The use of herbicide for cut-stump treatment is a paired activity with Hand Removal. Post-emergent herbicides are applied to manage fire breaks in areas at the top of bank.

B. Work Activity

The application of herbicide occurs in-stream and on bank bench areas as well as on maintenance roads, outboard levee slopes, and similar non-instream areas. Herbicide describes a work activity and not the formulation used. This activity consists of using herbicide as the primary abatement tool to kill vegetation and provide subsequent follow-up for hand removal activities.

All herbicide applications are performed using equipment appropriate to the specific application type. Instream herbicide application may use a hose and hand gun with a directed stream, or a backpack unit for smaller isolated areas.

On unpaved access roads, herbicides would be sprayed from a truck-mounted boom to control weeds in order to allow maintenance access

and provide firebreaks. The booms have multiple nozzles that are specifically calibrated to provide the dosage and spray pattern appropriate to the area. The application is managed from an on-board computer mounted in each spray rig. During the application, roads are posted closed to notify the public of the application and remain so until the application dries to reduce the risk of incidental exposure.

Hand Removal 'cut-stump' applications are topical herbicide applications as a follow-up activity to Hand Removal and are considered paired activities. Therefore, cut-stump applications are not defined as Herbicide. 'Cut-stump' applications are applied using topical equipment, such as a spray bottle, paintbrush, or "drip bottle". Hand Removal may occur where herbicide treatments have been applied to woody vegetation.

C. Work Projections

Herbicide usage is a projected work activity under Herbicide. Hand Removal may occur where Herbicide treatments have been applied to woody vegetation. Hand Removal may be substituted in areas where Herbicide has been projected. Pay-as-you-go vegetation removal is accounted for separately.

Work that is conducted in areas not originally projected in 2002, will require mitigation as described in the Mitigation Approach Memorandum, Appendix C, 2012 SMP FSEIR. Work projected in the 2002 SMP has been mitigated for in perpetuity, will continue to have work performed in these areas, and will not need to calculate impacts annually.

D. Work Window

1. In-stream herbicide use is a projected work activity and may occur between June 15 - October 15.

2. In-stream work may continue from October 16 until December 31 or until local rainfall greater than 0.5 inches falls within the subject watershed within a 24-hour period, whichever transpires first.

3. Bank bench herbicide work may occur year round, weather permitting and per the product label.

E. Requirements

1. All herbicide usage must have the appropriate biological surveys and clearances.

2. All herbicide applications must have a Pest Control Recommendation provided by a California licensed Pest Control Advisor. A recommendation is provided after each site is surveyed and the most appropriate control methods for the site are determined.

3. Foliar applications to woody vegetation are limited to under two (2) inches dbh and typically less than eight (8) feet in height.

4. Herbicide use is permitted in non-instream (bank/bench) areas.

5. Herbicide use is permitted year-round on in-stream concrete sections (e.g. weep holes, expansion cracks) in dry channels.

6. Unmodified streams, as defined per the maps in this document, may perform the following work activities:
   a) Pre-emergent herbicides are permitted in non-instream (bank/bench) areas outside of the channel banks.
   b) Post-emergent herbicides may be applied in aquatic habitats to control non-native and invasive plant species.
   c) Post-emergent herbicides may be applied outside the wetted channel (inboard slope, bank bench, and outboard slope) to control vegetation for fuel management, maintenance access and ecological requirements.
   d) Additional biological and pest control recommendations may be required to protect sensitive species and their habitats.

7. Herbicides may be permitted in serpentine areas when approved by a qualified plant biologist and with the incorporation of measures to protect sensitive biological resources, as appropriate.

   Considerations for herbicide use in serpentine areas:
   a) Maintain the designed function of the facility,
   b) Management for control of invasive and non-native plants, and
   c) Protection of sensitive species and habitat.

8. Aquatic herbicide can only be used in California red-legged frog and California tiger salamander SMP mapped areas when the creek is dry and no rain is forecast for the next 48 hours.

9. The use of surfactants on the 14 steelhead streams are permitted when:
   a. The stream is dry in the immediate work location and no rain is forecast for the next 24 hours.
   b. Spot spraying is necessary to control undesirable vegetation (eg. invasive non-native vegetation or vegetation that falls outside the acceptable maintenance design of the facility).
   c. Foliar spray work is a method necessary to maintain channel capacity per the engineering standards for the following facilities and locations:
      1) Stevens Creek from Highway 101 to L'Avenida Avenue
      2) Guadalupe River:
         i. Reach G thru B (500' downstream UPRR bridge to Highway 101)
         ii. Branham Lane to Guadalupe Creek/Alamitos Creek confluence
      3) Alamitos Creek (Guadalupe River confluence to Coleman Road)
      4) Los Gatos Creek (South Bascom Avenue upstream to Camden; and Hwy 85 to Lark Avenue)
      5) Uvas Creek (Bloomfield Rd upstream to Santa Teresa Boulevard)
      6) Llagas Creek (confluence with the Pajaro River upstream to Santa Teresa Boulevard).

10. Surfactants are permitted adjacent to steelhead streams when a 20 foot buffer is established between the treatment area and the wetted flow channel.

F. Applicable BMPs

Vegetation Management BMPs are listed in Attachment F. These BMPs may be revised on an annual basis through the Lessons Learned meetings, based on actual experience and site conditions.

G. Aquatic Herbicides and Surfactants

Only herbicides and surfactants that have been approved for aquatic use by the EPA and are registered for use by the CDPR will be used for SMP aquatic vegetation control work. The lowest recommended rate to achieve project objectives of both herbicides and surfactants will be utilized to achieve desired control. An indicator dye may be added to the tank mix to help the applicator identify areas that have been treated and better monitor the overall application.

Surfactants

Surfactants are a separate category of materials that are added to herbicide mixtures to enhance their performance. The surfactant may assist with spreading over the vegetation, sticking to the foliage, penetrating thick cuticles or other activities that increase the efficacy of the application. Most aquatic herbicides either require or highly recommend the use of a surfactant to achieve reasonable levels of control. In instances where surfactants are absent from the tank mix, the level of control is often reduced. A reduction in control causes a greater return frequency which translates to more herbicide being used in the system and more frequent disturbance to the site.

MOWING

Surfactant use will be limited to the products which are documented to have the least toxic affect to aquatic life. Currently, Agridex and Hasten (also known as Competitor) are documented as the least toxic in the NOAA 2006 Supplemental Environmental Assessment of NOAA Fisheries Implementation Plan for the Community Based Restoration Program. (NOAA Restoration Center. Silver Springs, MD). As new technologies and chemistry becomes available, the District will evaluate its program and adopt materials that achieve optimum control while affording the best protection to environmental resources. The District has a series of QEMS Documents, including– Q751D02 - Control and Oversight of Pesticide Use that define the processes for modifications to the Herbicide program.

2.2.2. Mowing

A. Purpose

Mowing provides visual access for facility inspections and may be required for flow conveyance capacity and to meet local fire codes. Local

fire codes call for all weeds and grasses to be maintained below 6" in height for 10' horizontally on both sides of access routes. Vegetation must be cut back 30' around any structures and a 30' firebreak must be maintained. Parcels up to one acre in size must be completely mowed. All work is performed to conform to local fire code requirements. Mowing is the area-wide cutting of above ground plant material by mechanized or hand-held equipment. Work primarily occurs in the bank bench/outboard areas; though may also be tidally influenced if the area is near the Bay.

B. Work Activity

Area-wide cutting of above ground plant material using a tractor mounted flail mower or hand-held equipment (weed-eaters). Work primarily occurs in the bank bench/outboard areas; though may also be tidally influenced if the area is near the Bay.

C. Work Projections

Mowing is a projected work activity. Areas currently managed by discing may be added to the mowing program if discing is deemed an undesirable management method. Work that is conducted in areas not originally projected in 2002, will require mitigation as described in the Mitigation Approach Memorandum, Appendix C, 2012 FSEIR. Work projected in the 2002 SMP is part of the original program, and will continue to have work performed in these areas, and will not need to calculate impacts annually.

D. Work Window

Mowing may occur from February 1st to November 30th.

E. Requirements

All standard procedures for biological clearances apply. Since much of this work is performed by contractors, annual Best Management Practice (BMP) training is required and BMP checklists shall be completed daily by the contractor.

F. Applicable BMPs

BMPs are listed in Attachment F. These BMPs may be revised on an annual basis through the Lessons Learned meetings, based on actual experience and site conditions.

DISCING

2.2.3. Discing

A. Purpose

Discing is another tool used for herbaceous vegetation control. Discing is the area-wide removal of above ground herbaceous plant material by tilling the soil using a disc. All work is performed to conform to local fire code requirements.

B. Work Activity

Discing is the removal of above ground herbaceous plant material in a defined area, by tilling the soil using a tractor drawn disc or similar implement. Discing is performed in non-instream areas.

C. Work Projections

Discing is a projected work activity. Work that is conducted in areas not originally projected as mowing in 2002, will require mitigation as described in the Mitigation Approach Memorandum, Appendix C, 2012 SMP FSEIR. Work projected in the 2002 SMP is part of the original Program, and will continue to have work performed in these areas, and will not need to calculate impacts annually.

D. Work Window

Discing may occur from February 1 – October 15.

E. Requirements

All standard procedures for biological clearances apply.

F. Applicable BMPs

BMPs are listed in Attachment F. These BMPs may be revised on an annual basis through the Lessons Learned meetings, based on actual experience and site conditions.

FLAMING

2.2.4. Flaming

A. Purpose

A hand-held propane gas-powered flamer may be used to control weed seedlings. Operation of a flamer is a useful alternative when non-target plants have known sensitivity to herbicide drift. It may also be useful in deterring annual exotics from invading a native, perennial habitat type, as when poison hemlock or perennial peppergrass seedlings invade a temperate Pacific tidal salt or brackish marsh.

B. Work Activity

A flamer is a gas powered hand-held wand that delivers a directed torch flame fueled by a propane canister. An individual would walk the project site carrying the flamer. Cell contents of the weed expand with the heat in a few seconds, bursting cell walls, leaving the plant wilted. Steam, not smoke, is the by-product. Upright, broad-leaved weeds from ½ to 1 inch tall are most effectively controlled by this method; grasses or rosettes are more difficult. If the ground substrate is flammable [e.g. wood mulch, leaf litter], it should be wet or moist when flamed. Non-flammable substrates such as rocked maintenance roads, cellular concrete mat [CCM], driveways, sidewalks, concrete floodwall seams, gabions [check the wire tolerance], gravel bars, marshes, weepholes and expansion joints in concrete line

creeks, canals or spillways, etc. are ideal for this tool. Smooth substrates allow even application of heat; rough surfaces allow weeds to evade the torch effects.

C. Work Projections

Use of a flamer is not a projected work activity and is permitted throughout the program area.

D. Work Window

Work may occur year round, though usually occurs between October and February, weather permitting.

E. Requirements

All standard procedures for biological clearances apply. Flamers shall be used only by trained qualified staff in strict compliance with all applicable regulations. Flamers shall not be used during periods of high fire danger or in areas where fuel or climate conditions could cause an accidental fire. Local fire districts may request notification prior to use.

F. Applicable BMPs

BMPs are listed in Attachment F. These BMPs may be revised on an annual basis through the Lessons Learned meetings, based on actual experience and site conditions.

GRAZING

2.2.5. Grazing

A. Purpose

In limited circumstances, grazing may be used for herbaceous weed control on District facilities. Grazing uses various species of domestic animals to provide non-targeted weed control. Animals include goats, sheep and other appropriate animals. Larger scale grazing by cattle is normally not appropriate for District facilities.

B. Work Activity

Small herds are put on parcels after evaluation by biological staff to identify sensitive resources. Vegetation to be preserved is fenced off as a protective measure. Grazing is excluded from channels and other water resources. If a sensitive water body is within the grazing area, it will be excluded with fencing.

C. Work Projections

Grazing is not a distinct projected work activity as it is permitted where mowing, discing, herbicide, or non-instream hand removal is projected. Grazing is permitted year round though it is typically done in the spring and summer when vegetation is young and still palatable to the livestock.

D. Work Window

Work may occur year round.

E. Requirements

All standard procedures for biological clearances apply.

F. Applicable BMPs

BMPs are listed in Attachment F. These BMPs may be revised on an annual basis based on actual experience and site conditions.

3. SEDIMENT REMOVAL

A. Purpose

Sediment removal is the act of mechanically removing sediment deposited within a creek or canal. Sediment removal is necessary when an accumulation of sediment: (1) reduces flow conveyance capacity; (2) prevents facilities or appurtenant structures from functioning as intended; or (3) impedes fish passage and access to fish ladders. The District's purpose in performing sediment removal activities is to ensure that a creek or canal will continue to provide flood capacity and that appurtenant facilities will function as designed.

Please refer to the Canal Maintenance section for work in canals.

B. Work Activity

Sediment may be removed from creek channel beds and canals with various pieces of equipment, including but not limited to excavators, long-reach excavators, bulldozers, scrapers, or front-end loaders. Sediment removal is usually conducted from the top-of-bank using one or more excavators. If the channel shape or the presence of mature vegetation along the channel banks prevents working from the top-of-bank, then the excavator may be positioned lower on the channel banks or within the channel bed using an existing access ramp, if available. Working within the channel may require the construction of temporary access ramps. Where practicable and necessary, smaller equipment can be lowered directly into the channel from a nearby stream crossing to minimize impacts associated with sediment removal operation. For smaller scale localized sediment removal or culvert clearing projects small loaders or excavators may be used within the culvert. Once excavated, sediment is typically either placed directly into dump trucks parked on the access road or stockpiled into central locations along the channel, where another operation subsequently lifts the stockpiled material into adjacent dump trucks.

Channel Access and Staging

Access to maintenance sites will occur via existing, adjacent access roads where present. Most SCVWD-maintained channels have at least one existing access road running along the top-of-bank on one side of the channel. Some channels have an access road on either side of the channel; and others may have a lower maintenance road along the lower level banks. When the channel shape, bank height, or the presence of mature vegetation prevents the use of the

top-of-bank access roads, equipment can move down the channel slope via existing access ramps, or forge a new temporary access route. Selective clearing of shrubs or trees may be necessary on the banks to provide equipment access to the channel bed.

In the event that work will be performed within the channel bottom, all work will be performed in dry conditions or within an area dewatered by a stream flow bypass system.

C. Work Projections

Sediment removal is a projected work activity. During the first nine years of the SMP (2002-2010), the District removed an average of 42,088 cubic yards of sediment in the Santa Clara Basin and 1,376 cubic yards from the Pajaro Basin each year. The total linear extent of sediment removal activity, including repeated work areas, was 56.25 miles of creeks, with 52.12 miles of work in the Santa Clara Basin and 4.13 miles in the Pajaro Basin from 2002-2009.

1. Projection Estimates

Sediment removal projections for the 2012-2022 work period are listed below per watershed. It is projected that 35.4 miles and 7.4 miles of sediment removal work will occur in the Santa Clara and Pajaro basins respectively during the 2012-2022 period.

Sediment Removal Projections for 2012 – 2022

Watershed	2012–2022 Total Projected Sediment Removal (miles)*	New Work Areas for 2012–2022 (miles)	Work Areas from 2002–2012 Not Projected for 2012–2022 (miles)
Santa Clara Basin			
Lower Peninsula	3.9	0.7	2.6
West Valley	3.8	0.9	8.3
Guadalupe	11	8.7	0
Coyote	16.7	5.9	0.7
Pajaro Basin			
Pajaro	7.4	3.1	3.5
Total	42.8 miles	19.3 miles	15.1 miles

D. Work Window

Sediment removal may occur during the work window of June 15 – October 15. Water quality monitoring shall be performed per the Water Quality Monitoring Plan and all excavated sediment shall be tested per the Sediment Characterization Plan.

1. Extended Work Window.
   a. Creeks supporting anadromous fish:
      An extended work window may occur from October 16 through October 31, or until local rainfall of 0.5 inches or greater falls within the subject watershed within a 24-hour period, whichever occurs first.
   b. Creeks not supporting anadromous fish:
      An extended work window may occur from October 16 through November 30th**,** or until local rainfall of 0.5 inches or greater falls within the subject watershed within a 24-hour period, whichever occurs first.

2. Extended Work Window in Lower Quality Areas:
   a) Work may occur from October 16 until December 31.
   b) Work areas will be included in the annual NPW.
   c) Work will only occur within Berryessa Creek (0-88+80; 232+70-236+00; 284+30-288+00), Lower Silver Creek (Reach 3 between Stations 37+40 and 381+19)), Thompson Creek (0+00-10+00), Canoas Creek (0+00-390+00), Ross Creek (0+00-86+30), Calabazas Creek (35+00-105+00), and San Tomas Aquino Creek (80+00-100+00), if:
      i. a preconstruction biological survey is performed and clearance provided,
      ii. site conditions are dry and access for all construction equipment and vehicles will not impact roadways,
      iii. water diversions will not be allowed,
      iv. all work will stop if any rainfall event is forecast three (3) days into the future, and an
   c) sites must be maintained in a winterized state. (See section 4. Bank Stabilization, I. for a definition of winterization.)
   d) Work may occur after a significant rainfall event but no later than December 31.

E. Applicable BMPs

Specific BMPs that are applicable to sediment removal activities are listed in Attachment F. These BMPs may be revised on an annual basis based on actual experience and site conditions.

F. Mitigation

Work that is conducted in areas not originally projected in 2002, will be calculated annually and determined per the requirements of the mitigation package described in the Mitigation Approach Memorandum, Appendix C, Final SEIR. Work projected in the 2002 SMP has been mitigated for in perpetuity, will continue to have work performed in these areas, and will not need to calculate impacts annually.

G. Annual Notification and Reporting

See the Water Quality Monitoring Plan and Sediment Characterization Plan for a description of reports that must be submitted to regulatory agencies during implementation of the SMP.

H. Water Quality Monitoring Plan For Sediment Removal

Minimum field sampling must be done for any site with active diversions. See the Water Quality Monitoring Plan for information on: (1) additional monitoring efforts and regulatory agency notification in case of exceedance of Receiving Water Limitations; (2) monitoring procedure; (3) monitoring for bladder dam use; (4) monitoring for new turbidity control BMPs; and (5) details on type of records and field documentation to be kept by District staff.

I. Sediment Characterization Plan For Sediment Removal

Sediment characterization is required for each sediment removal site. See the Sediment Characterization Plan for more information on: (1) additional information selecting random sampling location and how to determine the number of samples at each site; (2) sampling and analytical procedures used; and (3) details on type of records and field documentation to be kept by District staff.

4. BANK STABILIZATION

A. Purpose

Bank stabilization involves an action by the District to repair creek banks, levees and beds that are eroding or are in need of erosion protection. The District may implement bank stabilization when the problem: (1) causes or could cause significant damage to SCVWD property and/or adjacent property; or (2) is a public safety concern. Additional benefits of stabilizing eroding stream banks include reducing instream sedimentation, and protecting water quality and other beneficial uses such as riparian habitat and recreation. Repairs may take several forms from installing “hard” structures (e.g., concrete, sack concrete) to “soft” structures (e.g., willow brush mattresses, log crib walls, pole-plantings) or a combination (hybrid) of hard and soft structures. Bank stabilization also includes preventative maintenance to reduce the chances of banks eroding in the future. Such bank stabilization can potentially balance sediment and improve water quality.

Creek bank erosion is a natural process and mostly occurs during, or following, major storm events. Erosion can occur due to hydraulic forces and geotechnical conditions, and can be accelerated by adjacent land uses. Bank erosion can lower the stream bank and thereby increase the flood risk to adjacent properties. Bank erosion can also lead to increased downstream deposition which may further reduce conveyance capacity and increase the flood risk. Bank erosion may also cause vegetation and soil loss, damage to private or public property, transportation (trails and access roads), recreation, and utilities. Erosional conditions can increase turbidity which can be injurious to fish and aquatic life.

Sites with eroding or destabilized banks are evaluated for their local on-site soil conditions, slope stability, channel position, and geomorphic processes. A District engineer determines the most appropriate treatment to stabilize the bank, with consideration of habitat, species use, and other site beneficial uses. (See flow chart at the end of this chapter.) Based on the streambank conditions, the District design engineer will develop a treatment approach that stabilizes the streambank while trying to minimize the use of hardscape. In order to minimize temporal impacts to aquatic species due to failures of softer repairs and resulting sedimentation, a hardscape repair may minimize repeat work in an area and provide a long-term enhanced creek reach.

B. Work Activities

Bank stabilization activities may include installing “soft structures” (e.g., willow brush mattresses, log crib walls, and pole plantings), “hard structures” (e.g., concrete, sacked concrete), or a combination (hybrid) of hard and soft structures (shown in Attachment A of the Program Manual). Hybrid bank stabilization refers to a combination approach whereby softscape bank stabilization approaches like live construction, contour wattling, brush mattresses, or surface erosion matting are combined with a limited amount of rock toe protection at the base of the bank stabilization site. Additional boulders at the toe of the bank treatment is only applied if necessary, if there are hydraulic shear forces affecting the bank site, or geologic slumping or mass wasting forces affecting the site (because of the site’s position or slope) that require the additional presence of mass/rock at the base of the slope.

Based on the existing channel functions at erosion sites, a treatment approach is developed that seeks to stabilize the streambank while minimizing the use of hardscape, but ensures that required flood protection elements are not compromised. Bank stabilization activities will use bioengineering approaches when feasible and appropriate to stabilize eroding streambanks. Softer approaches typically involve removing existing undesirable soil and material from the failed bank, reconstructing the bank by placing and compacting back-fill soils, installing seeding or erosion control fabric, and planting of native riparian vegetation at the top-of-bank, on the slope, and at the toe-of-slope to provide additional bank stability. If the situation requires it (i.e., due to high channel velocities, channel constrictions, controlling structures, or other limitations), rock riprap may be installed at the base of the rebuilt bank to provide additional strength (e.g., resistance against high shear stresses caused by high channel velocities) and reduce the likelihood of future maintenance at the site. In some cases, site conditions my require rock riprap installed to a higher elevation than just the base area. For installation of hard structures, existing undesirable soil and material from the failed bank is removed and the bank is reconstructed by placement of back-fill soil and the hardscape material.

Equipment used for bank stabilization activities may include excavators, bulldozers, cranes, front-end loaders, dump trucks, water trucks, pumps, generators, compactors, and hand operated thumpers. Staging typically occurs on adjacent access roads or lands, if available, or within the work area. Where possible, soil and riprap are staged in areas that have been previously disturbed (i.e., service road, turn-outs, etc).

When repairs are made, banks are recontoured to match the adjacent bank slope (i.e., returned to pre-failure configuration), to the extent possible per site. If a riparian zone is present adjacent to the bank failure site, care will be taken to disturb the least amount of vegetation, including mature trees.

The District has included 13 bank stabilization methods (and sub-methods). Please see the Bank Stabilization Methods Table at the end of this section for a listing of the methods, mitigation and agency review requirements. Attachment A provides additional detail including conceptual schematics for each method.

Channel Access and Staging

Access to maintenance sites will occur via existing, adjacent access roads where present. Most SCVWD-maintained channels have at least one existing access road running along the top-of-bank on one side of the channel. Some channels have an access road on either side of the channel; and others may have a lower maintenance road along the lower level banks. When the channel shape, bank height, or the presence of mature vegetation prevents the use of the top-of-bank access roads, equipment can move down the channel slope via existing access ramps, or forge a new temporary access route. Selective clearing of shrubs or trees may be necessary on the banks to provide equipment access to the channel bed.

Tree removals necessary for bank stabilization activities would occur in a consistent manner as described above in Section 2.1.4 Hand Removal, G. Requirements. This includes any required mitigation for the removal of trees that occurs in relation to bank stabilization projects.

In the event that work will be performed within the channel bottom, all work will be performed in dry conditions or within an area dewatered by a stream flow bypass system.

C. Work Projection

Bank stabilization work can be performed in any creek under District jurisdiction unless specifically excluded by this Program. Bank stabilization is not a projected activity since it cannot be pre-determined where a site will need repairs. The District has made a commitment that no more than half of the annual bank stabilization projects (in all watersheds combined) will be of impervious hardscape.

The District performs an estimated average of one mile of bank stabilization work each year.

D. Work Window

Bank stabilization work is allowed during the work window of June 15 – October 15. If a work extension is granted, it may continue until the approved date stated below or until the first 72-hour forecast that includes significant rainfall. Significant rainfall is defined as local rainfall of 0.5 inches or greater that falls within a 24-hour period in the subject watershed. Winterization materials will be available and on-site when rain falls. Winterization will be completed by the actual rainfall event.

Extended Work Windows

1. In Creeks Supporting Anadromous Fish
   An extended work window may occur until October 31st for bank stabilization projects that will be 50% complete by October 15th.

2. In Creeks Not Supporting Anadromous Fish
   a. An extended work window may occur from October 16 until November 30th for projects that will be 50% complete by October 15th, or until significant rainfall.
   b. An extended work window may occur from October 16 until November 30th for new bank stabilization projects that will be completed in five (5) days or less, or until significant rainfall.

E. Requirements

Except for in-kind repairs, all hardscape method designs will be submitted to the agencies through the NPW. Hardscape designs in the 14 designated steelhead creeks will include a scientifically sound justification for the use of hardscape in steelhead creeks. Water quality monitoring shall be performed per the Water Quality Monitoring Plan and all excavated sediment shall be tested per the Sediment Characterization Plan.

F. Applicable BMPs

Specific BMPs that are applicable to bank stabilization activities are listed in Attachment F. These BMPs may be revised on an annual basis through the external Lessons Learned process, based on actual experience and site conditions.

G. Mitigation

Mitigation for bank stabilization work is determined on a project, site specific, annual basis per the mitigation ratios provided for in the Bank Stabilization Methods Table and per the requirements described in the Mitigation Approach Memorandum, Appendix C FSEIR. A Mitigation Feasibility Assessment will be performed at each bank stabilization site to determine the mitigation potential and success criteria per work site. The Mitigation Feasibility Assessment (MFA) process will evaluate site specific conditions and potential ecological functions at the site to determine the most suitable mitigation approach. The MFA process is described further below in Section H and in Attachment B.

The watershed engineer will develop the bank stabilization design with input from biological and horticultural staff. Integrating the needs of the repair site while considering the potential impacts to vegetation during the design process, will enhance the success of the stabilization project. Removal of any tree for a bank stabilization project, including tree removals for the purposes of access and/or staging, will be mitigated as described in Section 2.1.4 Hand Removal, G. Requirements. An exception for removal of trees >12" dbh may be permitted if necessary for the success of the bank repair and as approved through the NPW. Mitigation requirements will be determined via the Tree Scoring for Removal of Trees and Shrubs 6 - 12" dbh, April 2011 (Attachment C of this SMP Program Manual 2012-2022).

The Bank Stabilization Methods Table includes the standard revegetation mitigation required per method used. The MFA process will determine the appropriate success criteria for the required mitigation given the project site conditions. The addition of appropriate native vegetation to unvegetated hardscape methods that meet all revegetation success criteria can be considered for on-site mitigation credit.

H. Mitigation Feasibility Assessment

A Mitigation Feasibility Assessment (MFA) will be performed prior to finalizing the bank stabilization design to determine the revegetation potential of each bank repair site. The MFA will assess what plant species can be supported by the site and what the resulting success criteria should be based on the chosen species palette and site conditions. Site conditions with low value habitat have lower success criteria for cover and survival since the site conditions are less desirable and more challenging. High value habitat conditions support revegetation plantings and can achieve higher success criteria. See Attachment B of this SMP Program Manual 2012-2022, Mitigation Feasibility Assessment Field Protocol, July 2011 for implementation.

1. Purpose

Beyond simply installing mitigation on-site, it is an objective of the program to ensure feasible and the longer term sustainability of successful mitigation. The District's mitigation for bank stabilization projects will appropriately reflect site capabilities using the MFA. Planting species appropriate to the site conditions will promote a more successful revegetation program, in addition to a more efficient use of staff and natural resources. If a site has poor conditions yet is still desirable to plant, lower success criteria will be established to account for the poor site specific conditions. This will enable some replanting prior to seeking off-site mitigation. If the MFA results in a highly constrained site, then off-site mitigation will be considered to ensure greater revegetation success.

2. Site Assessment

The feasibility of mitigation depends on the opportunities and constraints of each bank stabilization site. These opportunities and constraints should be identified as part of the project planning process, prior to finalizing the bank repair design and regulatory agency review. The success criteria for mitigation should be evaluated and adjusted based on these findings. Mitigation credit may also be provided to include site enhancements, such as soil amendments, that would increase the site's MFA potential.

3. MFA Categories

The MFA will result in a revegetation potential divided into three separate categories: high, medium and low. Each of these categories is based on the presence or absence of specific attributes (opportunities and constraints) assessed for the site. If the project site is limited and it is determined that off-site mitigation is preferred, off-site locations will be evaluated using the same MFA.

Mitigation planting for bank stabilization projects will depend on the MFA for determining the appropriate site design and will be included in the NPW prior to commencing work.

I. Winterization

Winterization is the process to prepare and maintain work sites with the appropriate BMP's to prevent erosion, sediment transport, and protect water quality during the

rainy season. Every bank stabilization project is winterized upon completion. For projects that are not finished by October 15th, the District relies on weather forecasts to prepare for anticipated significant rainfall. After October 15th, seventy-two-hour look-ahead weather forecasts from the National Weather Service (or local vendor such as the Western Weather Group) are consulted to prepare for possible winterization measures. If a significant rainfall is forecast within the coming 72-hr forecast window, then maintenance work that may result in sediment runoff to the stream shall be stopped, to allow adequate time to complete erosion control measures. Winterization materials will be available and on-site if rain falls after October 15th.

Winterization is the process to maintain project sites with the appropriate BMPs to prevent erosion, sediment transport, and protect water quality. Winterization occurs upon completion of bank repairs or on incomplete projects after October 15 and prior to the forecast of significant rainfall, 0.5 inches or greater of rainfall within 24 hours in the subject watershed. Winterization shall be completed prior to the occurrence of such actual significant rainfall. Winterization materials will be available and on-site when rain falls after October 15.

Winterization includes erosion control practices, sediment control practices, and general site and materials management.

Basic ground rules for winterization:

1. Direct runoff away from disturbed areas.
2. Retain existing vegetation as much as possible.
3. Fit grading to the surrounding terrain.
4. Prepare temporary drainages and outlets.
5. Grade/excavate outside of rainy season.
6. Minimize length and steepness of slope.
7. Stabilize disturbed areas by mulching, vegetating (hydromulching, hydroseeding, hydraulic matrices, blankets, etc.).
8. Use every dissipating measure to keep runoff velocities low.
9. Trap sediment on site.
10. Inspect, log, and maintain control measures after each storm.

Proper use of erosion and sediment control BMPs requires training by experienced professionals. Certifications are available through the IECA (International Erosion Control Association).

J. Annual Notification and Reporting

Regulatory staff must review and indicate approval for bank stabilization designs that use hard materials. These methods are specified in the Bank Stabilization Methods Table at the end of this section. Regulatory agency staff have 30 days to respond to a proposed bank stabilization project requiring their approval. Written responses of "no comment" are requested. If no comments are received upon 30 days, the project proposals are presumed to be approved. Proposals for bank stabilization designs which require pre-review can be submitted at any time of year.

The submitted review plans for bank stabilization projects will consist of:

1) A plan view of the erosion site,
2) A cross-section of the erosion site,
3) Photographs of the site,
4) Repair method selected,
5) Brief description of why the method was selected,
6) Description of mitigation, if any, including the MFA results,
7) Identification of representative sites that will be monitored, and
8) Explanation for the use of hardscape in the 14 steelhead creeks, if applicable.

K. Monitoring of Completed Bank Stabilization Projects

The completed monitoring forms will be submitted with the May Notice of Proposed Work (NPW). Following submittal of the NPW no further evaluation for submittal is required under the Stream Maintenance Program CEQA and associated regulatory approvals.

Each year in the May NPW, the District will identify any bank stabilization monitoring sites. This monitoring will include a visual observation of evidence of erosion upstream and downstream of the site (i.e., 200 feet), condition of the bank stabilization repair, and condition of vegetation planting.

Table 1. Bank Stabilization Methods Table

I.D. No.	Method	Mitigation Ratio	Hard[2]-/Soft-scape	Requires Plan Review by Agencies
1	Earth Repair	1:1	Soft	No
1A	Earth Repair with Buried Rock	1:1	Soft	No
2	Live Construction	1:1	Soft	No

I.D. No.	Method	Mitigation Ratio	Hard[2]-/Soft-scape	Requires Plan Review by Agencies
2A	Live Construction with Boulder Toe	1:1 if boulder toe is vegetated 1½:1 if boulder toe is not vegetated	Vegetated: hybrid Not vegetated: hard	No
2B	Live Construction with Log Toe	1:1	Soft	No
3	Contour Wattling	1:1	Soft	No
3A	Contour Wattling with Boulder Toe	1:1 if boulder toe is vegetated 1½:1 if boulder toe is not vegetated	Soft	No
3B	Contour Wattling with Log Toe	1:1	Soft	No
4	Brush Mattress (Brush Layering)	1:1	Soft	No
4A	Brush Mattress (Brush Layering) with Boulder Toe	1:1 if boulder toe is vegetated 1½:1 if boulder toe is not vegetated	Vegetated: hybrid Not vegetated: hard	No
4B	Brush Mattress (Brush Layering) with Log Toe	1:1	Soft	No
5	Surface Matting (Erosion Mats)	1:1	Soft	No
5A	Surface Matting (Erosion Mats) with Boulder Toe	1:1 if boulder toe is vegetated 1½:1 if boulder toe is not vegetated	Vegetated: hybrid Not vegetated: hard	No

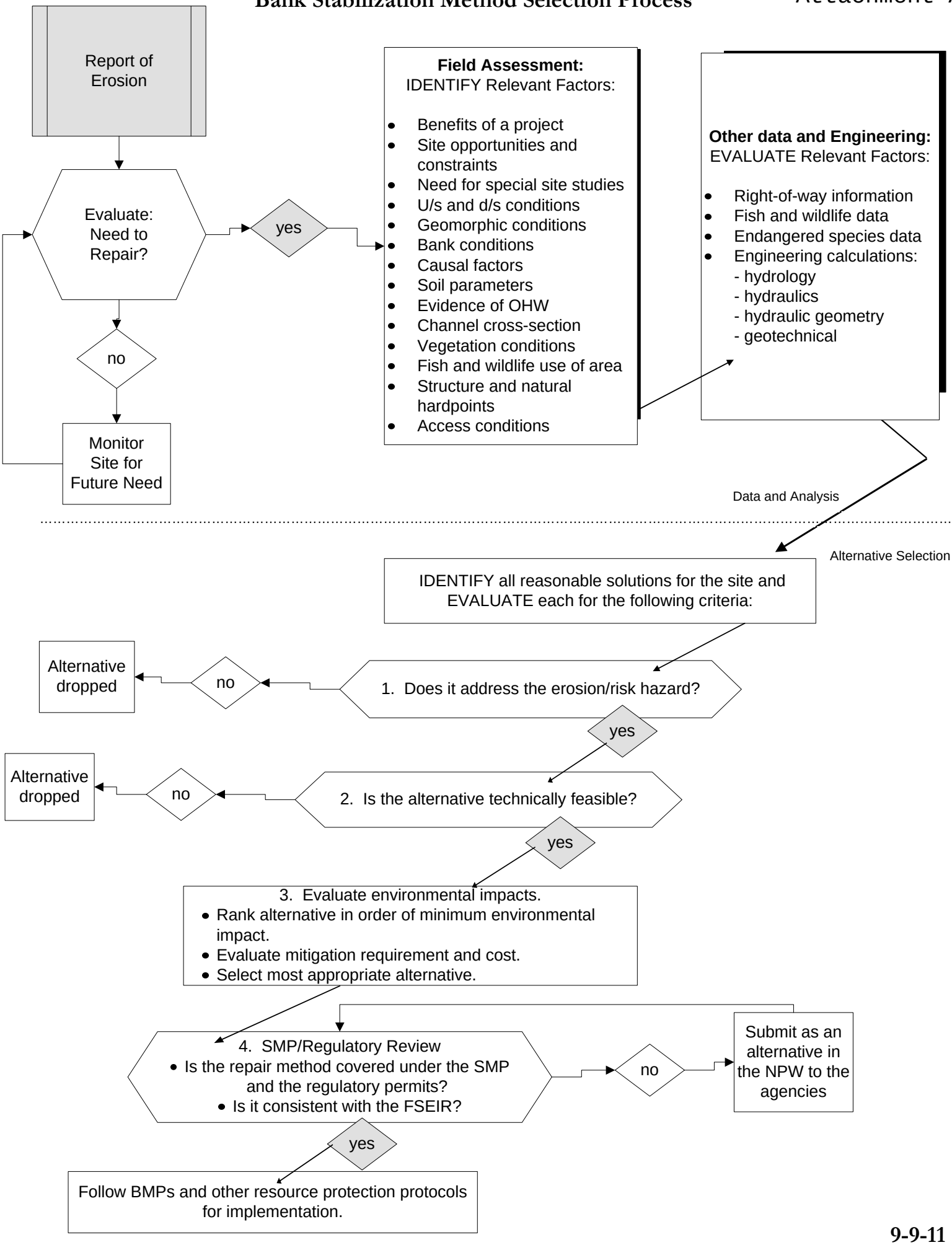
I.D. No.	Method	Mitigation Ratio	Hard[2]-/Soft-scape	Requires Plan Review by Agencies
5B	Surface Matting (Erosion Mats) with Log Toe	1:1	Soft	No
6	Add Rock to Invert	1:1	hybrid	No
6A	Rock Cross Vanes	1:1	hybrid	No
6B	Root Wads and Boulders	1:1	hybrid	No
6C	Live Log Crib Walls	1:1	Soft	No
6D	Log Revetment	1:1	hybrid	No
7	Cellular Confinement System	2:1	Hard	Yes
8	Rock Blanket	2:1	Hard	Yes
8A	Boulder Revetment	2:1	Hard	Yes
8B	Boulder Revetment with Soil and Vegetation	1:1	hybrid	Yes
9	Articulated Concrete Blocks	3:1	Hard	Yes
9A	Articulated Concrete Blocks with Planted Areas	2:1	Hard	Yes
10	Concrete Crib Walls	3:1	Hard	Yes
11	Sacked Concrete	3:1	Hard	Yes
12	Gunite Slope Protection	3:1	Hard	Yes
13[1]	Earth with Rock Toe on Grass Lined Channels	None if rock is below bankfull depth, and the mitigation ratio as specified in ID no. 1 thru 12 for areas above bankfull depth	Soft/hybrid	No

[1] Grass lined channels are those where grass is the predominant or sole vegetation, and that contain no significant riparian structure. The NPW submittal will include photographs and descriptions to justify use of this line item.

[2] All hardscape repair methods will be reviewed by the agencies.

Bank Stabilization Method Selection Process

Attachment A



5. MANAGEMENT of ANIMAL CONFLICTS

A. Purpose

Animals may damage District facilities by burrowing into levees, banks and along canals, forage on mitigation sites, and interfere with work activities. Animal burrows in levees and banks may threaten their structural integrity which can lead to failure, sloughing, and slumping. Animals feeding on vegetation can reduce the health and vigor of plants, or denude local areas. Animals can be territorial or defensive of specific resources or locations and can interfere with District facilities. The presence of some animals may require the District to postpone work activities. To avoid compromising District facilities and to reduce conflicts with species living in or protecting sites where work is needed, the management of animal conflicts may be undertaken.

B. Work Activities

Managing animal conflicts may include avoidance, biological control, physical alterations, habitat alteration, and lethal control. Work activities will be used during the appropriate season, life cycle timing and location to synergistically manage species at individual sites. Properly sequencing activities will more effectively manage the area by addressing different life stages and activities of the target animals.

1. Maintain Sanitary Conditions

   Wildlife biologists will work with the Department of Fish and Game and local agencies and Non-Governmental Organizations (NGOs) to identify and reduce potential wildlife disease outbreaks. Where appropriate, maintenance staff will remove and dispose of animal carcasses which do not pose a hazard to human health to reduce the spread of animal diseases. This may include the removal of animals that succumb to diseases such as botulism or avian cholera. The Santa Clara County Vector Control District will be contacted when animal carcasses are found that could pose a hazard to human health.

2. Avoidance

   Wildlife biologists conducting pre-construction surveys may recommend avoidance measures to protect individual species, specific resources (nests), or to reduce conflicts with potentially dangerous species such as mountain lions, bobcats, coyotes, raccoons, skunks, fox, or rattlesnakes. Where sensitive resources are present within the work site the biologist may establish appropriate buffers. For example, birds may occasionally become defensive and attack individuals or vehicles near nest sites or food resources.

If the ecological resource cannot be physically avoided, the biologist may recommend a temporal avoidance by delaying the work activity.

3. Maintain a safe work site environment.

   Field conditions and the types of animals encountered vary seasonally, geographically and per work activity. Swarms of wasps and bees can be located in a tree, arachnids and insects may be uncovered around culverts and bridges. Where avoidance and other measures are not sufficient to maintain a safe work site environment, off-the-shelf chemicals and sprays may be used.

4. Biological Control

   Biological control involves the deliberate release of one species into the environment to control a second species. Insects have been used as biological control agents to control other insect pests or to control plant species. Biological control may also include changing plant species composition to make a site inhospitable to a particular species.

   The District may change plant palettes to reduce the habitat suitability of a site for specific animals. Raptor nest structures and perches may be installed in areas to encourage natural predation on ground squirrels and gophers.

   Repellents may be used to deter rodents or other nuisance species, such as rabbits. Repellents may include plant species and extracts and will be used to target specific species. The placement of peppermint oil or capsaicin, or sprinkling pepper, cinnamon and cayenne in the areas where rodent activities are frequent, are examples of biological repellants.

5. Physical Alteration of the Facility

   Physical Alteration of a facility may include minor alterations that do not change the size or capacity of a facility to function but do promote the District's ability to conduct work at the facility. Bird netting on bridges or structures such as stream gauges and culverts may be installed to prevent birds such as swallows or black phoebes from nesting.

   Physical alterations may also occur to reduce or eliminate the effects of burrowing animals. Physical alterations of a facility may include:

   a. Surface compaction of levee faces with heavy construction equipment

Surface compaction consists of using heavy equipment to firm up, re-compact or harden the outer levee surface. Compaction is achieved by driving heavy equipment up and down or across the levee slope after the slope has been optimized for this operation. Optimization can include adding moisture (watering) to allow for better compaction rates, mowing the vegetation to improve equipment to soil contact, and possibly slurry filling identified rodent holes. Heavy equipment used to compact levee surfaces include the use of crawler tractors, rollers/compactors, and a water truck. Prior to the start of this method, the levee surface will be evaluated to determine how much moisture should be added. The levee surface is moistened using a water truck until an optimum moisture content is achieved. Heavy equipment then drives along the surface, traversing up and down the levee, compacting the soil to create a uniform surface.

b. Filling burrows with slurry material under pressure to backfill rodent holes

Filling burrows with slurry consists of using a truck or trailer mounted mixing machine to dispense a viscous, soil-like material (slurry) through a hose to adjacent locations where rodent burrow are filled. This operation requires good mobility and cannot be excessively large in order to accommodate the movement from site to site. In order to be mobile and flexible, the mixing equipment is relatively small, able to mix less than a few cubic yards at any given moment. A typical operation includes a truck or flatbed where bags of slurry mixture can be stored and transported, a trailer mounted mixing/pumping machine, and a water truck. At rodent burrow filling locations, bags of dry slurry material are hand loaded into the mixing machine and water is added until the appropriate consistency is reached. The material is then pumped through a hose to the actual rodent burrow where the slurry is pumped into the burrow until filled. Viscosity of the slurry mixture is critical in properly filling the burrows, and will vary dependent upon the moisture of the soil at the hole location. If the burrow is within the buffer area of a sensitive species, the hole must be inspected with a burrow camera, systematic excavations may be necessary to ensure no impact to sensitive species. Excavations may be performed with a small backhoe or hand tools.

c. Reconstruction of levee side slopes

Reconstructing levee slopes requires an operation to excavate or demolish a larger area of levee damaged by rodent burrows and rebuild it to the standard it was originally constructed. This type of operation would

utilize heavy equipment like an excavator, crawler tractor, loader, dump truck, motor grader, roller/compactor, scraper, back hoe, and a water truck.

d. Placing physical barriers, such as geotextile mats, chain link, exclusion fence, and erosion control blankets.

Placement of physical barriers consists of preparing an area for installation of the barrier, installing the barrier and providing follow up maintenance as needed. Site preparation may include scraping the barren soil, removing groundcover vegetation (weeds or grasses), or trenching. Equipment used for this operation can include hand tools, tractor, mower or trencher. This work activity is currently performed as a function of bank stabilization projects to prevent erosion and protect water quality. It is also used to winterize recently constructed maintenance projects.

6. Habitat Modification

Modifying the habitat through vegetation management is another method that is used to influence animal behavior. Low growing, herbaceous vegetation may be cleared prior to nesting bird season to minimize nesting in the area. Likewise, mowing or discing vacant or fallow lands adjacent to flood control levees can decrease the future food source and habitat for burrowing rodents. By limiting available forage areas adjacent to key District facilities, burrowing rodent populations may be reduced.

Habitat modification may include:

a. Managing vegetation growth to prevent individuals from taking up residence, burrowing or nesting.
b. Maintaining vegetative barriers to reduce animal occupancy at a site.
c. Change a plant pallet to reduce habitat suitability or desirability.

7. Non-lethal Trapping - Relocation

The District may employ non-lethal trapping and removal of animals when they occur in project areas. Animals to be removed and released out of harm's way include but are not limited to reptiles and amphibians. Honey bee colonies and swarms may be captured by local apiarists at the District's request.

The trapping and removal of birds will only be conducted in consultation and under separate permit from the U.S. Fish and Wildlife Service and authorization from the Department of Fish and Game.

The trapping and movement of mammals will only be conducted in consultation and under separate authorization from the Department of Fish and Game and/or U.S. Fish and Wildlife Service.

8. Lethal Control

a. Management

Control methods will be prescribed by a Pest Control Advisor. Compliance with species and habitat protections under the Program is managed by a biologist knowledgeable with the affected species. Lethal control methods will comply with County Agriculture Commission requirements. Non-native species in the work area will not receive special protections, though considerations will be made to minimize their harm.

b. Methodology

1. Fumigants

To be effective, fumigants are used when there is sufficient moisture in the soil to prevent the gases from diffusing out of the burrow. In Santa Clara County, this normally occurs between late January through early May. In areas where there are active burrows, an initial fumigant treatment will be conducted. One to two (1-2) weeks later, burrows that continue to show signs of activity will be retreated. California ground squirrels and gophers are the most targeted species.

a) Gas Cartridges (smoke bombs): Gas cartridges consist of a mixture of sodium nitrate, charcoal, and sawdust compressed in a tube. Cartridges are lit with a fuse and placed directly into the burrow which is then sealed with soil. The cartridge produces a carbon monoxide gas that spreads through the burrow and asphyxiates the animals within. If smoke is observed from any other burrows, those burrows are sealed as well.

b) Aluminum phosphide: Aluminum phosphide is a colorless gas with a punget odor (UC BMP's for California Ground Squirrel Control,

2011). Two to four aluminum phosphide tablets are placed directly into the burrow. The burrow entrance is then plugged with crumbled newspaper to seal the entrance and prevent soil from covering the tablets. The moisture in the burrow activates the fumigant which produces a phosphine gas that spreads through the burrow and is lethal to the enclosed animals.

2. Chemical Bait Types
   a) Acute toxins
      i. Zinc phosphide (Zn_3P_2): Formulations used in rodent control consist of a heavy, finely ground, crystalline gray-black powder that is practically insoluble in water and alcohol. It is available in pellet or grain baits that have been treated and dyed black (the black dye reduces the risk to birds). Zinc phosphide will be used one time per season once the ground and annual vegetation has dried out and burrowing rodent feeding habits transition from forbes to grains and seeds (normally between May and July). When ingested, zinc phosphide reacts with moisture and stomach acids to produce a lethal phosphine gas, causing death by asphyxiation. Treatment areas will be pre-baited with untreated non-toxic bait to enhance bait acceptance.

         Zinc phosphide will be applied by spot baiting (hand baiting). Using a bait spoon, 1 tablespoon of bait is spread evenly over the grass area near each active ground squirrel burrow. Each area will be limited to one treatment of zinc phosphide per year.

         To reduce the potential for exposure to non-target species the bait will not be piled and not be applied to bare soil or other surfaces. Zinc phosphide is used prior to application of the anticoagulant baits in order to significantly reduce the number of squirrels. This results in a lower population needing to be targeted with bait stations as well as reducing the number of squirrel carcasses that contain anticoagulant residue that could cause secondary poisoning of non-target species. (Salmon UC BMP's for California Ground Squirrel Control, 2010)

ii. Strychnine: Strychnine treated bait is the most common rodenticide used for gopher control. Gopher control may occur year round depending on activity level. Strychnine is only used underground and only for gopher control. A probe is used to locate main runways and strychnine treated bait is deposited into the runway where gophers are most likely to find it. The probe hole is then covered. Gopher runways typically occur at a depth of six to eight inches (CDFA Vertebrate Pest Control Handbook, 2010).

b) First generation anticoagulants (e.g. chlorophacinone and diphacinone): First generation anticoagulant baits are chronic baits that require several feedings over a period of days to a week to acquire a lethal dose. The anticoagulants cause capillaries to rupture and prevent the formation of blood clots which causes the animal to bleed to death over the period of a few days. Anticoagulant treated baits are used when burrows are active and can be strategically timed for use following a zinc phosphide application. The anticoagulants are applied in bait stations from May to November. The herbaceous vegetation should be dried out so ground squirrels are not feeding on green vegetation during application, but have transitioned from feeding on forbes to grains and seeds.

Bait stations have a 3-inch diameter opening to restrict access from non-target species and a lip to prevent feeding animals from spilling bait outside of the bait stations. The bait stations are secured in place to prevent them from being tipped over. Bait stations can also be removed or damaged by the public who may oppose their use. The application areas are surveyed during active baiting on a weekly basis and carcasses are removed to minimize secondary poisoning (UC BMP's for California Ground Squirrel Control, 2011).

3. Trapping
   a) Live traps: Live trapping is typically used when other methods are not appropriate due to concerns with special-status species. Live

trapping takes place year round when ground squirrels are present above ground. Wire cage traps are baited with untreated bait. The wire traps have openings no smaller than 2 inches by 1 inch, which is large enough to allow mice and other small species to escape the trap. Live traps are checked daily. Ground squirrels are removed from the site and are humanely euthanized with carbon dioxide gas. Non-target species will be released on-site as soon as they are detected.

b) Kill traps: Box traps and tunnel/tube traps are placed in main ground squirrel runways. Body gripping traps are placed over the entrance of a burrow. Traps are checked daily.

9. Coordinate with local, State, or Federal agencies.

The District may contract or request assistance from local, state, or federal agencies to capture nuisance animals such as feral cats, dogs, red fox, opossum, or skunks. The District may contract with local, state, or federal agencies to control animals on sites where the District manages the habitat for threatened and endangered species.

10. Safety

Label use restrictions will be followed for all rodenticides used. Fumigants will not be used near dry grasses or other flammable material. Fumigants will not be used near buildings.

Zinc phosphide persists for approximately two weeks under average conditions (U.S. National Library of Medicine, 1995). Zinc phosphide breaks down when exposed to water and converts to phosphine gas which is then diluted by air. In areas accessible to the public the District will provide postings that the area has been treated, which will be kept in place for two weeks following the initial application of zinc phosphide. After two weeks the bait will be deactivated with water, converting zinc phosphide into zinc phosphine gas. All postings will include a staff contact for further information.

Bait stations will be secured in place and will have a lip inside the opening to prevent any bait from being spilled by a feeding rodent. Any spilled bait will be cleaned up immediately and properly disposed of.

C. Work Projections

Management of Animal Conflicts is not a projected work activity as these activities may occur anywhere along the District's creeks and canals.

D. Work Window

Management of animal conflicts may occur year round. The method of control used will be based on the seasonal efficacy of the animal's life cycles and in compliance with the protection of special-status species.

E. Requirements

1. A District Wildlife Biologist will conduct a desk audit to determine whether suitable special-status species habitat is present in or adjacent to a maintenance activity.

2. If the District Wildlife Biologist determines that a special-status species could occur in the activity area avoidance and minimization measures will be inserted into the work order requirements including but not limited to:
   a) Salt Marsh Harvest Mouse Habitat
      i. No rodenticides or fumigants will be used within the range of the salt marsh harvest mouse (as identified by District range map or other information available to the wildlife biologist).
      ii. Methods of rodent control within SMHM or CCR habitat will be limited to live trapping. All live traps shall have openings measuring no smaller than 2 inches by 1 inch to allow any SMHM that inadvertently enter the trap to easily escape. All traps will be placed outside of pickleweed areas and above the high tide line..
   b) Burrowing Owls, Bald Eagles and Golden Eagles
      i. A 656-yard buffer will be established around known burrowing owl locations where no rodenticides or fumigants (including smoke bombs) will be used.
      ii. A 0.5-mile buffer will be established around known bald eagle and golden eagle nesting locations where no rodenticides will be used.

c) Special Status Amphibians
   i. Fumigants will not be used within the potential range of sensitive amphibians (California Red-legged Frog, California Tiger Salamander and Foothill Yellow-legged Frog) as identified by District mapped range maps.
   ii. Within the potential range of the California red-legged frog, California Tiger Salamander or Foothill Yellow-legged frog (as identified by District range maps or other information available to the wildlife biologist) will be limited to bait stations specifically designed to prevent entry by these species.

3. Carcass surveys will be conducted periodically when acute poisons and first generation anticoagulants are used. The frequency of the carcass surveys will be specific to the type of rodenticide used.

   a) Acute Toxins – Carcass surveys will be performed daily beginning the first day after application above ground until the end of the baiting period.
   b) Anticoagulants – Carcass surveys will begin within seven days after first-generation anticoagulants are made available. Anytime a carcass is found daily carcass surveys will begin for as long as carcasses are found until no carcasses are found during a daily survey. Once no carcasses are found, carcass surveys will return to the weekly carcass survey timeline maximum from the date of initial installation of an anticoagulant bait station.

4. To verify that the frequency of carcass surveys is adequate, a biologist will conduct daily carcass surveys 2 times per year over one baiting cycle. Based on the results of these surveys, the timing of carcass surveys will be adjusted if necessary.

5. Any spilled bait will be cleaned up immediately and disposed of properly.

F. Applicable BMPs

Specific BMPs that are applicable to management of animal conflicts are listed in Attachment F. These BMPs may be revised on an annual basis through the external Lessons Learned process, based on actual experience and site conditions.

References

CDFA Vertebrate Pest Control Handbook http://vpcrac.org/about/handbook.php. Accessed 4/19/2010.

Michigan Department of Natural Resources and Environment, Zinc Phosphide, http://www.michigan.gov/dnr/0,1607,7-153-10370_12150_12220-26326--,00.html, January 2011.

Salmon, Terrell P., P.D. Newman, 2010. Efficacy of Oat and Pellet Anticoagulant Baits following treatment with Oat and Pellet Zinc Phosphide Baits: Implications for Secondary Hazard Management. 24th Vertebrate Pest Conf.

University of California Best Management Practices for California Ground Squirrel Control http://groups.ucanr.org/GSBMP/index.cfm Accessed 1/25/11.

U.S. National Library of Medicine. Hazardous Substances Databank. Bethesda, MD, 1995.

6. MINOR MAINTENANCE ACTIVITIES

A. Purpose

Minor Maintenance activities are performed to make repairs and maintain District facility functions. Maintenance activities may occur along creeks, canals and at stream gauges. These small scale activities may occur throughout the SMP program area, but they do not change the footprint of any existing facility. These are minor activities because they are small in size and their potential environmental impact to resources is limited.

Please refer to the Canal Maintenance chapter for additional detail regarding maintenance work in District canals.

B. Work Activities

Maintenance activities are considered minor if they result in the removal of less than 0.05 acres (2178 sq ft) of wetland or riparian vegetation. The minimum reporting size for any vegetation work is 0.01 acres (436 sq ft) per project. Any vegetation work necessary for project access or staging is included in this calculation of potential project impacts.

Minor Maintenance activities include:

1. cleaning and minor sediment removal at outfalls, culverts, flap gates, tide gates, inlets, grade control structures, fish ladders, fish screens. Work at these facilities is limited to 50 cubic yards. Vegetation removal will be calculated and tracked to ensure compliance with annual maximums. All other work must be projected.

2. minor sediment removal less than 10 cubic yards per site may be removed anywhere at SMP stream/canal facilities;

3. trash and debris removal;

4. repair and installation of fences and gates;

5. grading and other repairs to restore the original contour of existing maintenance roads;

6. grading small areas above streambanks (without vegetation) to improve drainage and reduce erosion;

7. repair structures with similar materials within approximately the same footprint (such as replacement of concrete linings, culverts, pipes, valves or similar structures; or repairing a weir, in-stream orifice, communication pipe). For purposes of this activity description, similar materials means that materials will be replaced in-kind, such that hardscape and softscape facilities will be replaced with similar materials, respectively (as defined in the Bank Stabilization Methods Table.

8. graffiti removal;

9. installation and on-going maintenance of mitigation and landscape sites, including: irrigation, weed control, replanting of dead or declining individual plants and other types of ongoing maintenance at mitigation sites; until such time when the success criteria are met or the site fulfills the establishment phase requirements;

10. removal of obstructions at structures: bridges (not to exceed 100 feet upstream and downstream of the bridges), streamflow measuring stations (stream gauges), box culverts, storm drain outfalls and drop structures to maintain functions of such structures. See the Vegetation Management section for vegetation removal requirements.

11. Stream gauge maintenance including stilling well cleaning, painting of gauge house, replacing/adding antenna or solar panels to existing structures, replacing instrumentation, cableway repair, weir cleaning of algae and debris, and unburying staff markers/orifice/communication pipes.

C. Work Projections

Minor Maintenance is not a projected work activity and may occur throughout the SMP program area. Minor Maintenance activities are not

expected to have significant negative impact to water quality or beneficial uses when best management practices are implemented.

D. Work Window

Minor Maintenance activities may be performed year round or within the Work Window for specified Work Activities. Minor sediment or vegetation work must comply with the Work Windows specific to those work activities, even when they are Minor Maintenance activities.

E. Requirements

A minor activity is defined to be minor work that results in the removal of less than 0.05 acres (2178 sq ft) of wetland or riparian vegetation. The minimum reporting size is 0.01 acres (436 sq ft) per project. In addition, all minor activities for a single year have a total wetland or riparian vegetation impact of 0.2 acre and a total of 2 acres for the 10-year program. Any impact to wetland or riparian vegetation necessary for access or staging must be calculated as part of this total.

F. Mitigation

Work in Minor Maintenance is limited to those activities that do not have potentially significant impacts to resources, and thus do not require mitigation.

G. Applicable BMPs

BMPs that are applicable to the specific work activities are listed in Attachment F~~A~~. These BMPs may be revised on an annual basis through the external Lessons Learned process, based on actual experience and site conditions.

H. Annual Notification and Reporting

Notification and reporting will be provided for minor activities that have an impact of less than 0.05 acre/site. When reporting minor work projects which are outside of the major work areas, a map will be provided showing the location of both.

No reporting or mitigation will be required if a minor work activity results in removal of less than 0.01 acre of wetland and riparian vegetation.

H. CANAL MAINTENANCE

A. Purpose

The SMP includes routine and periodic maintenance of its canal facilities. The location of District canals are shown in the DSEIR Project Description (pgs 22-23) Figure 2-39, and representative photos are provided in Figure 2-40. The primary function of District canals are to serve as water supply transport facilities, though they also provide incidental flood protection by capturing surface runoff. During the first nine (9) years of the SMP, 2002-2010, the average length of a sediment job in canals was 1635 feet; removing an average of 290 cubic yards of sediment annually.

Future resource conservation programs, such as the Santa Clara Valley Habitat Plan or the Three Creeks Habitat Conservation Plan, may also provide regulatory coverage for maintenance activities at canals. If in the future another program provides adequate regulatory oversight for canal maintenance activities, then the SMP may be revised to exclude canal maintenance activities. Any such changes or revisions to the program would be coordinated with the SMP's regulatory agency partners.

Canal maintenance activities include the work activities previously discussed in this Program Manual, including: sediment removal, vegetation management, management of animal conflicts, and minor maintenance activities. Any and all of these activities may also occur at canals for all of the same reasons stated in the individual sections above, namely to provide flow conveyance and to maintain the function of the canal systems. Any damage to canal banks would be repaired with in-kind materials, as covered under the Minor Maintenance activity. Work activity parameters previously described herein, would also apply when performed in and along canals. For example, removal of trees ≤ 6 inches in diameter may be removed from canals without additional mitigation debts incurred. Similarly, tree removal activities at canals are implemented consistently with the protocols described in the Vegetation Management Chapter 2 and mitigation requirements as described in the Mitigation Approach Memorandum, Appendix C FSEIR.

B. Work Projections

1. Sediment Removal

Sediment removal may occur anywhere along the canals; though no more than 1000 cubic yards will be removed per calendar year, for all watersheds combined.

2. Vegetation Management

Vegetation Management may occur anywhere along the canals. The activities of herbicide application, mowing, hand removal of trees and shrubs, and pruning may occur within and adjacent to the canals. Of the 41 total miles of canals, no more than 6 acres of work will be performed during the period 2012-2022.

Discing may only be performed on Coyote Alamitos canal on the right bank from GIS stationing 188+88 – 208+88.

3. Minor Maintenance

Minor maintenance is not a projected work activity and may occur anywhere along the canals.

4. Management of Animal Damage

Management of Animal Damage is not a projected work activity and may occur anywhere along the canals.

C. Work Activities

1. Sediment Removal

Sediment removal activities range from 2 - 50 cubic yards in a single area and are performed to clear sediment deposits ("plugs") where local sediments have either entered the canal or have been deposited. Canal sediment removal will generally occur using a small loader from the top of the adjacent canal access road. Canal sediment removal may be conducted using hand tools at sites with small sediment volume. Sediment removal will be less than 1000 cubic yards per calendar year for all canals.

For further description of sediment work, please refer to the Sediment Removal chapter of this manual.

2. Vegetation Management

The following work activities are permitted within canals:

a) Hand removal
b) Herbicide
c) Pruning

The following work activities are permitted outside of and along canals:

a) Herbicide (Pre- and post-emergent herbicide applications will be made to maintain clear access roadways.)
b) Mowing
c) Pruning

For further description of vegetation management work, please refer to the Vegetation Management chapter of this manual.

3. Minor Maintenance

Minor Maintenance activities for canals include:

a) trash and debris removal;
b) repair and installation of fences and gates;
c) grading and other repairs to restore the original contour of existing maintenance roads;
d) grading small areas without vegetation above canal banks to improve drainage and reduce erosion;
e) repair of structures with similar materials within approximately the same footprint (such as replacement of concrete linings, culverts, pipes, valves or similar structures; repairing a weir, in-stream orifice, or communication pipe). For purposes of this section, similar materials means replacing hardscape and softscape materials with like materials, as defined by the Bank Stabilization Methods Table.
f) graffiti removal;
g) installation and on-going maintenance of mitigation and landscape sites, including: irrigation, weed control, replanting of dead or declining individual plants and other types of ongoing maintenance at mitigation sites; until such time when the success criteria are met or the site fulfills the establishment phase requirements; and
h) removal of obstructions at structures: bridges (not to exceed 100 feet up canal and down canal of the bridges), stream flow measuring stations, box culverts, storm drain outfalls and drop structures to maintain functions of such structures. See the Vegetation section for vegetation removal requirements.

For further description of minor maintenance activities, please refer to the Minor Maintenance chapter of this document.

4. Management of Animal Conflicts

Management of Animal Conflicts methods include:

a) Maintain Sanitary Conditions,
b) Avoidance,
c) Biological Control,
d) Physical Alteration of the Facility,
e) Habitat Modification,
f) Non-lethal Trapping – Relocation,
g) Lethal Control, and
h) Coordinate with Local, State or Federal agencies.

For further description of management of animal conflicts methods and protocols, please refer to the Management of Animal Conflicts chapter of this document.

D. Work Window

1. Sediment Removal

Sediment removal in canals may occur year round. Sediment removed during the wet season may be placed on the top-of-bank area adjacent to the canal (side casted) until the area is dry and heavy vehicles can easily access the area without damaging the roadways and facilities. Water quality monitoring shall be performed per the Sediment Characterization Plan protocols at each sediment removal site.

2. Vegetation Management

Vegetation management activities may occur:

a) In-canal (wetted area) hand pruning and hand removal may occur year round, except:
    i. Where ~~large~~ mechanized equipment would need to access the site by crossing a creek or otherwise affect water quality, or
b) In-canal (wetted area) herbicide application may occur between June 15 - October 15.
    i. In-canal herbicide work may continue until December 31 or until local rainfall greater than 0.5 inches falls within the

subject watershed within a 24-hour period, whichever transpires first.

c) Non-instream (bank/bench) herbicide work may occur year round, weather permitting and per product label.

d) Vegetation management outside the bankfull channel may occur year round, weather permitting.

i. Year round work opportunities do not apply to areas where equipment would need to access the site by crossing a creek or otherwise affect water quality.

3. Minor Maintenance

Minor maintenance activities may be performed year-round.

4. Management of Animal Conflicts

Management of animal conflicts may occur year round. The method of control used will be based on the seasonal efficacy of the animal's life cycles and in compliance with the protection of special-status species.

E. Requirements

For Management of Animal Conflicts activities, the following exclusions apply:

1. A District Wildlife Biologist will conduct a desk audit to determine whether suitable special-status species habitat is present in or adjacent to a maintenance activity.

2. If the District Wildlife Biologist determines that a special-status species could occur in the activity area avoidance and minimization measures will be inserted into the work order requirements including but not limited to:

a) Salt Marsh Harvest Mouse Habitat

i. No rodenticides or fumigants will be used within the range of the salt marsh harvest mouse (as identified by District range map or other information available to the wildlife biologist).

ii. Methods of rodent control will be limited to live trapping with the traps having openings measuring no smaller than 2 inches by 1 inch to allow the smaller Salt Marsh Harvest Mouse to escape.

b) Burrowing Owls, Bald Eagles and Golden Eagles

i. A 656-yard buffer will be established around known burrowing owl locations where no rodenticides or fumigants (including smoke bombs) will be used.
ii. A 0.5-mile buffer will be established around known bald eagle and golden eagle nesting locations where no rodenticides will be used.

c) Special Status Amphibians
i. Fumigants will not be used within the potential range of sensitive amphibians (California red-legged frog, California Tiger Salamander and Foothill Yellow-legged Frog) as identified by District mapped range maps.
ii. Within the potential range of the California red-legged frog, California Tiger Salamander or Foothill Yellow-legged frog (as identified by District range maps or other information available to the wildlife biologist) will be limited to bait stations specifically designed to prevent entry by these species.

3. Carcass surveys will be conducted periodically when acute poisons and first generation anticoagulants are used. The frequency of the carcass surveys will be specific to the type of rodenticide used.

a. Acute Toxins – Carcass surveys will be performed daily beginning the first day after application above ground until the end of the baiting period.
b. Anticoagulants – Carcass surveys will begin within seven days after first-generation anticoagulants are made available. Anytime a carcass is found daily carcass surveys will begin for as long as carcasses are found until no carcasses are found during a daily survey. Once no carcasses are found, carcass surveys will return to the weekly carcass survey timeline maximum from the date of initial installation of an anticoagulant bait station.

4. To verify that the frequency of carcass surveys is adequate, a biologist will conduct daily carcass surveys 2 times per year over one baiting

cycle. Based on the results of these surveys, the timing of carcass surveys will be adjusted if necessary.

5. Any spilled bait will be cleaned up immediately and disposed of properly.

K. Applicable BMPs

Applicable BMPs will vary depending upon the specific work activity that is taking place. All BMPs are listed in Attachment F. These BMPs may be revised on an annual basis based on actual experience and site conditions.

ATTACHMENT A

Bank Stabilization Methods

Bank Stabilization Measures

#1: Earth Repair

Description:

Earth repair involves the replacement and repair of eroded channel banks using compacted soil. The eroded slope is scarified and readied for fill placement. A three-foot deep key is cut into the invert. Fill is placed and compacted 80% to 90% in 8-inch lifts. The new slope is trimmed to a 2:1 slope. The surface is seeded with fast sprouting grass species like rye. Geotextile/erosion control fabric is placed over hydroseeding to secure newly compacted bank.

The fill material needs to be appropriate to this purpose. There should be no deleterious or organic material or other debris contained in the fill. The Atterberg Plasticity Index of the material should be between 15 and 25, with the Liquid Limit no higher than 40. The material must contain at least 20% clay (by weight) passing U.S. standard sieve number 200.

Design Criteria:

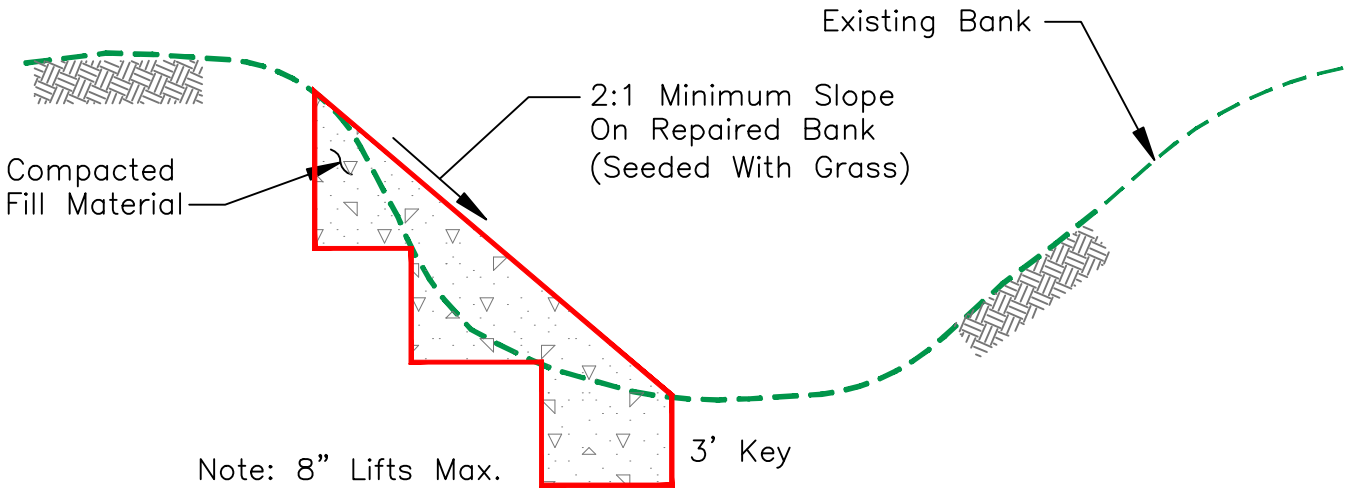
Appropriate on bank slopes of 2:1 or flatter.

Appropriate for local stream velocities of 6 feet per second or less.

Habitat Impact Assessment:

In-stream: Provides limited biotic resources
Stream-side: Provides limited biotic resources

Bank Stabilization Measures
#1: Earth Repair



SECTION

Bank Stabilization Measures

#1A: Earth Repair with Buried Rock

Description:

Earth repair with buried rock protects against erosion scour and stabilizes excavated or steep channel embankments. The buried rock (rock buttress) contributes to slope stability and prevents embankment failure (e.g., slumps, slides, sags). The rock structure will guard against bank scour, loss of adjacent property, protect infrastructure, and arrest future erosion, thereby reducing the loss of riparian vegetation during high flow events. The rock buttress is buried and compacted earth is placed over the top to provide an area for plants and stream side restoration.

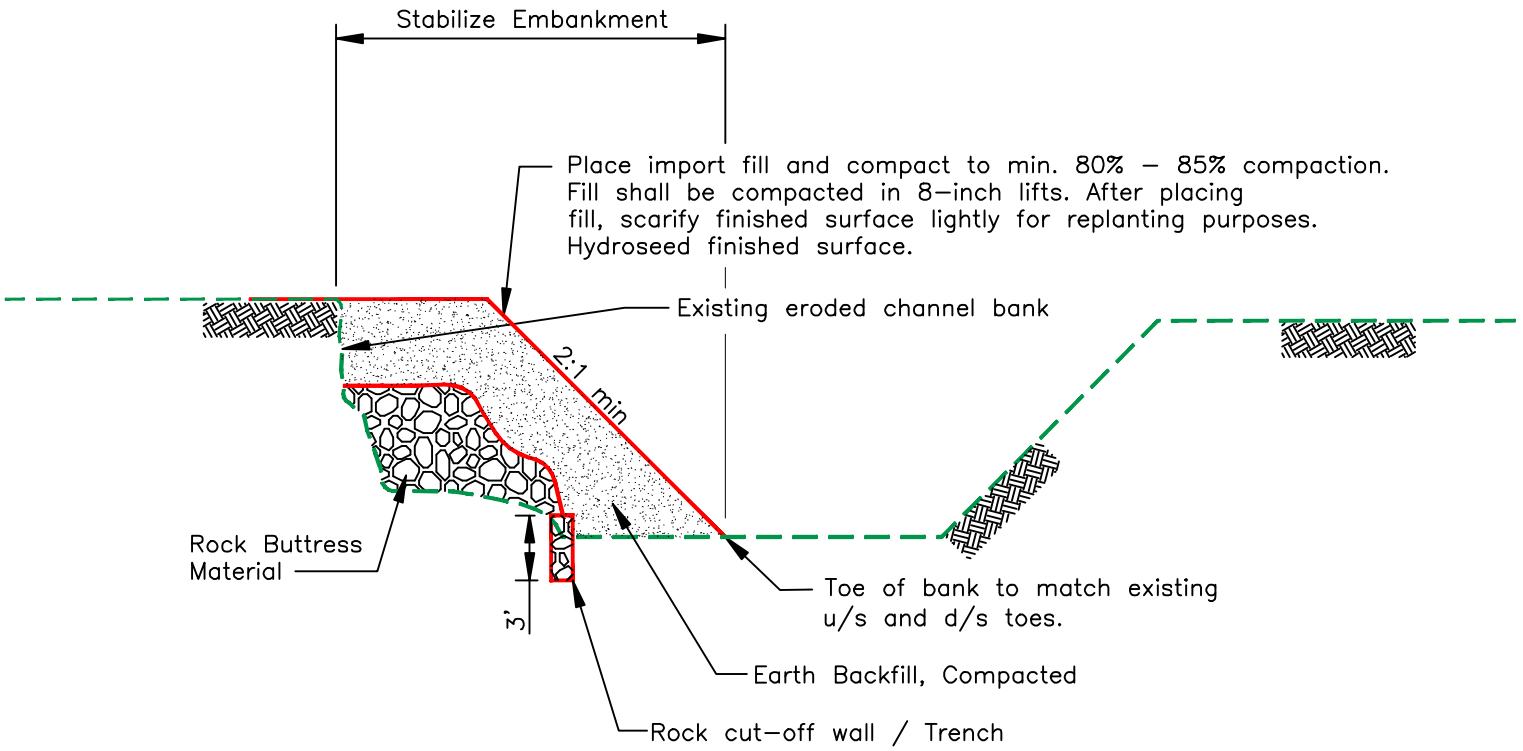
Since the rock is permanently buried, mitigation is not required. Any understory or trees planted within the footprint of the embankment repair will be counted as a credit for the SMP program. Depending upon the local creek ecology, hydrology, and channel capacity, plants utilized in the restoration area may consist of a mix of ground cover, understory, and/or trees.

The buried rock typically requires a cutoff wall to prevent undermining. The cutoff wall is an excavated trench with revetment, rock, or boulders placed inside. The rock buttress is composed of rock revetment or boulders placed and stacked in such a manner as to construct a gravity retaining wall. The buttress height is limited and may be installed on cut benches in the embankment for purposes of stability. Earth is placed in successive lifts adjacent to the toe of the rock buttress and over the tops of the boulders. Once the earth has been placed, the overbuilt embankment is cut and trimmed back to match the upstream and downstream channel side slopes and toes.

Habitat Impact Assessment:

In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

Bank Stabilization Measures
#1A: Earth Repair with Buried Rock



Bank Stabilization Measures

#2: Live Construction

Description:

Live construction consists of traditional methods of grading stable slopes and planting live grasses and other plants to control erosion. Vegetation planting methods commonly used include cuttings, transplants, live staking, and direct seeding (including hydro-seeding). Plants are chosen on the basis of drought tolerance and erosion control effectiveness. Biodegradable erosion control materials could be used where necessary in conjunction with live construction to assist in plant establishment.

Excellent revegetation potential. Most successful in streambanks where moderate erosion and channel migration are anticipated. Bank slope, eroding velocity, and reinforcement at the toe of the bank are limiting factors. Enhances conditions for colonization of native species. Streambank soil materials, probable groundwater fluctuation, and bank loading conditions are factors for determining appropriate design.

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter.

Appropriate for local stream velocities of 6 feet per second or less.

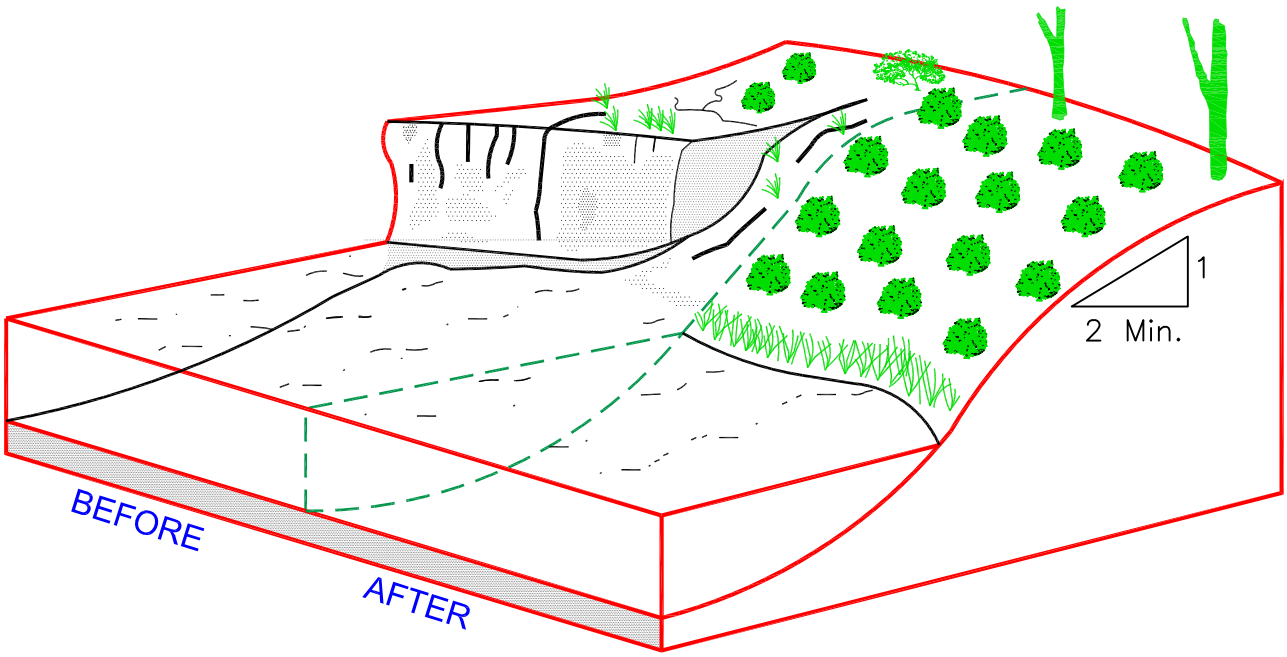
Soil moisture conditions and availability of water year-around determines appropriate vegetation species.

Habitat Impact Assessment:

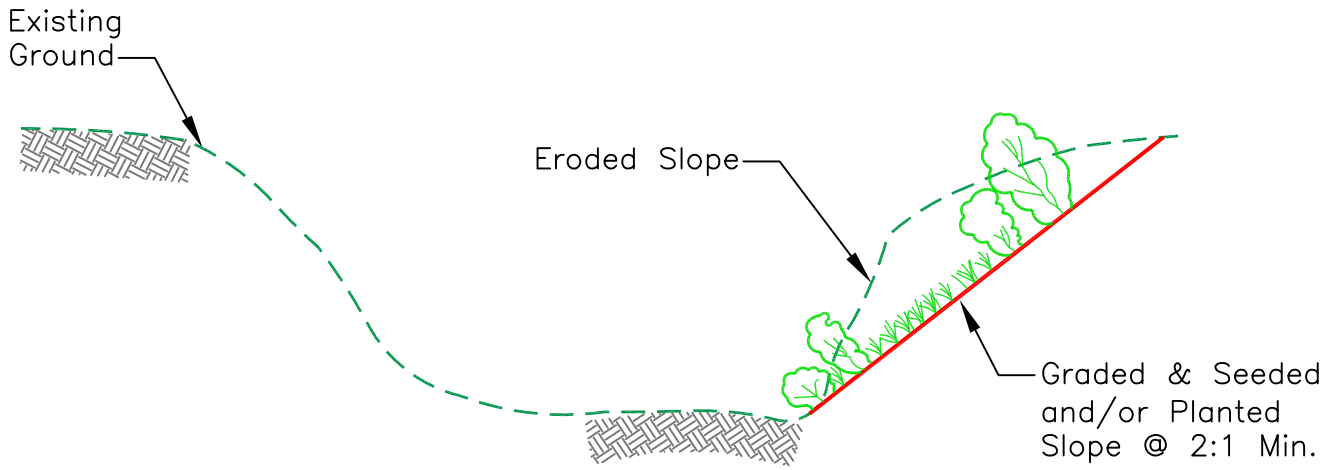
In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

Source: Adapted from Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices

Bank Stabilization Measures
#2: Live Construction



Source: Adapted from Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices



SECTION

Bank Stabilization Measures

#2A: Live Construction with Boulder Toe

Description:

Live construction consists of traditional methods of grading a flatter slope and planting live grasses and other plants to control erosion. Vegetation planting methods commonly used include cuttings, transplants, live staking, and direct seeding (including hydro-seeding). Plants are chosen on the basis of drought tolerance and erosion control effectiveness. Biodegradable erosion control materials are used where necessary in conjunction with live construction to assist in plant establishment.

Appropriately-sized boulders are placed at the toe of the rebuilt bank up to the ordinary high water elevation. Voids in between the boulders can be planted using live stakes.

Excellent revegetation potential. Enhances conditions for colonization of native species. Streambank soil materials, probable groundwater fluctuation, and bank loading conditions are factors for determining appropriate design.

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter for live construction section. 1.5:1 or flatter for boulder section.

Boulders must be keyed in (minimum 3 feet deep) at the toe of bank.

Appropriate for local stream velocities of 6 feet per second or less.

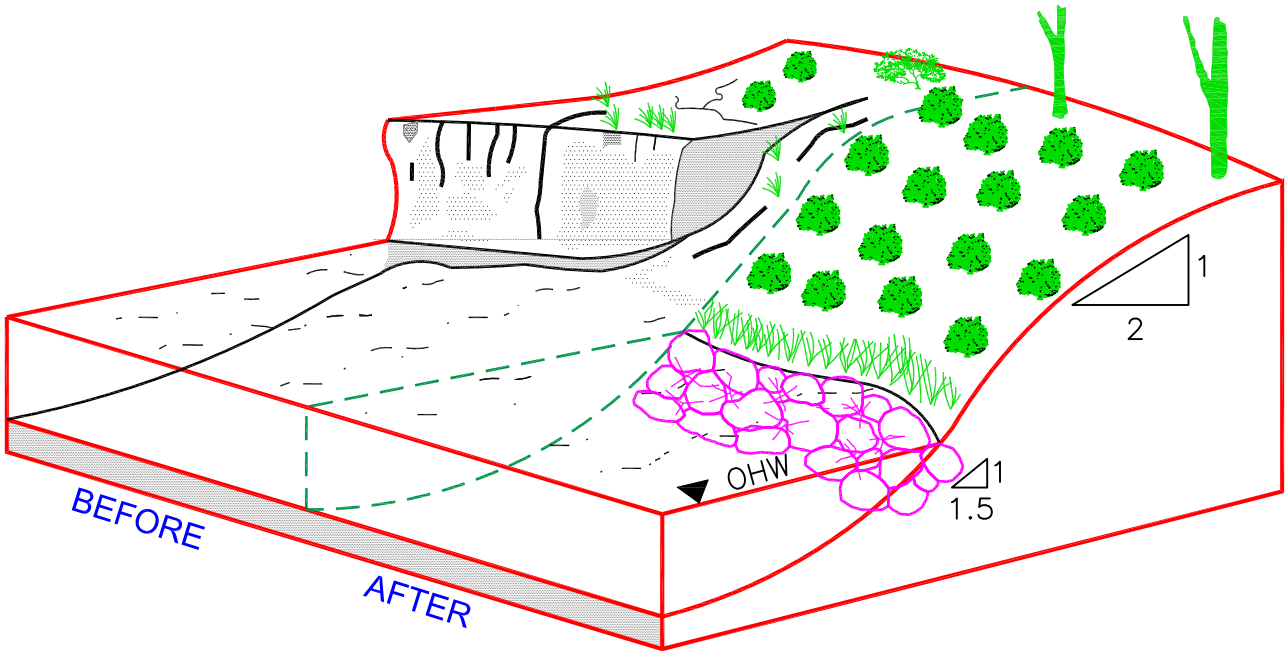
Soil moisture conditions and availability of water year-around determines appropriate vegetation species.

Habitat Impact Assessment:

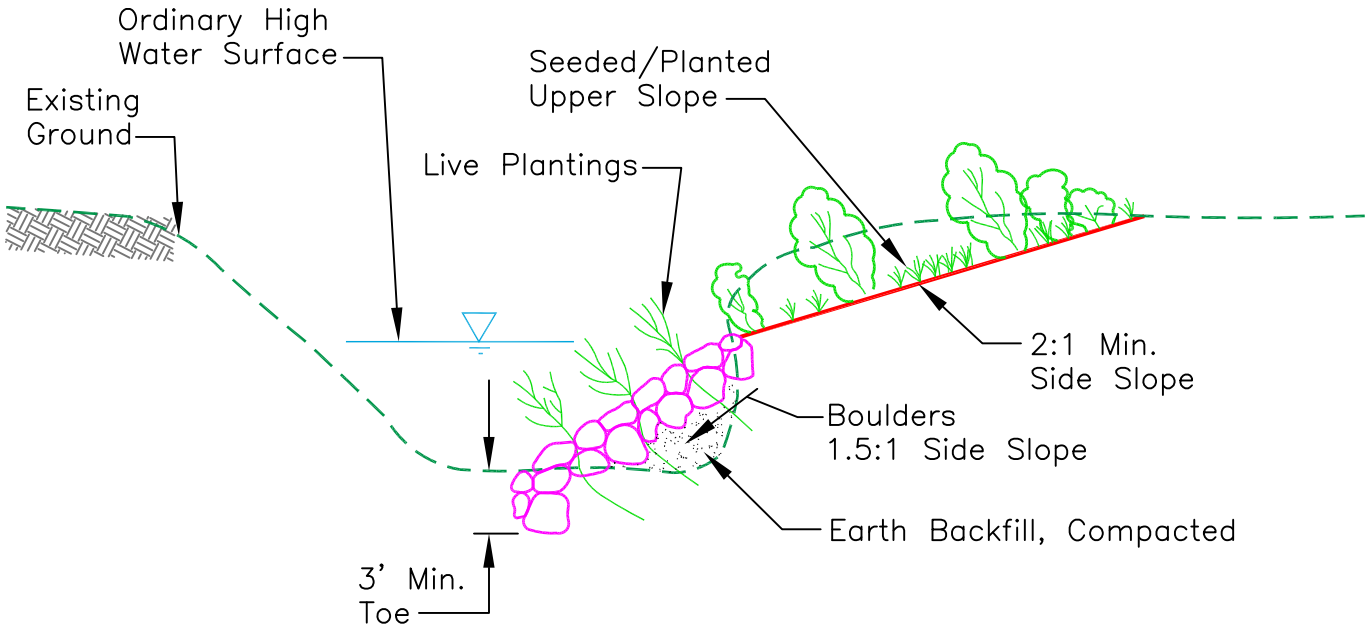
In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

Source: Adapted from Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices

Bank Stabilization Measures
#2A: Live Construction with Boulder Toe



Source: Adapted from Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices



SECTION

Bank Stabilization Measures

#2B: Live Construction with Log Toe

Description:

Live construction consists of traditional methods of grading a flatter slope and planting live grasses and other plants to control erosion. Vegetation planting methods commonly used include cuttings, transplants, live staking, and direct seeding (including hydro-seeding). Plants are chosen on the basis of ecological suitability and erosion control effectiveness. Biodegradable erosion control materials are used where necessary in conjunction with live construction to assist in plant establishment[1].

Logs are anchored to the bed and/or native bank up to ordinary high water elevation. Determine scour depth, log size (typically between 6 inches to 24 inches in diameter), and anchor system based on specific site conditions. Where applicable and/or available, rootwads may also be used.

This repair method is used to protect the toe line from erosion. It is especially useful for long straight channel reaches. The logs provide immediate protection from erosion while live branch cuttings contribute long-term durability and ultimately replace the decaying logs[2].

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter for live construction section. 1.5:1 or flatter for log toe section.

Install log toe with anchors. Moisture conditions and availability of water year-round determines appropriate vegetation species.

Appropriate for local stream velocities of 15 feet per second or less.

Habitat Impact Assessment:

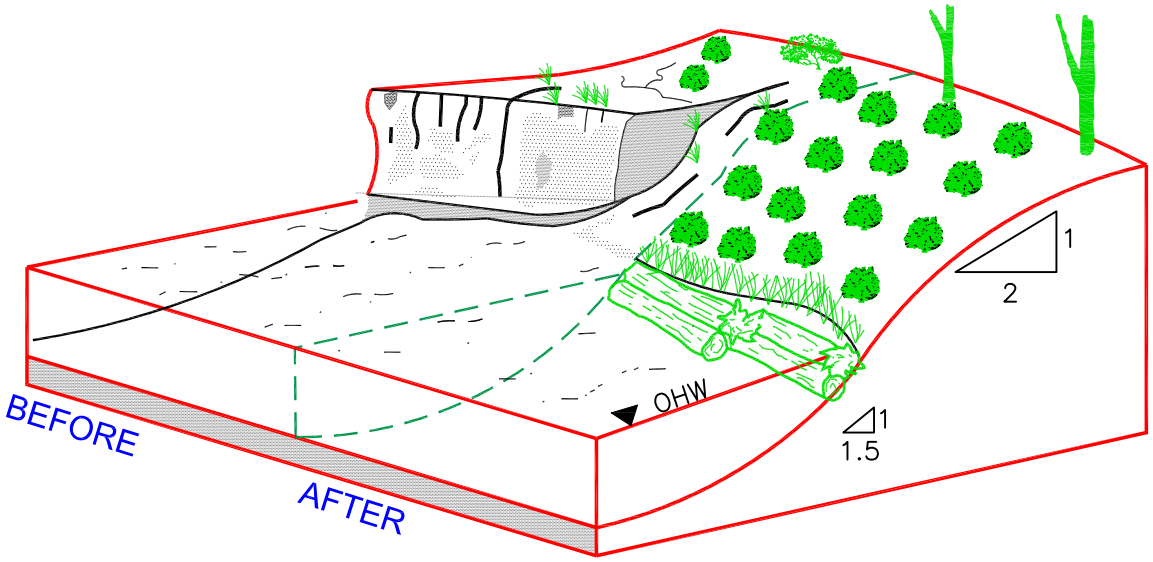
In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

[1]Source: Adapted from Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices

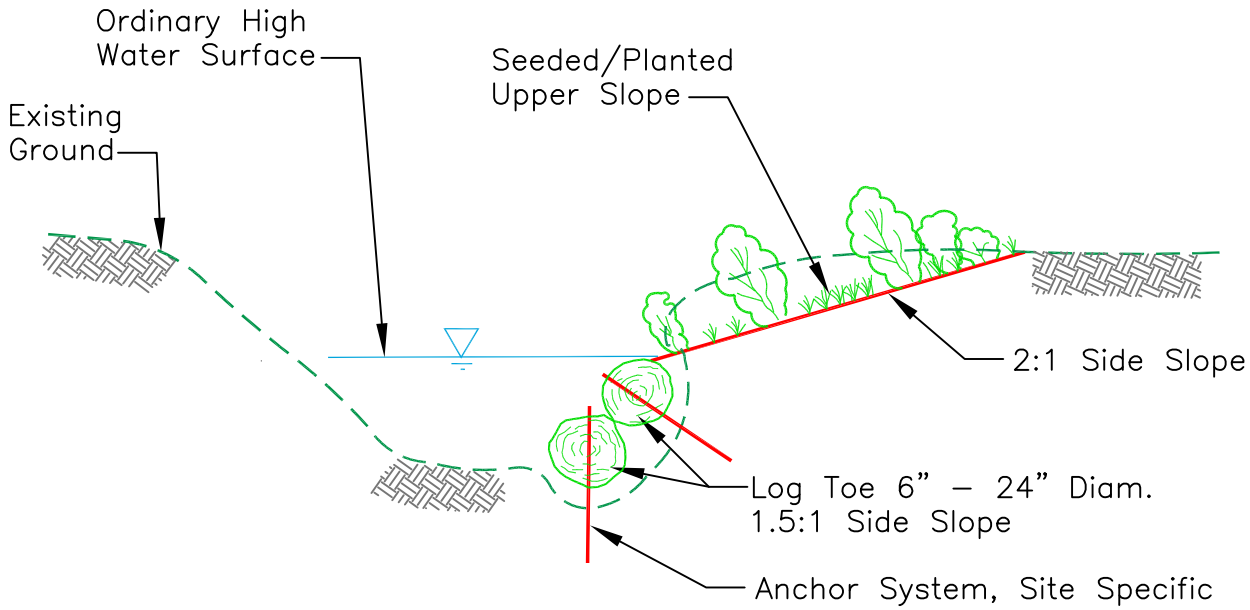
[2]Source: Santa Clara Valley Water District, “Design Manual Open Channel Hydraulics and Sediment Transport”. July 2009

Bank Stabilization Measures

#2B: Live Construction with Log Toe



Source: Adapted from Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices



SECTION

Source: Adapted from Santa Clara Valley Water District; "Design Manual Open Channel Hydraulics and Sediment Transport", July 2009

Bank Stabilization Measures

#3: Contour Wattling

Description:

This method consists of tying long bundles of plant stems (typically willows or cottonwoods) together with twine and anchoring them in shallow trenches with wooden stakes. When the stems develop root systems and mature, the plants establish structural soil stabilization properties. This technique is generally used to manage surface erosion.

Excellent revegetation potential. The long bundles trap and hold soil on banks by creating small, dam-like structures, effectively cutting the slope length into a series of shorter slope lengths. This method enhances the conditions for colonization of native species and should, where appropriate, be used with other soil bioengineering systems and live plantings. Reinforcement at the toe or bank may be a limiting factor (see bank stabilization measures 3A and 3B). Not appropriate for treatment of slopes actively undergoing mass earth movement[1].

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter.

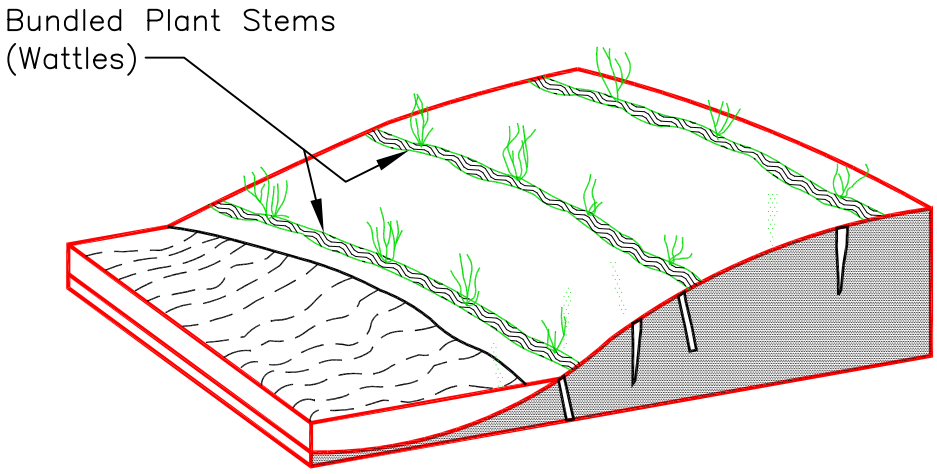
Appropriate for local stream velocities of 6 feet per second or less.

Habitat Impact Assessment:

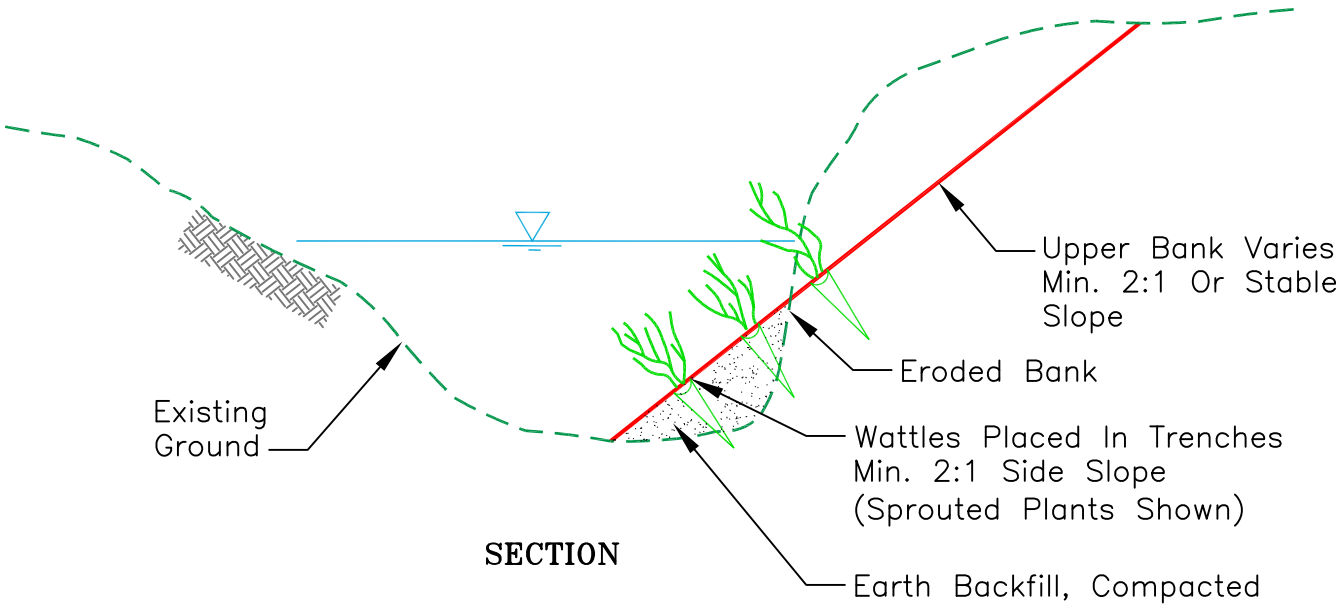
In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

[1]Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices

Bank Stabilization Measures
#3: Contour Wattling



Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices



SECTION

Bank Stabilization Measures

#3A: Contour Wattling with Boulder Toe

Description:

This method consists of tying long bundles of plant stems together with twine and anchoring them in shallow trenches with wooden stakes. When the stems develop root-systems and mature, the plants establish structural soil stabilization properties.

Appropriately-sized boulders are placed at the toe of the rebuilt bank up to the ordinary high water elevation. Voids in between the boulders can be planted using live stakes.

Excellent revegetation potential. The long bundles trap and hold soil on banks by creating small, dam-like structures, effectively cutting the slope length into a series of shorter slope lengths. This method enhances the conditions for colonization by native species and should, where appropriate, be used with other soil bioengineering systems and live plantings. Not appropriate for treatment of slopes actively undergoing mass earth movement[1].

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter for contour wattling section of slope, and slopes of 1:5 or flatter for boulder section.

Boulders must be keyed in (minimum 3-foot depth) at toe of bank.

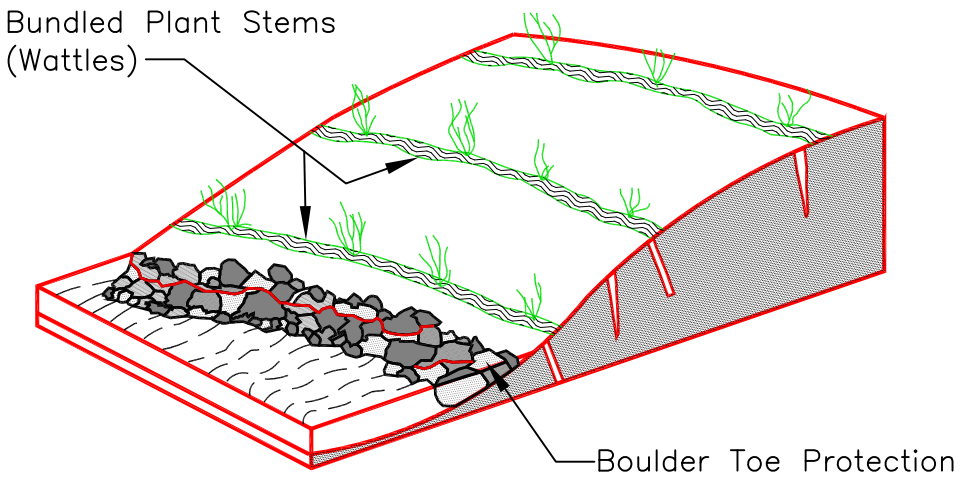
Appropriate for local stream velocities of 6 feet per second or less.

Habitat Impact Assessment:

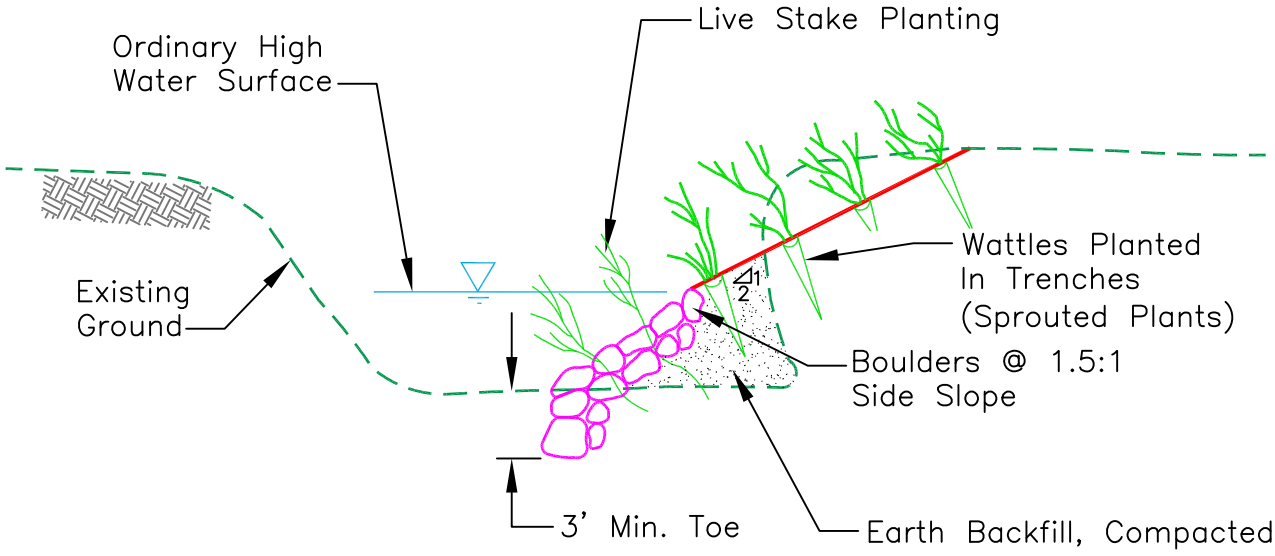
In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

[1]Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices

Bank Stabilization Measures
#3A: Contour Wattling with Boulder Toe



Source: Adapted from Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices



SECTION

Bank Stabilization Measures

#3B: Contour Wattling with Log Toe

Description:

Contour wattling consists of tying bundles of plant stems together with twine and anchoring them in shallow trenches with wooden stakes. When the stems develop root systems and mature, the plants establish structural soil stabilization properties.

Logs are anchored to the bed and/or native bank up to ordinary high water elevation. Determine scour depth, log size (typically between 6 inches to 24 inches in diameter), and anchor system based on specific site conditions. Where applicable and/or available, rootwads may also be used.

This repair method is used to protect the toe line from erosion as well as manage surface erosion. It is especially useful for long straight channel reaches. The logs provide immediate protection from erosion while contour wattlings contribute to long-term durability and ultimately replace the decaying logs.

Excellent revegetation potential. The long bundles trap and hold soil on banks by creating small, dam-like structures, effectively cutting the slope length into a series of shorter slope lengths. This method enhances the conditions for colonization by native species and should, where appropriate, be used with other soil bioengineering systems and live plantings. Not appropriate for treatment of slopes actively undergoing mass earth movement[1].

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter for contour wattling section of slope, and slopes of 1.5:1 or flatter for log toe section.

Install log toe with anchors. Moisture conditions and availability of water year-round determines appropriate vegetation species.

Appropriate for local stream velocities of 15 feet per second or less.

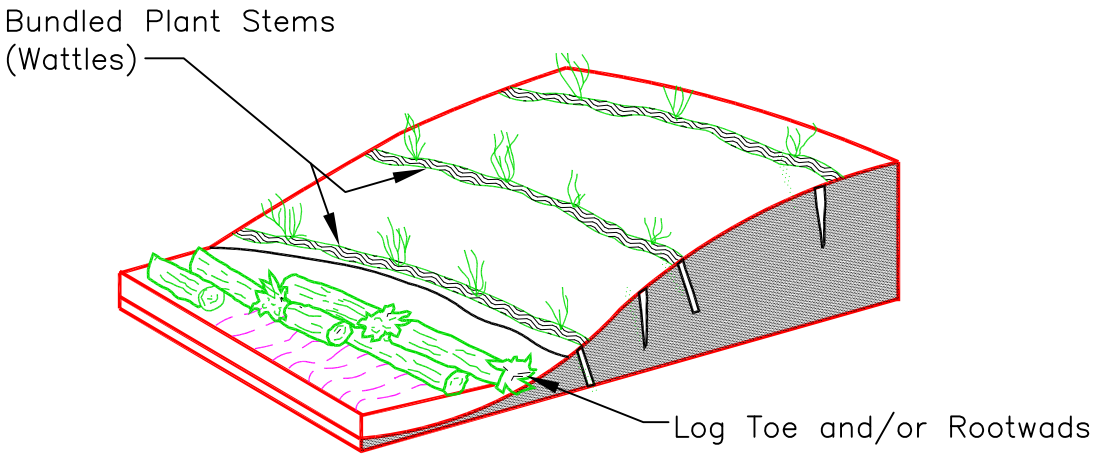
Habitat Impact Assessment:

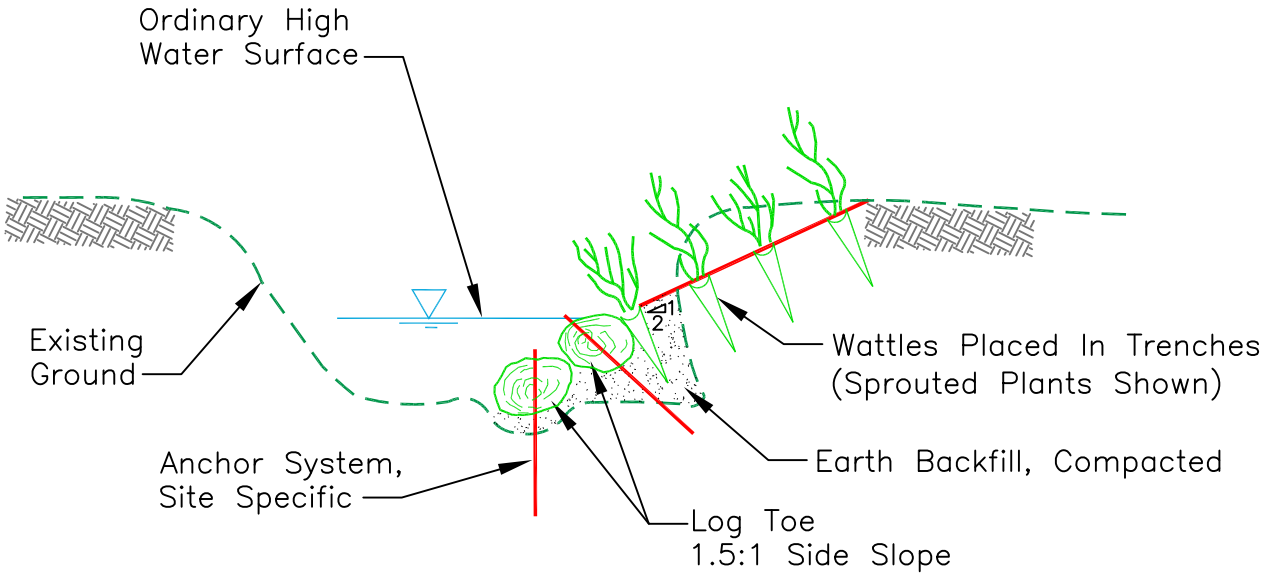
In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

[1]Source: Adapted from Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices

Bank Stabilization Measures

#3B: Contour Wattling with Log Toe





SECTION

Source: Adapted from Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices

Bank Stabilization Measures

#4: Brush Mattress (Brush Layering)

Description:

The eroded slope is graded and smoothed to ensure all willows are in contact with soil. A minimum 2-foot deep trench is dug at the toe of the bank for the butt ends of the willow branches. Wood, steel, or live willow stakes are partially driven in rows on three-foot centers in the area that will be covered by the mattress. After the stakes have been placed, live willow branches are put on the bank with their butt ends in the trench. Straight branches no shorter than 4 feet in length and ½-inch to 1-inchin diameter are used. If the branches are not long enough to reach the upper end of the mattress, several layers may be used; however, it is necessary to "shingle" the layers by lapping each new layer over the one below by at least 18 inches. Once the bank is covered by a thick layer of willows, cross branches are placed horizontally over the bottom layer. These branches are placed against the stakes and then tied to the stakes using wire or string. The stakes are then driven into the bank a minimum of two feet or deeper, if possible. After the completion of the mattress, the toe trench is filled with appropriately sized boulders and rocks to anchor the butt ends of the branches. The entire mattress is then covered by earth or fine stream material[1].

This method forms an immediate protective cover over the stream bank, captures sediment during flood flows, and rapidly restores riparian vegetation and streamside habitat. This measure is not appropriate where toe scour is anticipated (see bank stabilization methods 4A and 4B). This method should not be used on slopes that are experiencing ongoing mass movement or other slope instability[2].

Design Criteria

Appropriate on bank slopes of 2:1 or flatter.

Appropriate for local stream velocities of 6 feet per second or less.

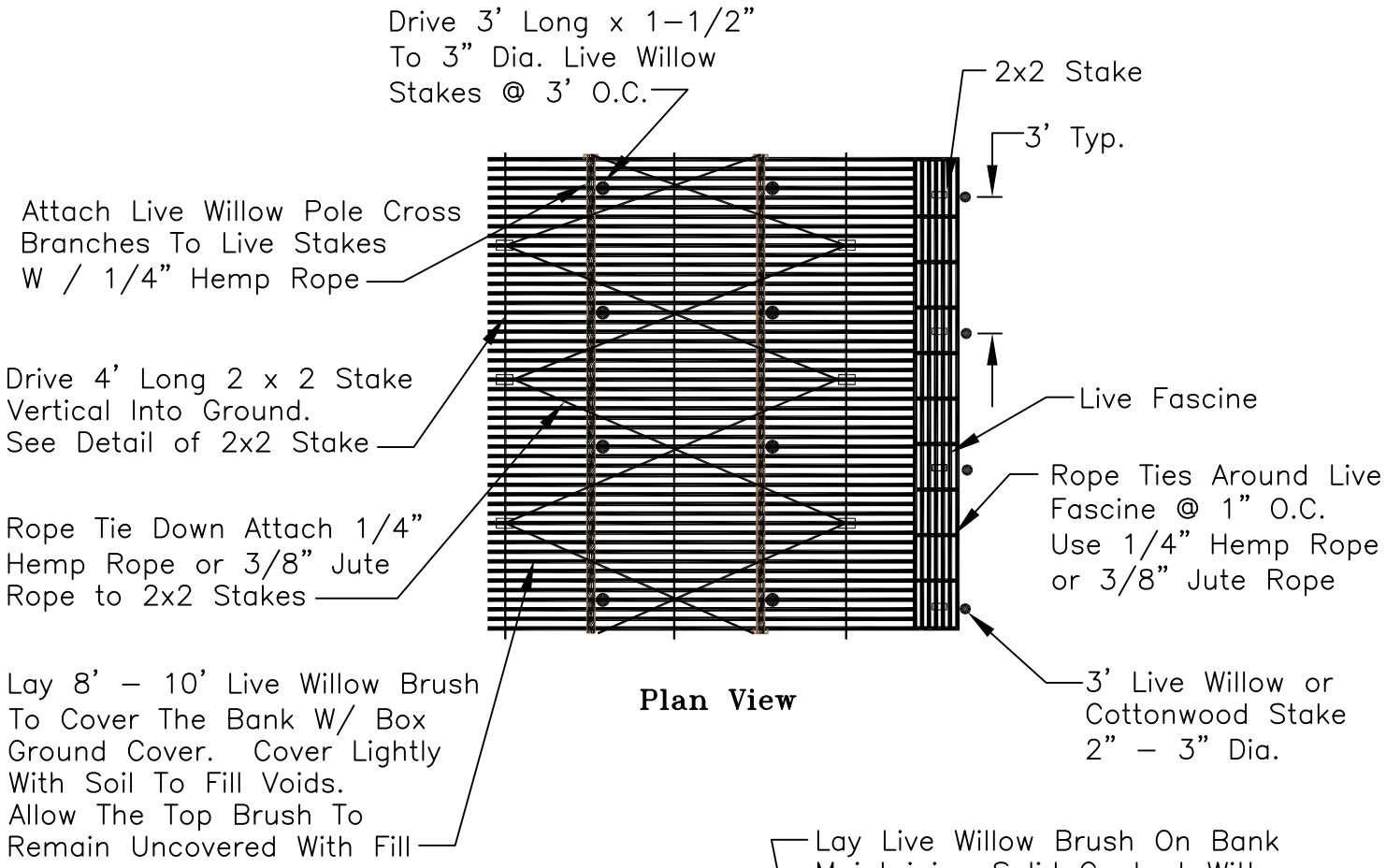
Habitat Impact Assessment:

In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

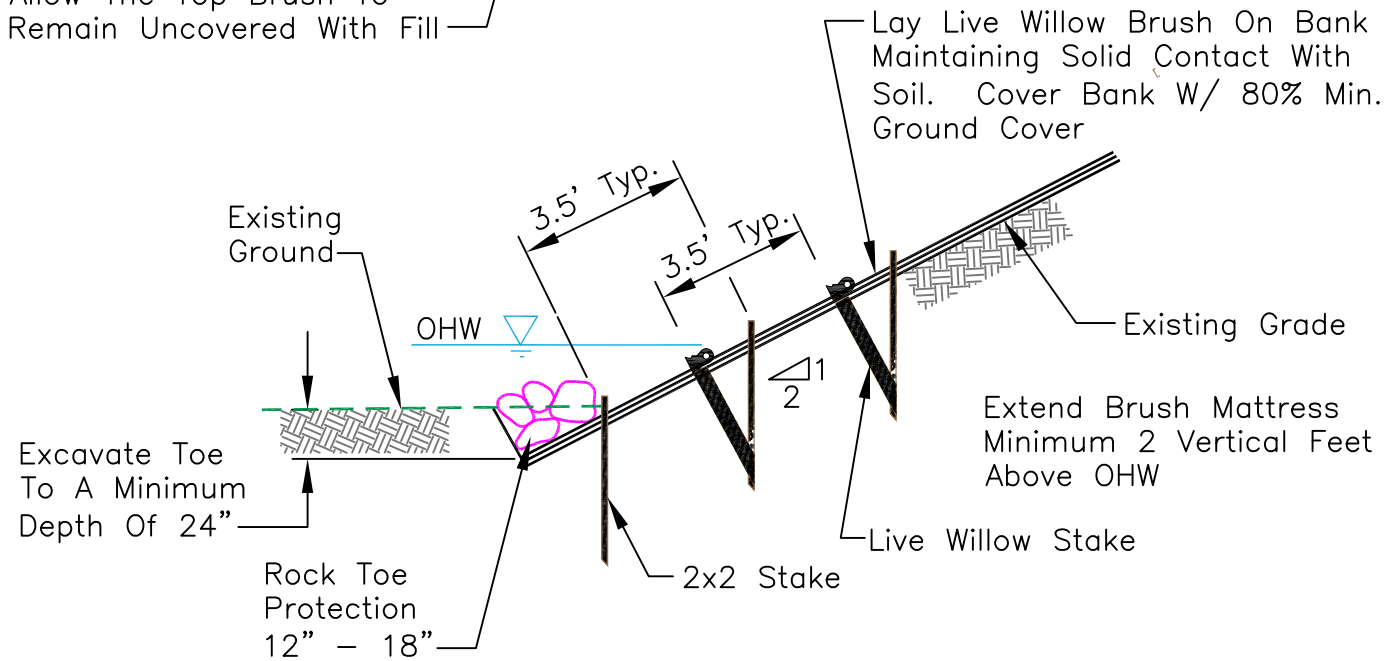
[1]Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

[2]Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices

Bank Stabilization Measures
#4: Brush Mattress (Brush Layering)



Plan View



Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices

SECTION

Bank Stabilization Measures

#4A: Brush Mattress (Brush Layering) with Boulder Toe

Description:

The lower portion of the eroded slope (below ordinary high water, OHW) is graded at a maximum of 1.5:1 slope. The upper portion of the slope is graded at a minimum slope of 2:1 and smoothed to ensure all plantings are in contact with soil. Appropriately-sized boulders are placed at the toe of the rebuilt bank up to the ordinary high water elevation. Voids between the boulders can be planted using live stakes.

A minimum 2-foot deep trench is dug at the top of the boulder line for the butt ends of the branches. Wood, steel, or live stakes are partially driven in rows on three foot centers in the area that will be covered by the mattress. After the stakes have been placed, live branches are put on the bank with their butt ends in the trench. Straight branches no shorter than 4 feet in length and ½-inch to 1-inch in diameter are used. If the branches are not long enough to reach the upper end of the mattress, several layers may be used; however, it is necessary to "shingle" the layers by lapping each new layer over the one below by at least 18 inches. Once the bank is covered by a thick layer of willows, cross branches are placed horizontally over the bottom layer. These branches are placed against the stakes and then tied to the stakes using wire or string. The stakes are then driven into the bank a minimum of two feet or deeper, if possible. After the completion of the mattress, the toe trench is back filled with boulders and rocks to anchor the butt ends of the branches. The entire mattress is then covered by earth or fine stream material[1].

This method forms an immediate protective cover over the stream bank, captures sediment during flood flows, and rapidly restores riparian vegetation and streamside habitat. This method should not be used on slopes that are experiencing ongoing mass movement or other slope instability[2].

Design Criteria

Appropriate on bank slopes of 2:1 or flatter for brush mattress section of slope. 1.5:1 or flatter for the boulder section.

Boulders must be keyed in (minimum 3-foot depth) at toe of bank.

Appropriate for local stream velocities of 6 feet per second or less.

Habitat Impact Assessment:

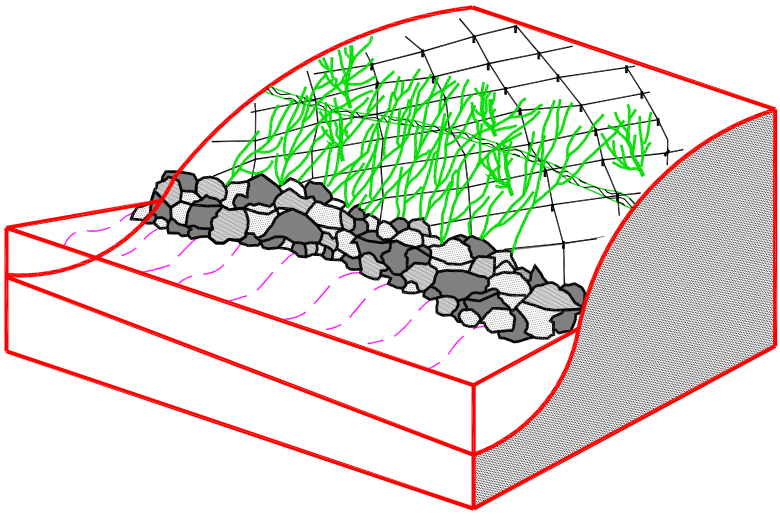
In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

[1]Source: Adapted from California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

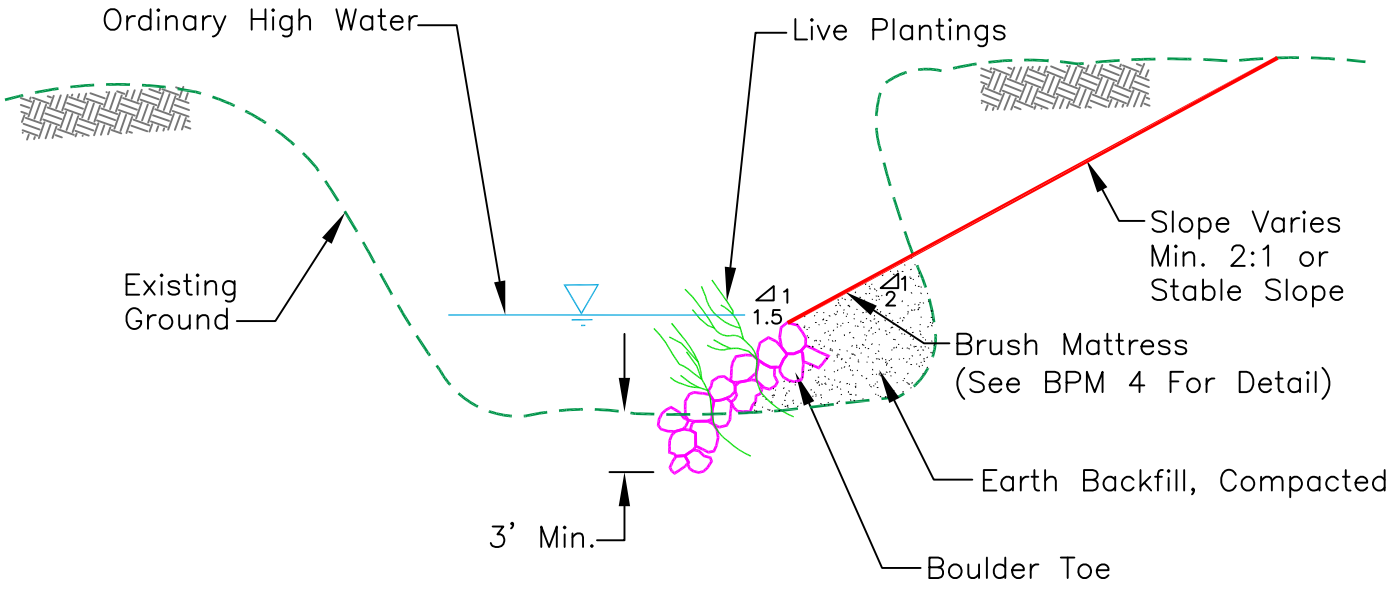
[2]Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices

Bank Stabilization Measures

#4A: Brush Mattress (Brush Layering) with Boulder Toe



Source: Adapted from Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices



SECTION

Bank Stabilization Measures

#4B: Brush Mattress (Brush Layering) with Log Toe

Description:

Brush mattress with log toe consists of grading the upper and lower portions of the eroded slope (below and above ordinary high water, OHW) at a minimum of 2:1 and maximum of 1.5:1 slopes respectively, and smoothed to ensure all willows are in contact with soil. Logs are placed at the toe of the native bank up to the OHW[1]. Where applicable and or available, rootwads may be used in combination with logs.

A maximum 2-foot deep trench is dug at the top of the log toe for the butt ends of the willow branches. Wood, steel, or live willow stakes are partially driven in rows on three-foot centers in the area that will be covered by the mattress. After the stakes have been placed, live branches are put on the bank with their butt ends in the trench. Straight branches no shorter than 4 feet in length and ½-inch to 2-inch in diameter are used. If the branches are not long enough to reach the upper end of the mattress, several layers may be used; however, it is necessary to "shingle" the layers by lapping each new layer over the one below by at least 18 inches. Once the bank is covered by a thick layer of willows, cross branches are placed horizontally over the bottom layer. Stakes are then driven into the bank as deep as possible. These branches are placed against the stakes and then tied to the stakes using biodegradable wire or string. After the completion of the mattress, the toe trench is back filled with logs to anchor the butt ends of the branches. The entire mattress is then covered by earth or fine stream material[1].

This method forms an immediate protective cover over the stream bank, captures sediment during flood flows, and rapidly restores riparian vegetation and streamside habitat. This method should not be used on slopes that are experiencing ongoing mass movement or other slope instability[2].

Design Criteria

Appropriate on bank slopes of 2:1 or flatter for brush mattress section of slope. 1.5:1 or flatter for the log toe section.

Install log toe with anchors. Moisture conditions and availability of water year-round determines appropriate vegetation species.

Appropriate for local stream velocities of 15 feet per second or less.

Habitat Impact Assessment:

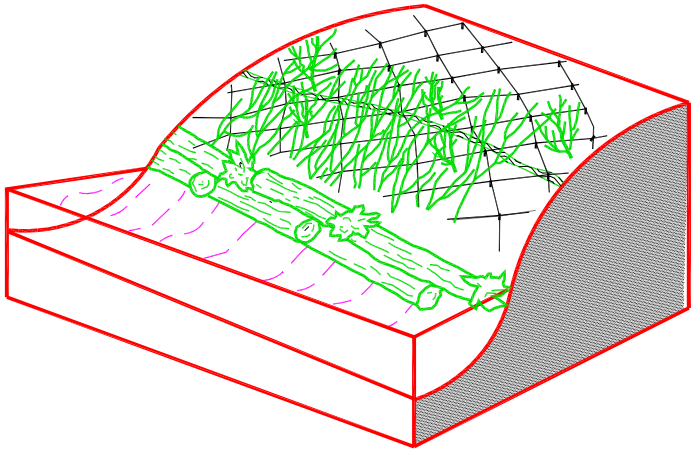
In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

[1]Source: Adapted from Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices

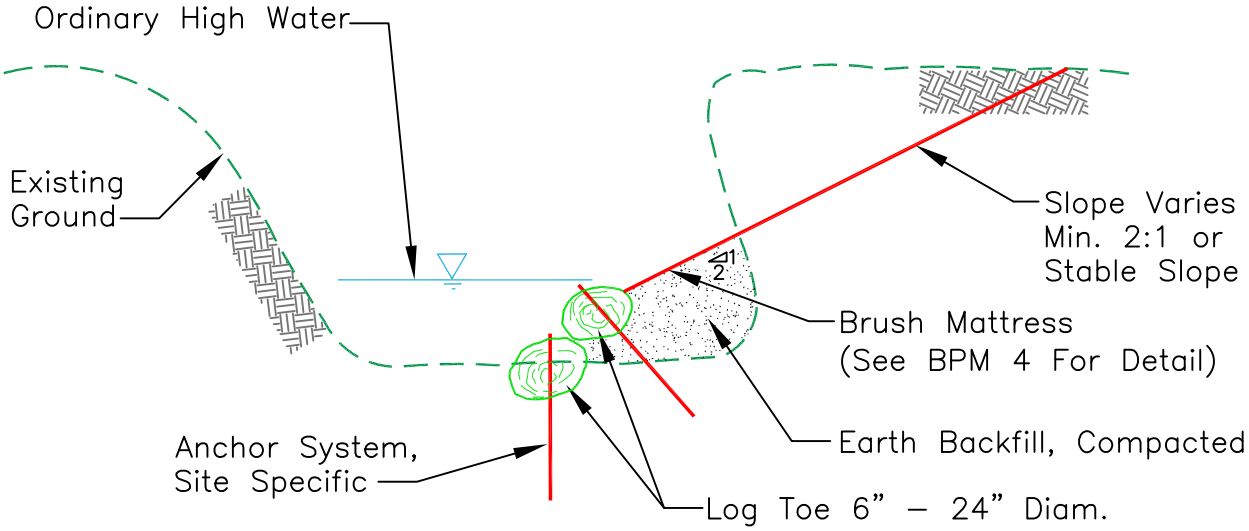
[2]Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Stabilization Measures

#4B: Brush Mattress (Brush Layering) with Log Toe



Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices



Source: Adapted from California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

SECTION

Bank Stabilization Measures

#5: Surface Matting (Erosion Mats)

Description:

This method consists of securing plastic, jute, or geotextile erosion control fabric to channel banks using stakes or staples. These materials provide soft armor protection against erosive forces and are combined with live staking and direct seeding. Abrasive sediment, debris, foot traffic, and sunlight will wear, snag, and tear these fabrics with time, potentially undermining the structure. These methods are intended to be the skeleton of a vegetated erosion control system. The establishment of vegetation is crucial to the long-term success of erosion mats.

Work best in small, uniform, improved channels with mild bank slopes. This method has good revegetation potential. Toe protection is required where toe scour is anticipated (see bank stabilization measures 5A and 5B).

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter.

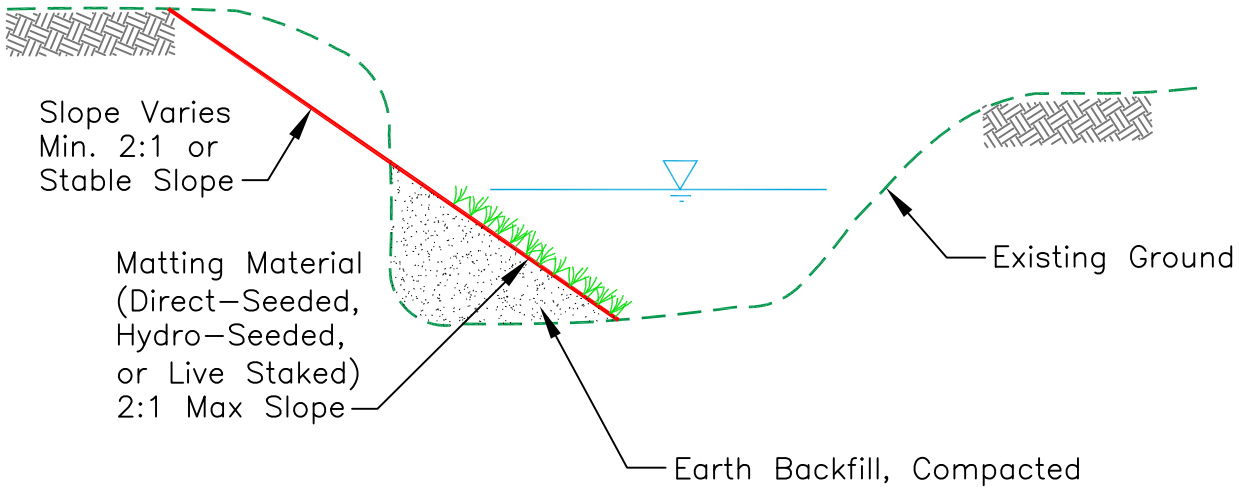
Typically appropriate for local stream velocities of 12 feet per second or less depending on the type of erosion mat and revegetation method selected.

Habitat Impact Assessment:

In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

Bank Stabilization Measures

#5: Surface Matting (Erosion Mats)



SECTION

Bank Stabilization Measures

#5A: Surface Matting (Erosion Mats) with Boulder Toe

The lower portion of the eroded slope (below ordinary high water, OHW) is graded at a maximum of 1.5:1 slope. The upper portion of the slope is graded at a minimum slope of 2:1 and smoothed to ensure erosion mat is in full contact with soil. Appropriately-sized boulders are placed at the toe of the rebuilt bank up to the ordinary high water elevation. Voids between the boulders can be planted using live stakes.

In the upper portion of the slope, plastic, jute, or geotextile erosion control fabric is attached to channel banks using staking or staples. These materials provide soft armor protection against erosive forces and are combined with live staking and direct seeding. Debris, foot traffic, and sunlight will wear, snag, and tear these fabrics with time. The boulder toe protection will prevent undermining of the structure. These methods are intended to be the skeleton of a vegetated erosion control system.

Work best in uniform improved channels with mild bank slopes. This method has good revegetation potential.

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter for erosion mat section of slope. 1.5:1 or flatter for the boulder section.

Boulders must be keyed in (minimum 3-foot depth) at toe of bank.

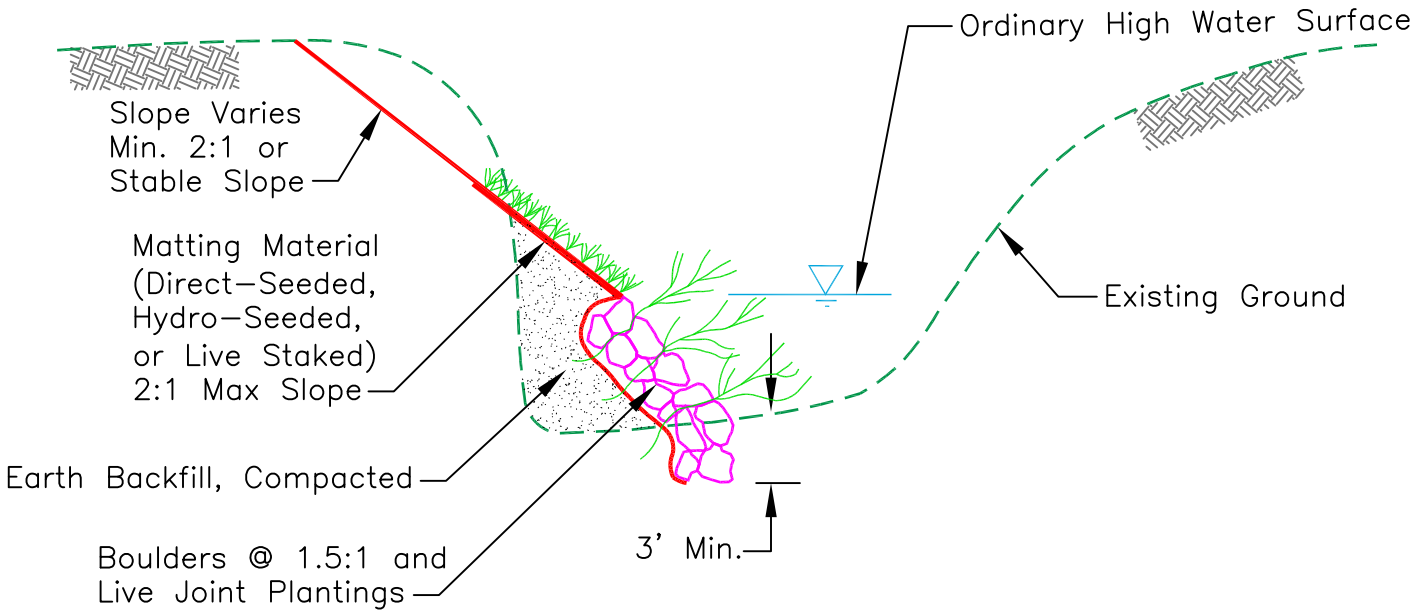
Appropriate for local stream velocities of 6 feet per second or less if boulders are planted with live stakes. 12 feet per second if boulders are not planted.

Habitat Impact Assessment:

In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

Bank Stabilization Measures

#5A: Surface Matting (Erosion Mats) with Boulder Toe



SECTION

Bank Stabilization Measures

#5B: Surface Matting (Erosion Mats) with Log Toe

Description:

Surface matting with log toe consists of grading the upper and lower portions of the eroded slope (below and above ordinary high water, OHW) at a minimum of 2:1 and maximum of 1.5:1 slopes respectively, and smoothed to ensure erosion mat is in full contact with soil. Logs are placed at the toe of the native bank up to the OHW. Where applicable and/or available, rootwads may be used.

In the upper portion of the slope, plastic, jute, or geotextile erosion control fabric is attached to channel banks using stakes, staples, or anchors. These materials provide soft armor protection against erosive forces and are combined with live staking and/or direct seeding. Debris, foot traffic, and sunlight may wear, snag, and tear these fabrics with time. The log toe protection will prevent undermining of the structure. These methods are intended to be the skeleton of a vegetated erosion control system.

This repair type works best in uniform improved channels with mild bank slopes and has good revegetation potential.

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter for erosion mat section of slope. 1.5:1 or flatter for the boulder section.

Install log toe with anchors. Moisture conditions and availability of water year-round determines appropriate vegetation species.

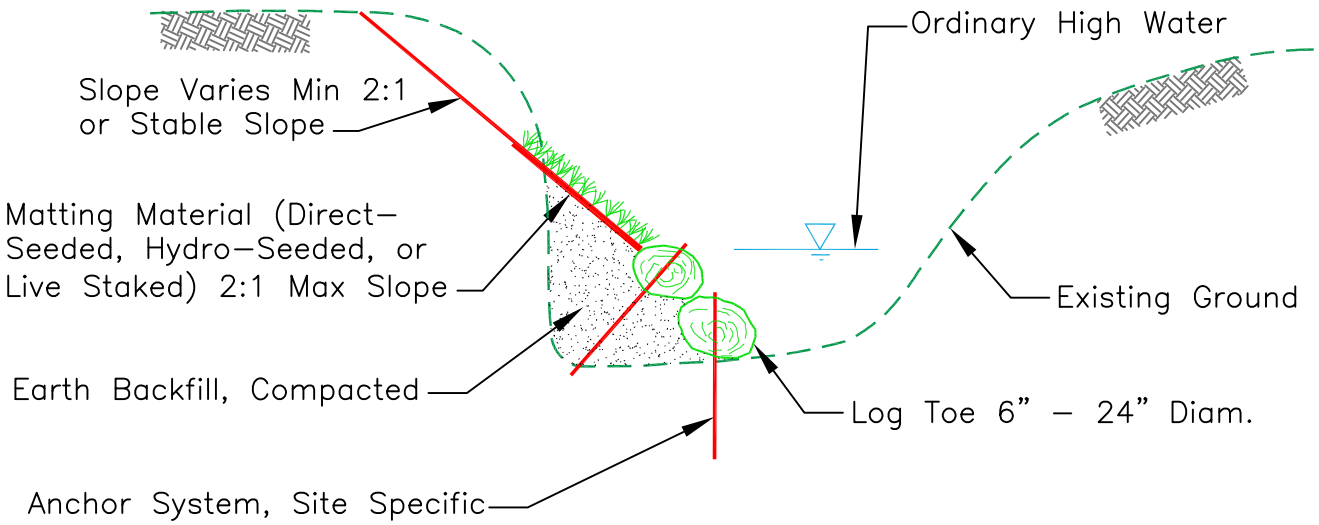
Appropriate for local stream velocities of 15 feet per second or less.

Habitat Impact Assessment:

In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

Bank Stabilization Measures

#5B: Surface Matting (Erosion Mats) with Log Toe



SECTION

Bank Stabilization Measures

#6: Add Rock to Invert

Description:

This is a technique most commonly used to armor a channel invert susceptible to incision or scour downstream of various control structures such as bridges or concrete channels. Rock channel bottoms can also be valuable in terms or reoxygenation of water in the creek. This installation method can also retard stream turbidity in many cases[1].

Rocks are placed in scour holes or along the invert for the appropriate length depending on the length and depth of repair needed. This can include scour holes just downstream of a drop structure that needs armoring, or an entire reach of channel can be armored with well-graded, angular rock to stop incision. If lining a long length of channel, rocks can be formed into a concave shape and a key can be constructed every few hundred feet to stabilize the lining.

Design Criteria:

Appropriate for incised channels or scour holes downstream of a concrete portion of creek.

Habitat Impact Assessment:

In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

[1]Source: Santa Clara Valley Water District, Design Manual, Open Channel Hydraulics and Sediment Transport, June 2009

Bank Stabilization Measures

#6: Add Rock to Invert

(No drawing included for this bank stabilization measure;
please refer to narrative for more information)

Bank Stabilization Measures

#6A: Rock Cross Vanes

Description:

The cross-vane is a grade control structure that decreases near-bank shear stress, velocity and stream power, but increases the energy in the center of the channel. The structure will establish grade control, reduce bank erosion, create a stable width/depth ratio, and maintain channel capacity, while maintaining sediment transport capacity and sediment competence. The cross-vane is also a stream habitat improvement structure.

The cross-vane is typically composed of a row of header rocks and a row of footer rocks. The header rocks can be installed with half of its size embedded below the final grade. The footer rocks are installed downstream of and at a lower elevation than the header rocks to provide support. The top of the footer rocks are positioned at the final grade[2].

With the channel boundary opening up at the floodplain level, the vane may be properly keyed into the side slopes, an advantage not easily afforded by incised channels[2]. Each leg of the vane typically makes an angle of 20-30 degrees with the bank[1].

Design Criteria:

Appropriate in “B” and “F” type channels, according to Rosgen’s stream classification system.

Habitat Impact Assessment:

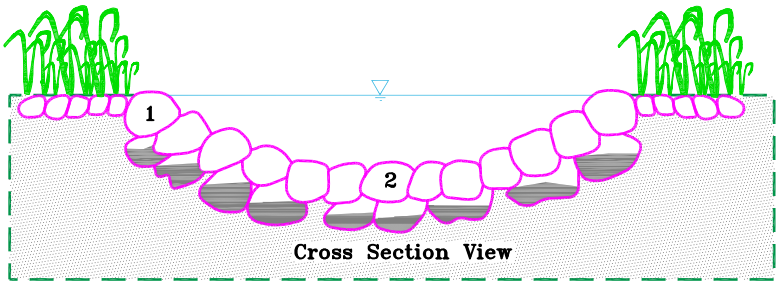
In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

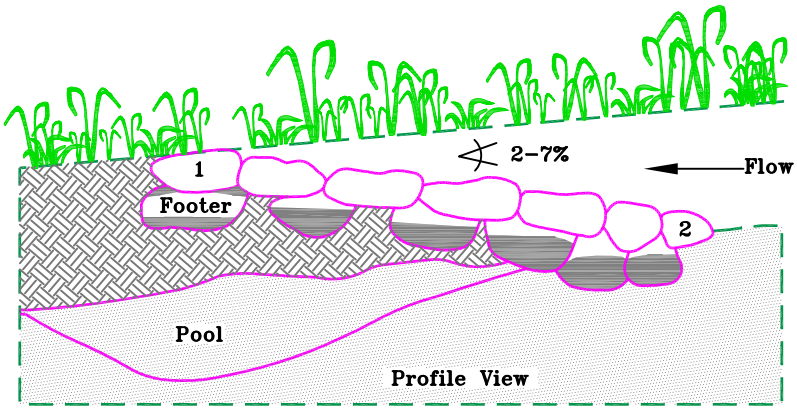
[1]Source: Wildland Hydrology, Inc.; Rosgen, David L.P.H.; “The Cross-Vane, W-Weir and J-Hook Vane Structures…Their Description, Design and Application for Stream Stabilization and River Restoration”.

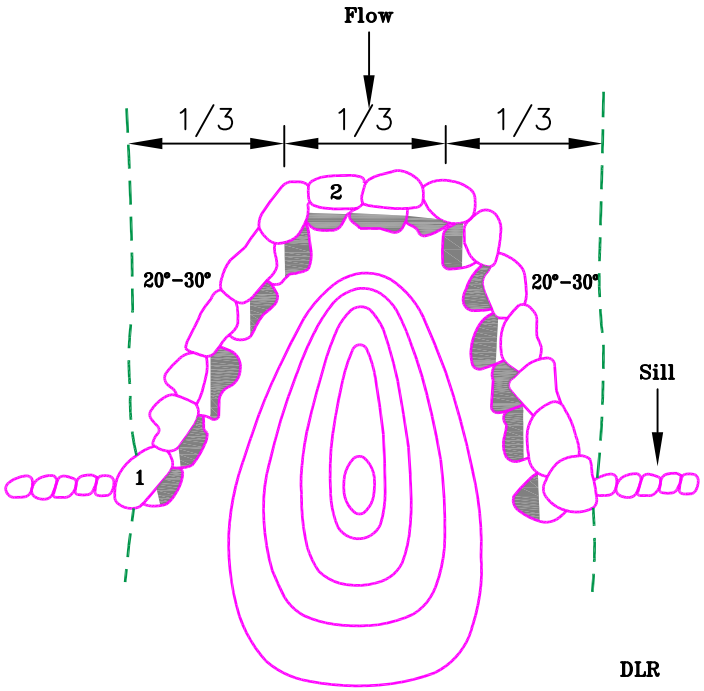
[2]Source: Santa Clara Valley Water District, Design Manual, Open Channel Hydraulics and Sediment Transport, June 2009

Bank Stabilization Measures

#6A: Rock Cross Vanes







Plan View

Source: Wildland Hydrology, Inc.: Rosgen, David L, P.H.; "The Cross-Vane, W-Weir and J-Hook Vane Structures... Their Description, Design and Application for Stream Stabilization and River Restoration".

Bank Stabilization Measures

#6B: Root Wads and Boulders

Description:

This method combines boulders, logs, and live plant material to armor a stream bank. Fish habitat is enhanced in addition to creating a natural-looking bank stabilization structure[1].

Footer logs are set in a toe trench below the thalweg line with the channel end pointed downstream and the butt end angled 45 to 60 degrees upstream. A second log (with root wad) is set on top of the footer log diagonally, forming an "X". The root wad end is set pointing upstream and the butt end lying downstream 45 to 60 degrees. The apex of the logs is anchored together using boulders, re-bar or cables. Large boulders are placed on top and between the logs at each apex. After all the logs and boulders are set in place, live plant material such as willows is placed within the spaces of the structure, behind the boulders. Excavated gravel and stream materials can then be placed over the bank end portion of the structure.

This method will tolerate high boundary shear stresses if logs and root wads are well-anchored. This method should, where appropriate, be used in conjunction with soil bioengineering or live vegetation plantings to stabilize the upper bank and ensure a regenerative source of streambank vegetation. The life of the structure depends on the species of logs used. It might need replacement if vegetative colonization does not take place. This method can create local scour (channel bottom) and erosion (opposite bank)[2].

Design Criteria:

Appropriate for channel velocities at 10 feet per second or less.

Habitat Impact Assessment:

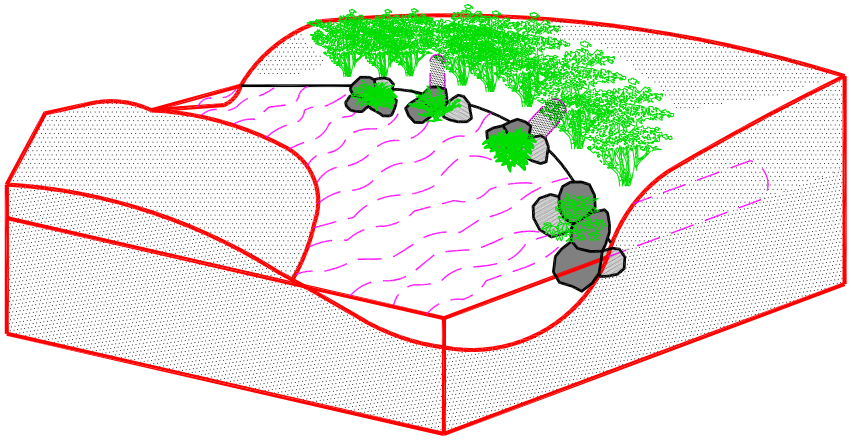
In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

[1]Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

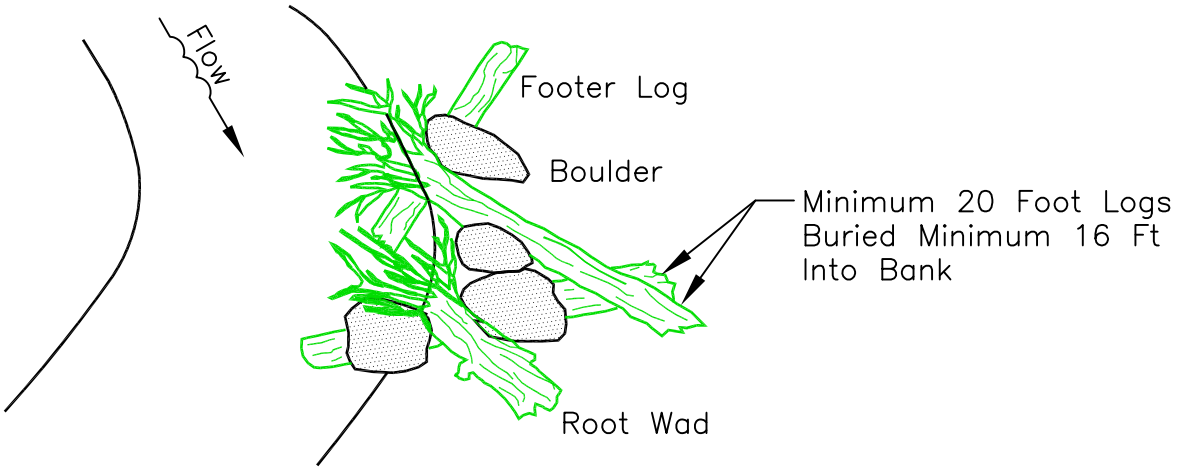
[2]Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices

Bank Stabilization Measures

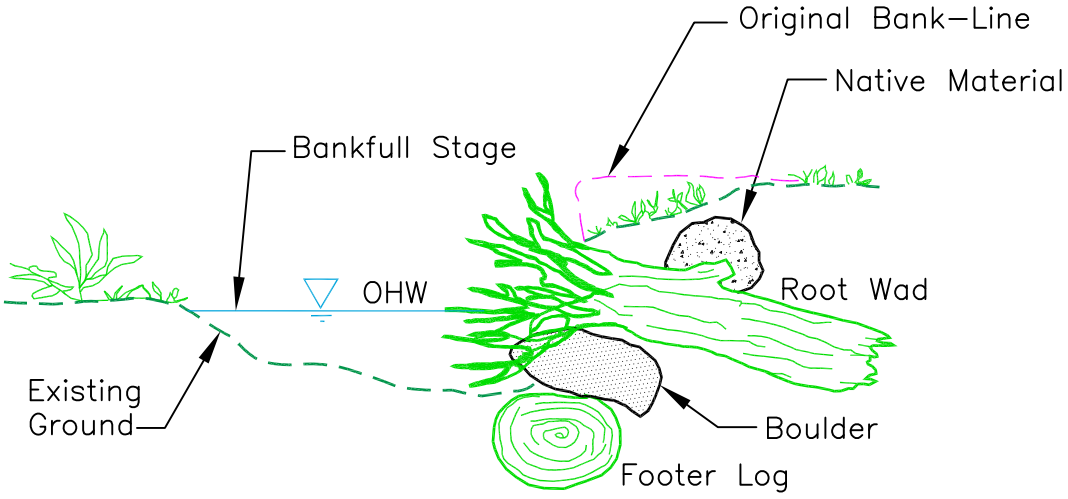
#6B: Root Wads and Boulders



Source: Adapted from Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices



Plan



SECTION

Source: Adapted from California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Stabilization Measures

#6C: Live Log Crib Walls

Description:

Log crib walls are used to reduce sediment input and protect banks in areas where logs are available and boulders are not practical[1]. Cribbing provides protection in areas with near-vertical banks where bank sloping options are limited by issues such as right of way restrictions[2]. Crib walls afford a natural appearance, immediate protection, and accelerate the establishment of woody species[2]. This method is effective on the outside of bends where high velocities are present and in situations where a low wall may be required to stabilize the toe and reduce slope steepness[2]. This method does not adjust to toe scour and should be used in combination with soil bioengineering systems and live plantings to stabilize the upper slopes[2]. Logs should be selected for soundness, durability, uniformity of size, and ease of handling (straight logs much preferred) and delivery.

Two rows of base logs or untreated timbers are placed in trenches below stream grade to prevent undercutting of the structure. Base logs should be as large (long and thick) as can be manipulated while conforming to the contour of the stream bank. Good base logs are crucial to ensure stability and durability of the cribwall[1]. Geotextile fabric should be placed behind and inside the face of (to keep material in) the structure. Tie-back logs are notched, nailed, or bolted into the base logs and placed at regular intervals (6 to 8 feet typically) along the base logs. Tie-back logs are attached to both rows of base logs. Once the first row of tie-back logs has been connected a second set of face logs is placed on top of the tie-backs. These logs are placed approximately 6 inches back into the slope. This procedure is repeated until the desired level of bank protection is achieved. As each lift is constructed, the face logs and tie-backs are filled with a mix of gravel and cobbles to the top of the face log. It is not necessary to use topsoil in the fill material; but there should be sufficient fine grained material to insure vegetation growth. Live cuttings are then laid in to form a complete cover layer. These live branches should be long enough to have their butt end in the native soil behind the crib wall. The tips should stick out of the crib wall no more than a quarter of the cutting total length. The branches are then covered with gravel/cobble mix to the top of the tie-backs and the nest layer is continued.

Design Criteria:

Appropriate for slopes up to ¼ to 1.

Appropriate for velocities from 6 feet per second up to 12 feet per second, depending on opening size.

Habitat Impact Assessment:

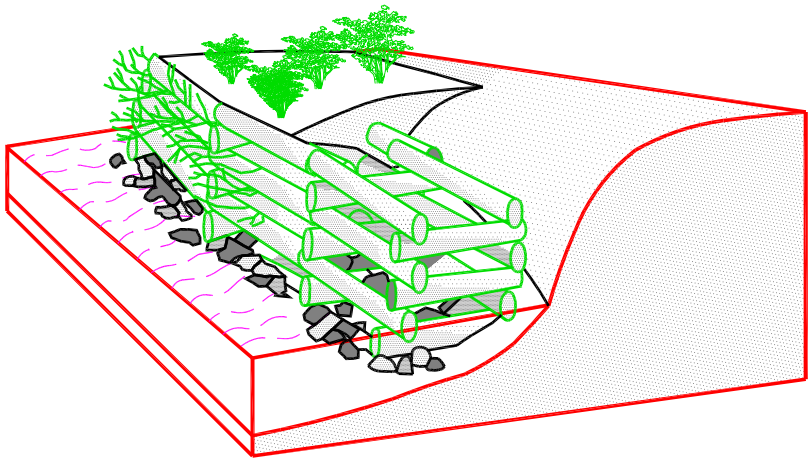
In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

[1]Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

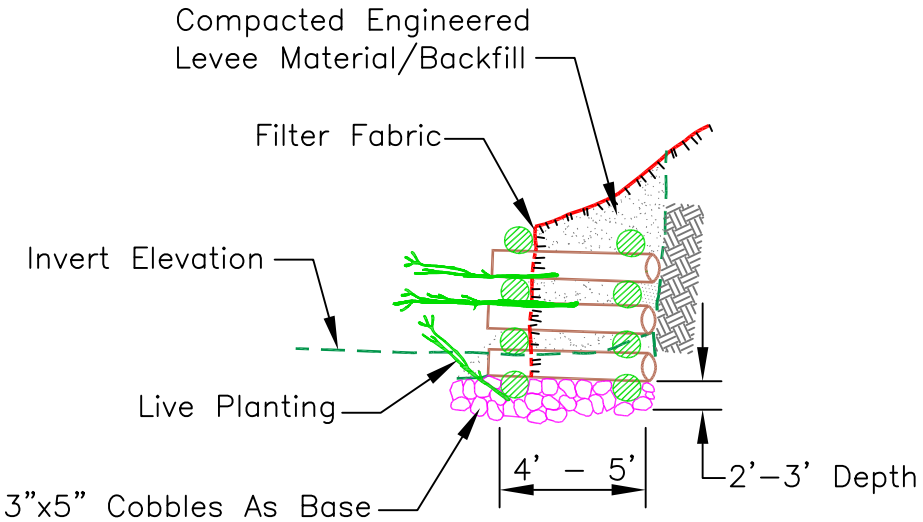
[2]Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices

Bank Stabilization Measures

#6C: Live Log Crib Walls



Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices



Source: Adapted from California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Stabilization Measures

#6D: Log Revetment

Description:

For sites where erosion has cut out the toe and a portion of a steep bank and there is no room for shaping back the bank slope, log revetment may be used for bank repair. Log revetment is a stack of logs that forms the protected bank slope with compacted soil backfill behind the logs. Each individual log is anchored to the foundation and rebar is used to connect logs to each other. The logs are cut to fit the size of the eroded bank. There is minimal excavation except to clear away debris and loose materials. Live tree roots are saved as much as possible by burying them in the soil backfill[1].

Log revetment will be mitered to match the upstream and downstream bank slopes. The bottom log of the log revetment is aligned with the upstream and downstream toe line to minimize encroachment into the flow area[1]. Two adjacent logs are laid below grade to act as a footing for the structure. These footer logs are anchored into the native ground using either rebar or duckbill anchors and cable, or some other site-appropriate anchoring method. Logs are then stacked one on top of the other, at the appropriate slope, and are rebarred to one another. Each log is anchored into existing ground using duckbill anchors and cable, rebar, or another site-appropriate method, until the appropriate height is obtained.

Design Criteria:

Appropriate on steep bank slopes ½:1 or flatter.

Appropriate for velocities up to 15 feet per second.

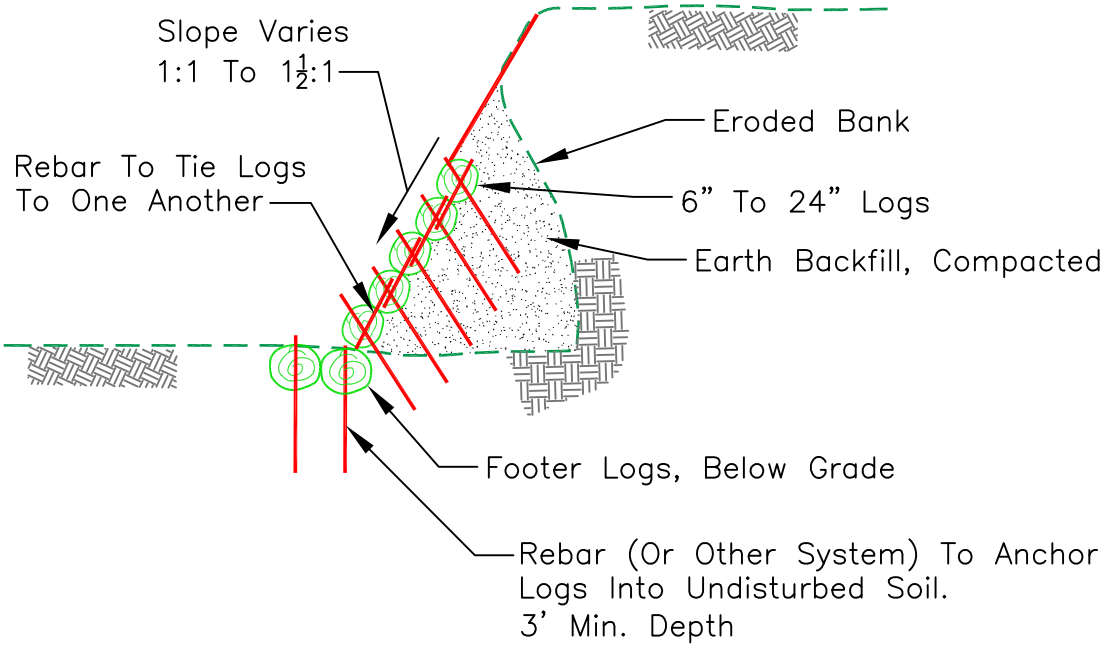
Habitat Impact Assessment:

In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

[1]Source: Santa Clara Valley Water District, Design Manual, Open Channel Hydraulics and Sediment Transport, June 2009

Bank Stabilization Measures

#6D: Log Revetment



Bank Stabilization Measures

#7: Cellular Confinement System

Description:

Soil cellular confinement system (geocell) is a polyethylene plastic cellular system where structural strength is developed by the composite design of soil, plant roots, and the plastic's cellular configuration. This system is available in 8-inch deep honeycomb mats that are installed in offset vertical layers to create terraced planting areas. The honeycomb cells are filled with soil, moderately compacted, and planted with woody vegetation and grasses. The structure functions similarly to a crib wall structure.

This method has the capability of developing some vegetation potential.

Design Criteria:

Appropriate for slopes up to ½ to 1.

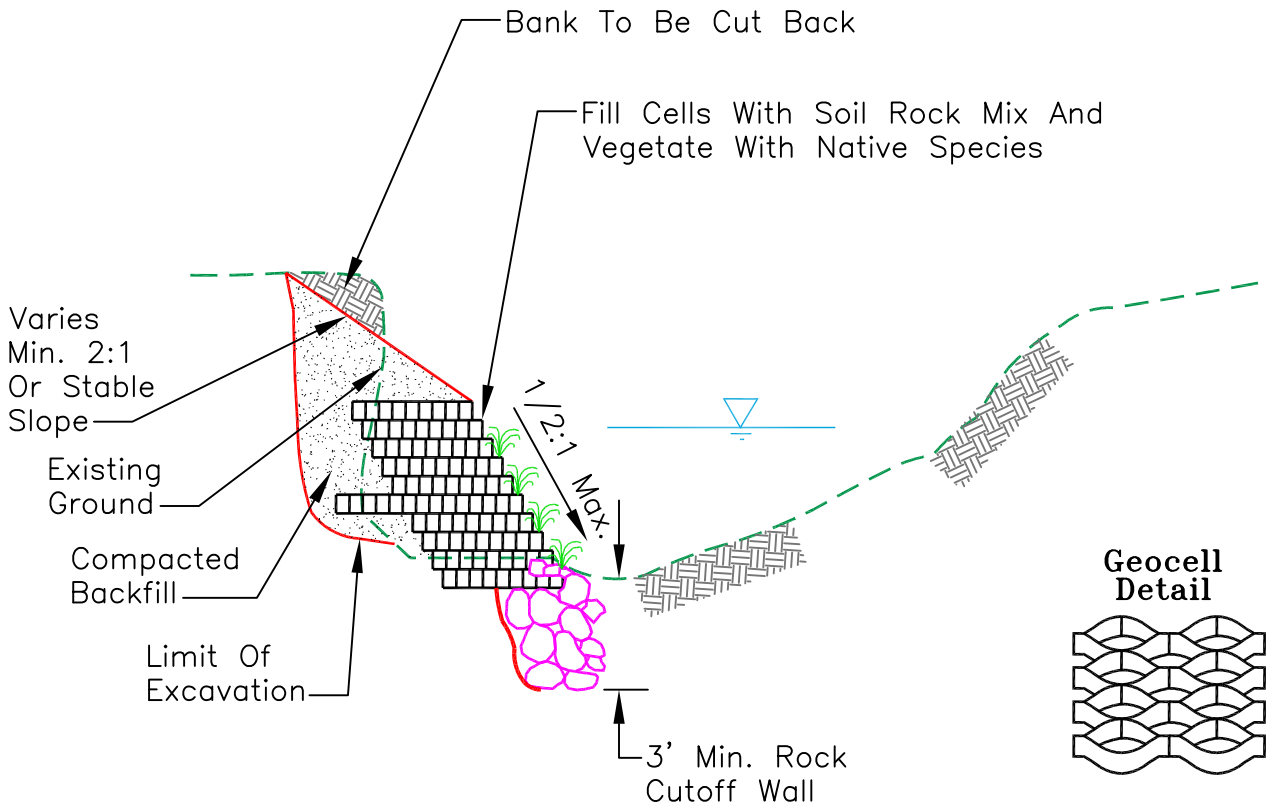
Appropriate for velocities up to 6 feet per second.

Habitat Impact Assessment:

In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

Bank Stabilization Measures

#7: Cellular Confinement System



Bank Stabilization Measures

#8: Rock Blanket

Description:

This method consists of placing a blanket of appropriately-sized rock over the bank to control erosion. Smaller cobbles may be placed in the voids of the rock to create a solid structure so as to minimize scour behind the rock and failure of the structure. This method is appropriate where long-term durability is needed, design discharge is high, there is significant threat to life or property, or there is no practical way to otherwise incorporate vegetation into the design. This method should, where appropriate, be used with soil-bioengineering systems or live vegetation to stabilize the upper bank and ensure a regenerative source of streambank vegetation. A major benefit to this method is that the components are flexible and function is not impaired by slight movement from settlement or other adjustments[1].

Angular rock should be used, because they tend to interlock, making the structure act like a single structure rather than a collection independent stones.

Design Criteria:

Appropriate for slopes up to 1.5 to 1, preferably 2 to 1.

Rock sizes of 6 inches to 18 inches in diameter.

Appropriate for velocities up to 15 feet per second.

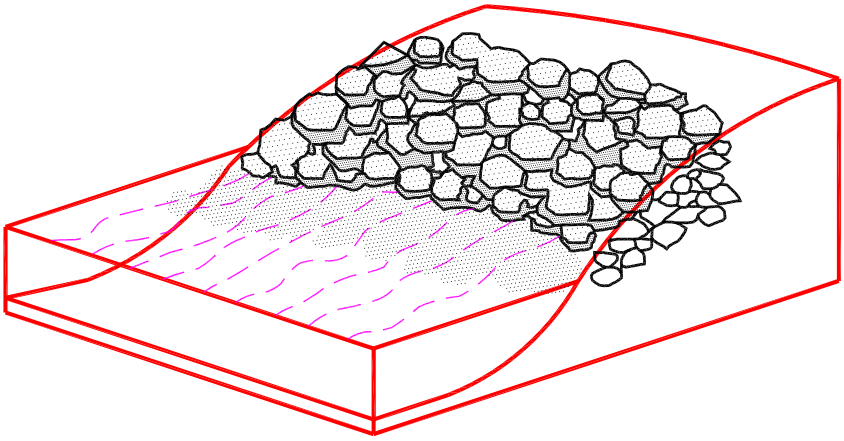
Habitat Impact Assessment:

In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

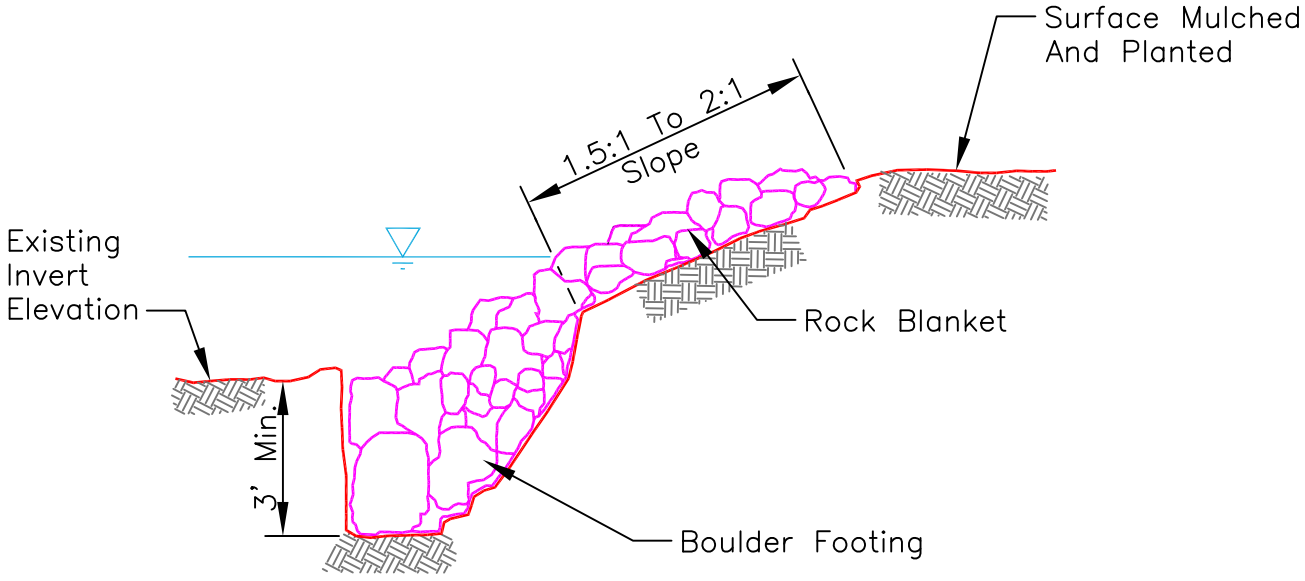
[1]Source: Adapted from Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices

Bank Stabilization Measures

#8: Rock Blanket



Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices



Source: Adapted from California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Stabilization Measures

#8A: Boulder Revetment

Description:

Boulder revetment is a method for armoring stream banks with large boulders for preventing bank erosion. Revetment footing is laid in a "toe" trench dug along the base of the bank. Large boulders are then laid on the bank slopes up to the design water surface level (ordinary high water or other design water surface). Large angular boulders are best suited for this purpose. Boulder revetment can provide protection in areas where log or boulder instream structures may lead to bank erosion. The boulders used should be dense and structurally competent[1].

Geotextile fabrics should be avoided, as they prevent the natural establishment of vegetation[1].

This method should, where appropriate, be used with soil bio-engineering systems or live vegetation to stabilize the upper bank and ensure a regenerative source of streambank vegetation. A major benefit of this method is that the components are flexible and function is not impaired by slight movement from settlement or other adjustments[2].

This structure would allow for some natural revegetation of the bank.

Design Criteria:

Appropriate for slopes up to 1 to 1, preferably 2 to 1.

Appropriate for velocities up to 6 feet per second if boulder joints are planted, 15 feet per second if boulders are not planted.

Habitat Impact Assessment:

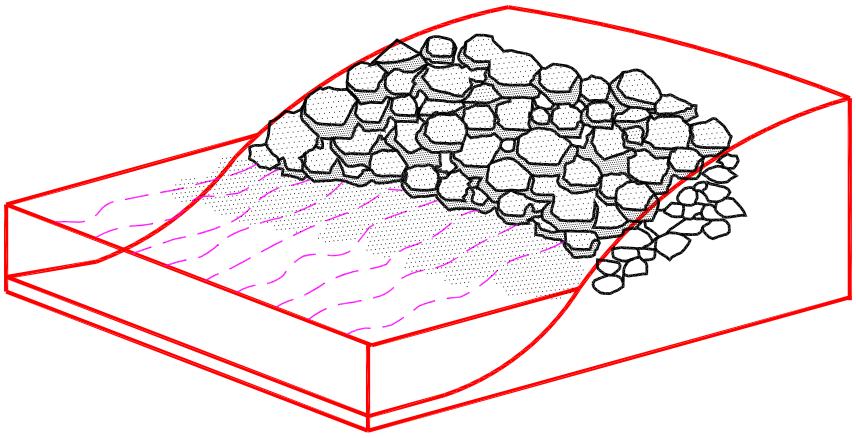
In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources

[1]Source: Adapted from California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

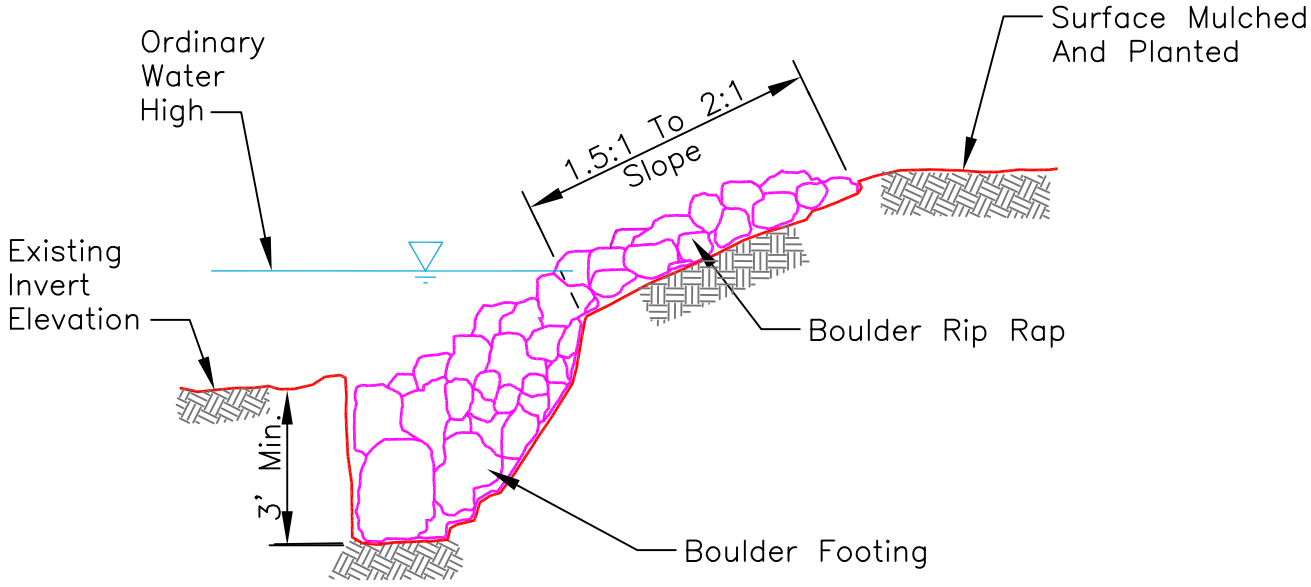
[2]Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices

Bank Stabilization Measures

#8A : Boulder Revetment



Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices



Source: Adapted from California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Stabilization Measures

#8B: Boulder Revetment with Soil and Vegetation

Description:

Boulder revetment is a method for armoring stream banks with large boulders for preventing bank erosion. Revetment footing is laid in a "toe" trench dug along the base of the bank. Large boulders (are then laid on the bank slopes up to the ordinary high water or other design water surface. Large angular boulders are best suited for this purpose. Boulder revetment can provide protection in areas where log or boulder instream structures may lead to bank erosion. The boulders used should be dense and structurally competent[1].

Soil is placed over the boulders and vegetation is installed by staking and/or direct seeding. Bio-degradable erosion control mats may be placed over the soil to help control erosion until vegetation establishes itself. Special care must be taken in staking to avoid damage to the stakes' cambium and to ensure good soil/water/stake contact. Thick revetment layers may require special tools for establishing staking pilot holes[2].

Geotextile fabrics should be avoided, as they prevent the natural establishment of vegetation[1].

This method should, where appropriate, be used with soil bio-engineering systems or live vegetation to stabilize the upper bank and ensure a regenerative source of streambank vegetation. A major benefit of this method is that the components are flexible and function is not impaired by slight movement from settlement or other adjustments[2].

Design Criteria:

Appropriate for slopes up to 1 to 1, preferably 2 to 1.

Appropriate for velocities up to 6 feet per second.

Habitat Impact Assessment:

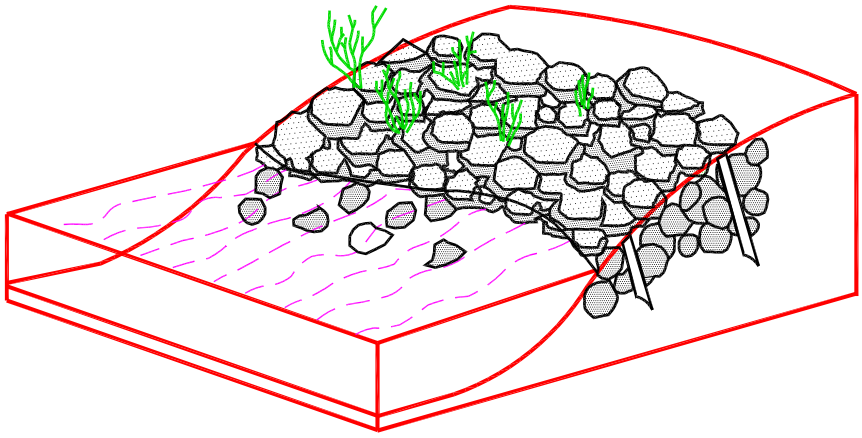
In-stream: Enhances biotic resources
Stream-side: Provides limited biotic resources

[1]Source: Adapted from California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

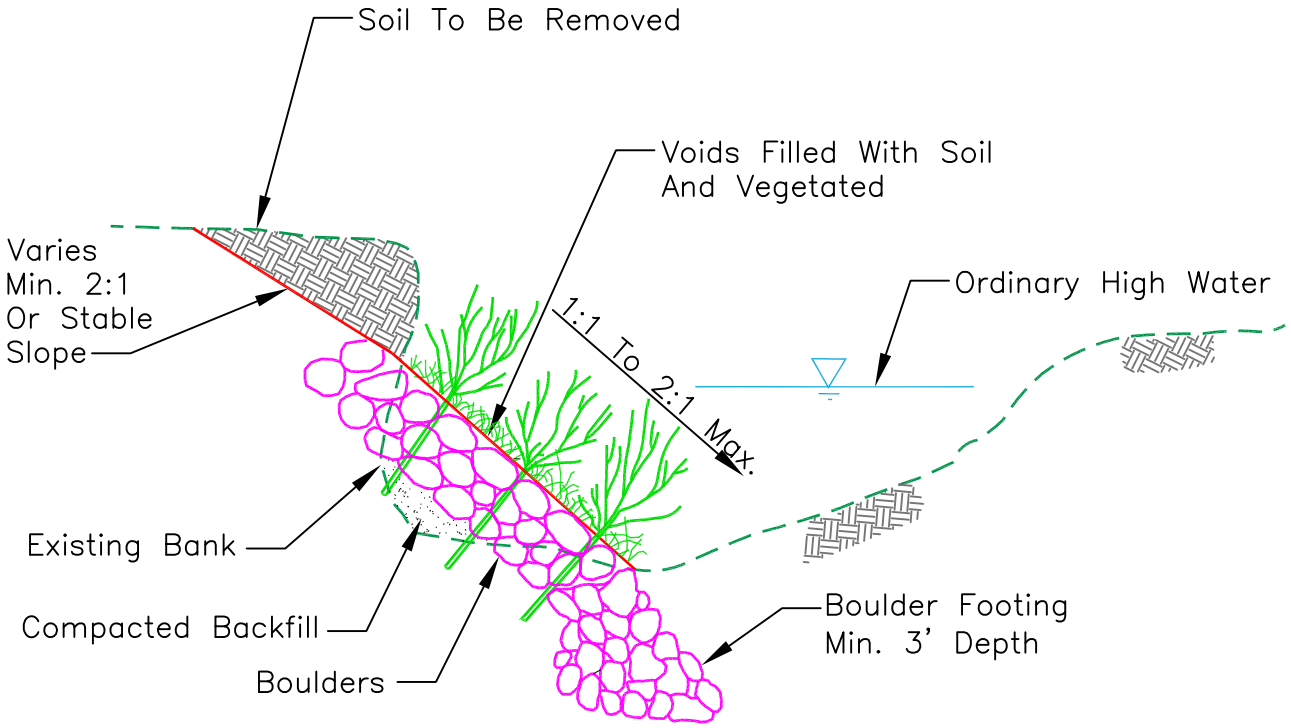
[2]Source: Adapted from Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices

Bank Stabilization Measures

#8B: Boulder Revetment with Soil and Vegetation



Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices



Bank Stabilization Measures

#9: Articulated Concrete Blocks

Description:

Articulated concrete blocks (ACB) consists of concrete interlocking blocks that are cabled together to form mats that can be laid on the channel slope and/or channel bottom. The ACB is extended below the invert to form a cutoff wall.

ACBs are available in two styles: open cell and closed cell. The open cell style allows for vegetation to be recruited into the soil filing of the cell. Vegetation growth is restricted by the sizes of the cell openings and by the disconnection caused by the cell walls.

Design Criteria:

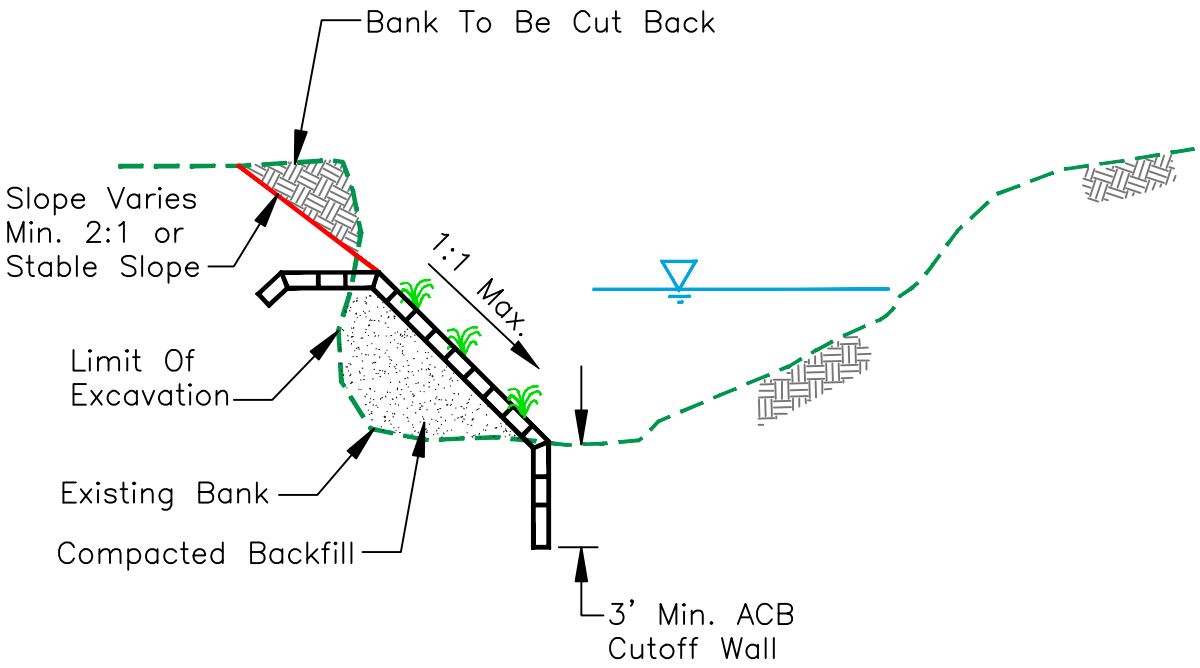
Appropriate for slopes up to 1 to 1.

Appropriate for velocities up to 15 feet per second for closed cell ACBs, 6 feet per second for open cell ACBs.

Habitat Impact Assessment:

In-Stream: Provides limited biotic resources
Stream-side: Reduces or eliminates biotic potential

Bank Stabilization Measures
#9: Articulated Concrete Blocks



SECTION

#9A: Articulated Concrete Blocks with Planting Areas

Description:

Articulated concrete blocks (ACB) consists of concrete interlocking blocks that are cabled together to form mats that can be laid on the channel slope and/or channel bottom. The ACB is extended below the invert as a cutoff wall to prevent undermining of slope protection.

ACBs are available in two styles: open cell and closed cell. The open cell style allows for vegetation to be recruited into the soil filing of the cell. Vegetation growth is restricted by the sizes of the cell openings and by the disconnection caused by the cell walls.

Open planting areas can be constructed into the ACB mats by creating an opening in the mat by removing some of the blocks. The open areas can be revegetated with shrubs and trees. Irrigation is provided to the planted vegetation to aid plant establishment.

Design Criteria:

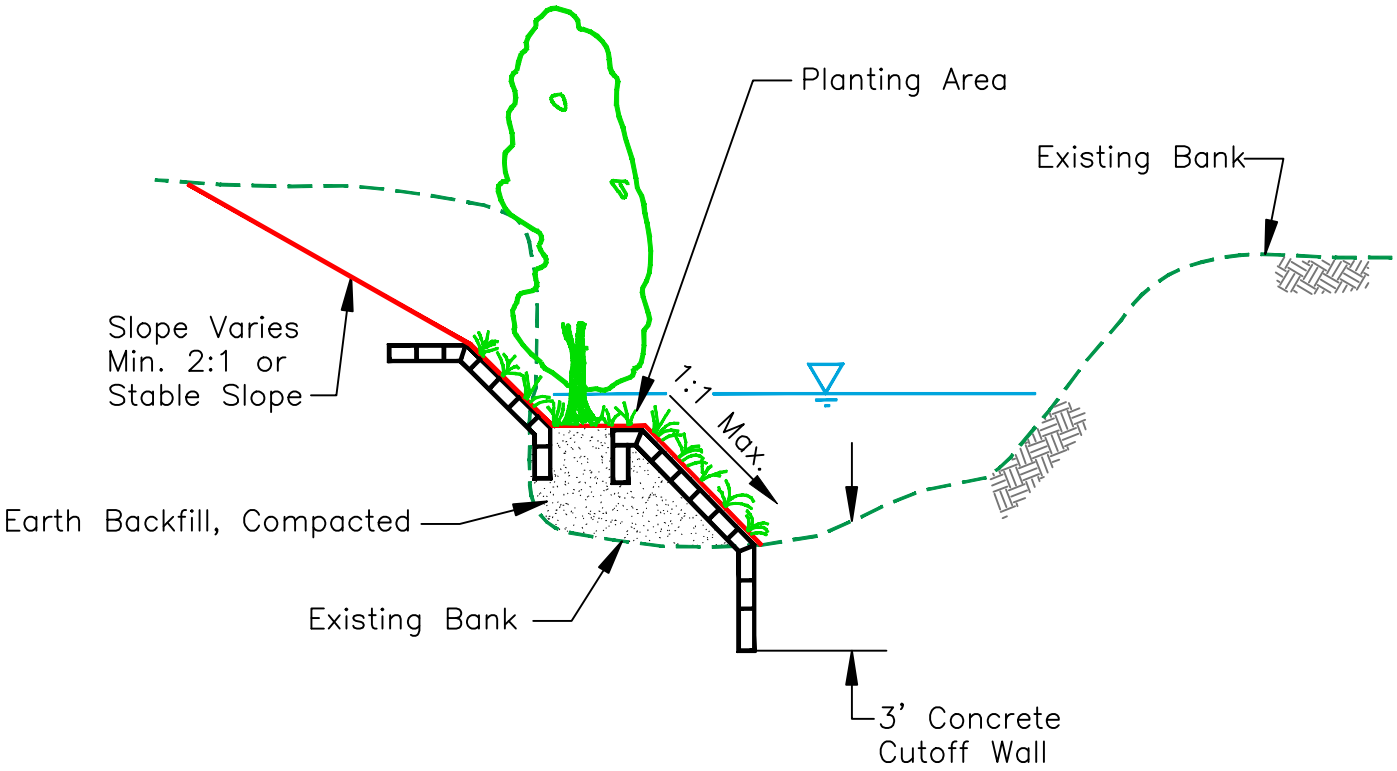
Appropriate for slopes up to 1 to 1.

Appropriate for velocities up to 15 feet per second for closed cell ACBs, 6 feet per second for open cell ACBs.

Habitat Impact Assessment:

In-Stream: Provides limited biotic resources
Stream-side: Reduces or eliminates biotic potential

Bank Stabilization Measures
#9A: Articulated Concrete Blocks with Planting Areas



SECTION

Bank Stabilization Measures

#10: Concrete Crib Walls

Description:

Concrete crib walls consist of stacked interlocking concrete frames that form a retaining wall. The structural strength is developed by the composite design of a concrete frame with compacted backfill. Crib walls are constructed with open face panels that are planted by live staking. This method restricts plant growth by the size of the panel opening. As the crib wall slope is flattened and the lattice becomes more open, the vegetation potential increases and the allowable velocity decreases because of the exposed soil and vegetation.

Design Criteria:

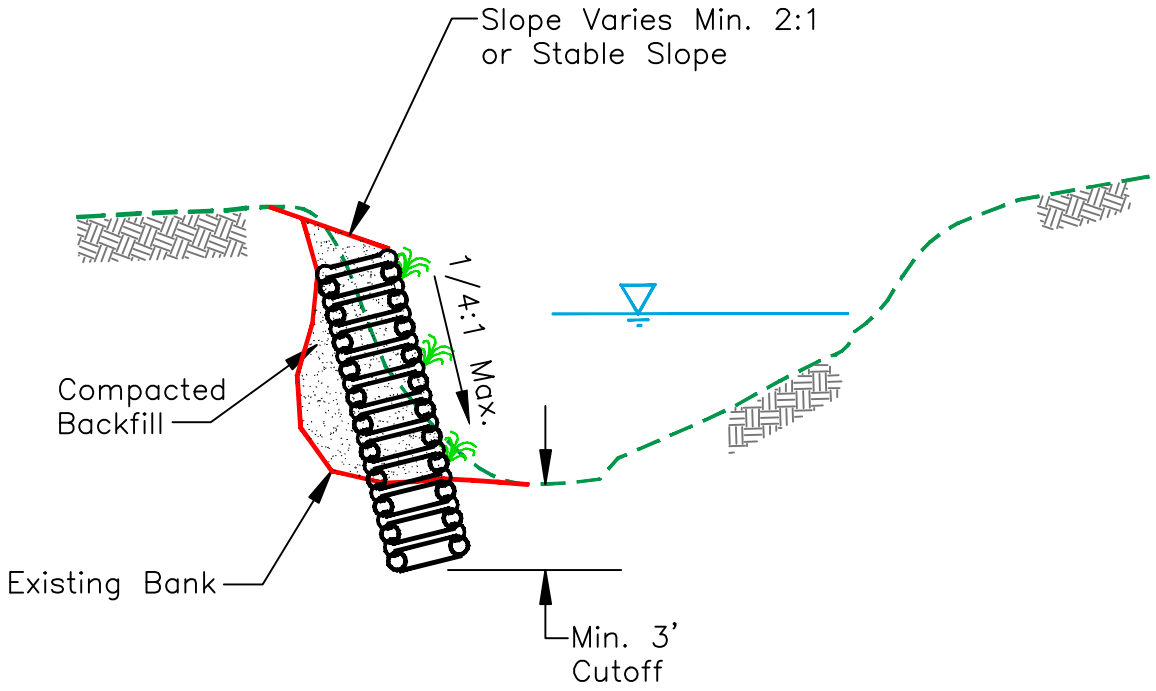
Appropriate for slopes up to ¼ to 1.

Appropriate for velocities from 6 feet per second up to 15 feet per second, depending on the size of the crib wall's openings.

Habitat Impact Assessment:

In-Stream: Reduces or eliminates biotic potential
Stream-side: Reduces or eliminates biotic potential

Bank Stabilization Measures
#10: Concrete Crib Walls



SECTION

Bank Stabilization Measures

#11: Sacked Concrete

Description:

Sacked concrete slope protection (SCSP) consists of burlap bags filled with concrete and placed against channel banks. SCSP requires a three-foot deep concrete or SCSP cutoff wall at the toe of the slope to prevent failure. SCSP does not provide any revegetation potential. However, it offers the opportunity to contour walls such that impacts to existing vegetation are avoided

Design Criteria:

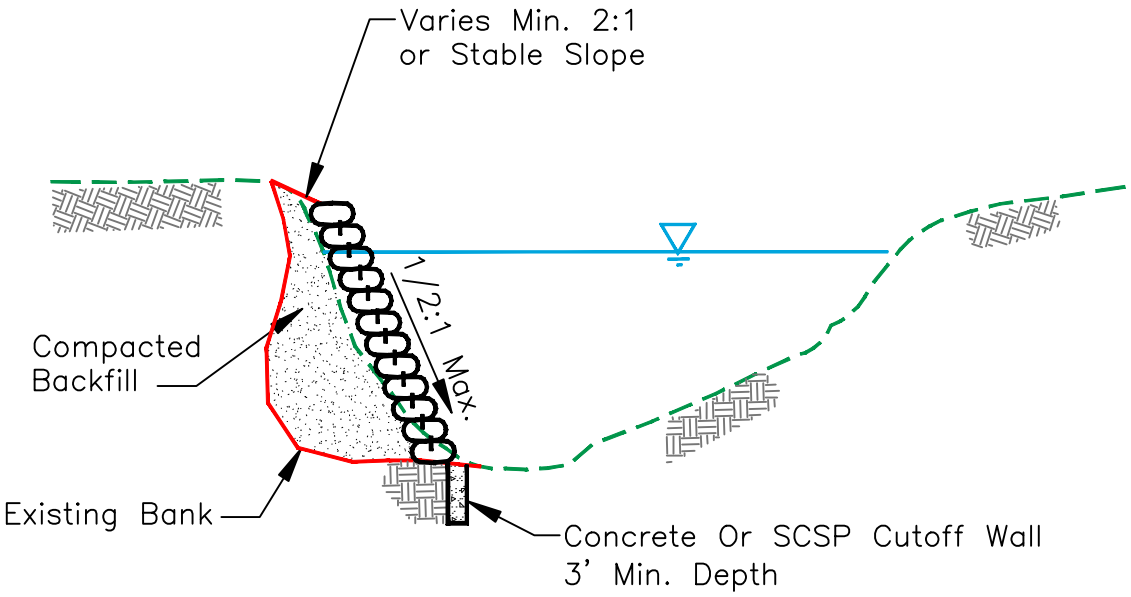
Appropriate for slopes up to ½ to 1.

Appropriate for velocities up to 15 feet per second.

Habitat Impact Assessment:

In-Stream: Reduces or eliminates biotic potential
Stream-side: Reduces or eliminates biotic potential

Bank Stabilization Measures
#11: Sacked Concrete



SECTION

Bank Stabilization Measures

#12: Gunite Slope Protection

Description:

Gunite slope protection consists of a concrete mixture sprayed under pressure oven an eroded bank. Reinforcing steel may be placed against the bank prior to spraying.

Design Criteria:

Appropriate for slopes up to vertical.

Appropriate for velocities up to 15 feet per second.

Habitat Impact Assessment:

In-Stream: Reduces or eliminates biotic potential
Stream-side: Reduces or eliminates biotic potential

Bank Stabilization Measures

#12: Gunite Slope Protection

(No drawing included for this bank stabilization measure;
please refer to narrative for more information)

Bank Stabilization Measures

#13: Earth with Rock Toe on Grass Lined Channels

Description:

Earth repair with rock toe on grass-lined channels* involves the repair of eroded channel banks using appropriately-sized boulders and compacted soil. Boulders are placed at the toe of the bank up to the ordinary high water elevation. Above this, earth is placed and compacted in successive lifts. The overbuilt embankment is then cut and trimmed back to match the upstream and downstream channel side slopes and toes. The surface is seeded with fast sprouting grass species like rye. Geotextile/erosion control fabric may be placed over hydroseeding to secure newly compacted bank.

* Grass-lined channels are those where grass is the predominant or sole vegetation, and that contain no significant riparian structure.

Habitat Impact Assessment:

In-Stream: Enhances biotic resources
Stream-side: Enhances biotic resources

Bank Stabilization Measures

#13: Earth with Rock Toe on Grass Lined Channels

(No drawing included for this bank stabilization measure;
please refer to narrative for more information)

ATTACHMENT B

Mitigation Feasibility Assessment (MFA)

Mitigation Feasibility Assessment Field Protocol

1. Introduction

Revegetation and riparian planting is one of five methods of mitigation. Experienced staff with recognized botanical and/or horticultural expertise should be consulted early in the project planning phase. Incorporating revegetation and riparian planting direction early into the planning phase will enable staff to identify critical elements or pre-existing conditions at each site. Assessing the project site for revegetation and planting mitigation feasibility will provide direction in determining:

a) Bank stabilization design,
b) Root zone protection measures: construction fencing, plywood/mulch, best access route,
c) Composition of a plant palette suitable to the site if planting is possible,
d) Feasibility of on-site mitigation by standard revegetation methods, and
e) Selection of an alternate mitigation strategy (off-site, invasive species control, revegetation by seeding and/or weed control).

2. Attributes

The feasibility of mitigation depends on the opportunities and constraints of each bank repair site. These elements should be identified as part of the planning process, prior to bank repair design and regulatory agency review. The success criteria for mitigation should be evaluated and adjusted based on these findings. Each site will be analyzed with the criteria elements described below:

a) Hydrology – the proximity of the mitigation site to high-water events and the availability of water to mitigation plantings will directly impact the success of the mitigation site.
b) Velocity – location of plantings in relation to hydraulic characteristics. As an example, the inside of an oxbow or curve may receive velocities that cannot sustain vegetation.
c) Soils – soil type, nutrient content, friability, historic land use, and degree of compaction.
d) Type of repair – may directly relate to the site's ability to grow and support native plants. The type of bank repair may also limit the space available for mitigation, thereby requiring an off-site mitigation alternative.
e) Aspect – duration of sun/shade on site and influence of existing tree canopy. This will influence mitigation species palette.
f) Slope – directly relates to accessibility of site by staff, irrigation needs, and associated maintenance costs.
g) Adjacent land use – run-off from adjacent properties, proximity to trails, impacts from trash/vandalism, and fire hazards.
h) Access to site – tree removals/pruning/root zone protection, impacts to understory vegetation, and accessibility of site by staff to maintain mitigation site. .
i) Presence of invasive plants or animals that are destructive to developing habitat – the long-term success of each site may be adversely impacted by the encroachment of invasive plants and animals into the site. The presence of native herbivores may also require additional protective measures to be incorporated into the mitigation strategy.
j) Presence of rare/listed species – may limit the maintenance activities allowed at the site.
k) Maintenance needs – should be incorporated into the revegetation design for each site. Assess future maintenance needs and determine access requirements, capacity needs, frequency site will need to be re-visited, etc.

3. MFA Ranking

The MFA will result in a revegetation potential divided into three separate rankings: high, medium, and low. Each of these rankings is based on the presence or absence of specific attributes (opportunities and constraints) assessed for the site. These attributes can be further grouped into:

- Physical constraints: required engineering, soil compaction, elevation and distance from the stream, shade/sun availability, etc.;
- Horticultural constraints: soil characteristics, availability of water; shading;
- Cultural/biological constraints: public access/vandalism, rodent activity, wildlife browse, invasive plant species; and
- Maintenance constraints: routine maintenance activities of the creek and flood protection infrastructure – such as access.

All attributes may not be applicable to every project site. Only those applicable attributes will be assessed to determine an appropriate MFA ranking.

MFA Ranking

a) **High** revegetation potential sites have few constraints and no insurmountable constraints with reasonable inputs.

b) **Medium** revegetation potential sites have a few constraints but no insurmountable constraints with reasonable inputs.

c) **Low** revegetation potential sites have several constraints and have constraints that cannot be overcome with reasonable inputs.

Revegetation Planting Potential

Ranking	High	Medium	Low
Site Attribute			
Soils	Soil texture and chemistry suitable to horticultural processes with little or no intervention. **(0)**	Soil texture and chemistry require some intervention but will support establishment and long term plant processes. **(5)**	Soil texture or chemistry have significant obstacles to horticultural processes. Competing goals (levee compaction for instance) preclude modification. **(10)**
Slope	Slope stable and grade suitable for planting and worker safety during plant establishment. **(0)**	Slope creates difficulty in plant installation and maintenance (1.5: or greater). Planting and maintenance requires special infrastructure. **(5)**	Severe and/or unstable slope that limits or precludes planting. Worker safety (slope requires roping in, unstable slope above planting, etc.) constraints. **(8)**

Hydrology	Water on or immediately adjacent to site, soil allows good capillary action, return flows allow frequent inundation. No need to modify to create good hydrology. **(0)**	Site and soils have some limitations regarding water availability. Substrate suitable to root expansion. Site may be modified to facilitate water connectivity. **(5)**	Little to no water holding capacity. Site goes dry during hottest part of the year. Little or no ability to improve hydrology through site manipulation. **(10)**
Stream Velocity	Low velocity flows that will not impact plant establishment or mature plantings. **(0)**	Infrequent velocities sufficient to undermine or wash out vegetation. **(5)**	Frequent or constant velocities likely to undermine or wash out vegetation. **(8)**
Solar Aspect/Shade	Open area without harsh sun exposure. **(0)**	Harsh solar aspect or heavy shade that could impact plant establishment. Reasonable inputs can offset limitations. **(5)**	Heavy shade or solar aspect, coupled with other factors, create significant probability of plant failure. No reasonable remedies to overcome site condition. **(10)**
Repair Characteristics	Repair has planting attributes designed into the project. Design requirements are not incompatible with plant establishment. **(0)**	Repair has some features that are incompatible with plant establishment. Reasonable inputs or design modifications increase survival potential. **(5)**	Design requirements are incompatible with planting. Little or no accommodation can be made to increase plantability. **(10)**
Adjacent Land Use	No land use issues incompatible with mitigation goals. **(0)**	Some level of land use or human activity incompatible with habitat goals (trespass, homeless habitation, dumping, illegal recreational uses, etc). Level may be reduced or eliminated with minimal intervention. **(5)**	Excessive or chronic human activity that is incompatible with habitat goals. Heavy homeless habitation, historic dumping, or other evidence of persistent unauthorized activity. Ability to change conditions unlikely or impossible. **(10)**
Access to Site	Little or no access restrictions for staff and equipment. **(0)**	Some access requirements that preclude vehicular access and or make pedestrian access difficult. Site may be accessed for establishement maintenance with reasonable	Significant obstacles to access by vehicles and pedestrians. Site may be landlocked (no easement), require extensive hiking or water crossings. Topography may preclude equipment access. **(10)**

		accommodations.**(5)**	
Invasive Species/Rodents, Browse	Little or no evidence of invasive plant species or heavy rodent activity. **(0)**	Invasive plants on and/or encroaching into site. Current or recent evidence of heavy rodent populations (Pocket Gopher, CA Ground Squirrel. Issues and to be resolved or reduced to acceptable threshold at time of construction. **(5)**	Heavy infestation of invasive plant species (Arundo, Cape Ivy, Broom, Blue Gum Eucalyptus, etc.). Established active rodent population on and adjacent to site. Surrounding conditions suggest ongoing difficulty in controlling negative impacts (re-infestation from adjacent areas). **(10)**
ESA Limitations (Endangered Species Act)	No management limitatations based on presence of listed species. Potential benefit to listed species due to creation of habitat. **(0)**	Presence of listed species requires alteration some of maintenance practices. Examples would be some pesticide prohibitions, delays in scheduled maintenance, limitations on vehicular access. **(5)**	Presence of listed species requires significant alteration of maintenance practices. Examples would be on-site biological monitor, complete pesticide ban, major calendar exclusions of maintenance activities. **(8)**
Facility Maintenance	Little or no change in site management based on required facility maintenance. **(0)**	Some change to mitigation required due to required facility needs. Examples such as reduced planting due to ongoing prescribed maintenance, setback of vegetation to meet fire codes, elimination of tree species to maintain capacity. **(5)**	Significant compromises in habitat design to accommodate facility needs. Examples would be Corps inspection setbacks, elimination of woody species to reduce roughness, loss of planting area for equipment access. **(8)**

4. Revegetation Potential Scoring

   a) The “highest” revegetation potential rating results in a “zero” score. The lower the score, the feasibility for replanting is higher; the site is better suited to revegetation efforts.

   b) Each “Medium” or “Low” rating of an attribute would be scored as outlined in the above table. The individual points attached to each attribute are based on its potential to impede mitigation success and the degree of difficulty involved in overcoming the obstacle.

c) The total points would be deducted from the maximum success criteria (75% total cover of native vegetation in 5 years, with a 70% survival rate), and would result in an adjusted success criteria commitment; more appropriate to the specific site conditions.

d) If a site scores more than 40 using the prescribed formula, it would be considered unsuitable for revegetation and an alternative site or mitigation obligation would be proposed.

Some sites might have an extraordinary condition where one specific attribute could be scored higher than is listed in the table, whereby its function at that site is critical for the success of the site. (Sites with heavily compacted soils or areas within difficult hydrological conditions.) In that case, even if the overall scoring would seem possible, if one (a few) attribute(s) makes a site undesirable to plant, an alternative success criteria could be negotiated separate from the scoring formula proposed in the table. These exceptional conditions would be presented to the regulatory agencies on a case specific basis.

5. Mitigation Accounting

The maximum success criteria is 75% total cover of native vegetation in 5 years, with a 70% survival rate. Trees may be replanted at any time, for loss of individuals. The lowest acceptable success criteria is 35% total cover of native vegetation in 5 years. A 35% success criteria would be the result of a site receiving a “Revegetation Planting Potential“ scoring of 40.

a) A site receiving a “perfect score” defined as a “High” in every category would commit to a maximum of 75% total cover of native vegetation in 5 years from the time of installation. Some replanting of lost individuals may occur during this time.

b) The sum of all attribute scores are subtracted from the maximum success criteria percentage.

Example: A site receives a total score of 20. The maximum success criteria is 75%. Therefore, 75-20 = 55%. This is the new success criteria of total native cover after 5 years.

c) The highest calculated score that a site could receive would be 40, resulting in a success criteria cover commitment of only 35% total native cover after 5 years. If a site scores more than 40 using the prescribed Revegetation Planting Potential formula, it would be considered unsuitable for revegetation and an alternative site or mitigation obligation would be proposed.

ATTACHMENT C

Tree Scoring for Removal of Trees and Shrubs 6 - 12” dbh

Tree Scoring for Removal of Trees and Shrubs 6 - 12" dbh

Trees and shrubs 6 to 12" dbh may be removed under the Stream Maintenance Program 2012-2022. The sum value from the assessment of four (4) attributes will provide a mitigation ratio for the trees/shrubs proposed for removal. Trees >12" dbh are not included as a part of this removal program. High scores equate to higher value trees, with greater potential impacts if they are removed; and therefore, will require more mitigation. Low scores equate to lower value trees, having fewer potential impacts if they are removed; and therefore, require lower mitigation.

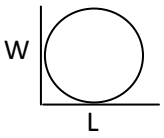
Multi-stem: A tree or shrub with a root ball and multiple trunks or stems. This may occur at ground level or several feet above ground. The dbh of trees with multiple stems will be calculated by adding the diameters of the individual stems at 4.5 feet above ground. Individuals with greater than seven (7) stems at dbh will be assessed by their canopy cover.

A. Approach

Tree replacement would start with a baseline ratio of 1:1. Replacement ratios would increase or decrease based on specific ecological attributes of the individual(s) to be removed and the setting in which it is/they are located. Scoring would add to or subtract from the baseline ratio. Final ratios would be calculated using the methodology outlined below. Due to the habitat value of native oaks and sycamores, these species will be replaced in-kind, with like native species.

B. Ranking

1. Canopy cover
   a) Square footage of canopy is measured at the widest drip-line extension of the subject tree.
   b) Grouping or stands of trees are calculated as the summation of each individual tree canopy, even if the canopies overlap. Open space between the trees would not be factored into the square footage calculation.
   c) Calculations may be made on approximations (+/- 5 feet) with areas converted to measurable geometry. Width x length = square footage. (Estimating by a triangle or circle is also acceptable.)
   d) 0-100 sq. ft. is ranked 0 as the baseline from which mitigation starts is 1:1



Metric: Choose 1. Assess at widest dripline extension point.

Attribute	**Score**
0-100 Square Feet of Canopy (< 10' diameter)	0 points
101-400 Square Feet of Canopy (10 - 20' diameter)	+ 1 points
>401 Square Feet (> 20' diameter)	+ 2 points

0-2 points

2. Local Area Value
   a) Is the affected vegetation unique to its geographic location based on a measurable attribute (species, size, structure, absence of adjacent comparable vegetation).
   b) There is a 2000 sq ft maximum for removal of a stand of trees.

Metric: Choose all that apply. Score = 0 if none of these apply.

Attribute	**Score**
Native Species	+1 point
No similar vegetation within 500 feet radius (Size of canopy, height, or similar measurable criteria; even if non-native).	+1 point
Stand Reduction (Removal of target trees would reduce stand by more than…)	+1 point for 20-50% reduction +2 points for greater than 50% reduction

0-4 points

3. Ecosystem Benefits (wildlife, fisheries, streams)
    a) Tree used by wildlife. Examples include: cavity nesting, nectar feeders, high wildlife food value (seeds, fruits, flowers), cavities and crevices for bats, dead wood for woodpeckers and insect feeders, perching, roosting, nesting, etc. This will rarely ever be zero.
    Supports macroinvertebrate and biomass decomposition processes.
    b) Provides structure/cover : Nurse tree, horizontal or vertical cover.
    c) Provides SRA: Shaded Riverine Aquatic, $\leq$ 15 ft from the water's edge or overhangs water, shade, roots or branches in water providing habitat for fish and aquatic organisms, could contribute instream woody debris.
    d) Tree is 6-12" dbh, provides more mature structure and life form to the surrounding environment.

Metric: Choose all that apply.

Attribute	**Score**
Used by wildlife	+ 1 point
Structure/Cover (vertical, horizontal)	+ 1 point
SRA	+ 1 point
Tree is 6-12" dbh (life form)	+ 1 point

1-**4 points**

4. Ecosystem Detriments

    a) Tree has ecologically undesirable attributes.
    b) Ecological arboriculture would include a tree failing to thrive with little or no hope of recovery. Note: this distinguishes between tree removals that may benefit the ecological setting versus hazard trees.

Metric: Choose all that apply. Score = 0 if none of these apply.

Attribute	**Score**
Significant structural defects	-1 point
Non-native species OR Invasive species	-1 point OR -2 points
Removal for ecological arboricultural reasons (diseased, infestation), excludes hazard trees	-1 point

-4-0 points

C. Mitigation Calculation

Baseline is 1:1 ratio for trees impacted in this size class.
Point reductions could result in a final score that reduces the ratio to less than 1:1.
Due to the habitat value of native oaks and sycamores, these species will be replaced in-kind, with like native species.

Attributes	Min.	Max.
Vegetation Cover	0	2
Local Area Value	0	4
Ecosystems Benefits	1	4
Ecosystems Detriments	-4	0
Total Range	**-3**	**10**

Attribute Range	Mitigation Ratio
-3 - 2	1:1
3 - 5	2:1
6 - 10	3:1

Tree Scoring for Removal of Trees and Shrubs 6 - 12" dbh

Site Location_____ Species_____
Assessors Name_____ DBH_____
Date_____ Canopy Cover sq ft_____
ESU #_____ Reason for Removal_____

1. Canopy cover

Metric: Choose 1. Assess at widest dripline extension point.

Attribute	Score
0-100 Square Feet of canopy cover (< 10' diameter)	0 points
101-400 Square Feet of canopy cover (10-20' diameter)	+ 1 points
>401 Square Feet (> 20' diameter)	+ 2 points

0-2

Vegetation Cover
Score:_____

Stand maximum = 2000 sq ft

2. Local Area Value

Metric: Choose all that apply. Score = 0 if none of these apply.

Attribute	Score
Native Species	+1 point
No similar vegetation within 500 feet radius (Size of canopy, height, or similar measurable criteria; even if non-native).	+1 point
Stand Reduction (Removal of target trees would reduce stand by more than:…..)	+1 point for 20-50% reduction +2 points for greater than 50% reduction

0-4

Local Area Value
Score:_____

3. Ecosystem Benefits (wildlife, fisheries, streams)

Metric: Choose all that apply.

Attribute	Score
Used by wildlife	+ 1 point
Structure/Cover (vertical, horizontal)	+ 1 point
SRA	+ 1 point
Tree is 6-12" dbh (life form)	+ 1 point

1-4

Ecosystem Benefit
Score:_____

4. Ecosystem Detriments

Metric: Choose all rows that apply. Score = 0 if none of these apply.

Attribute	Score
Significant structural defects	-1 point
Non-native species or Invasive species	-1 point or -2 points
Removal for ecological arboricultural reasons (diseased, infestation) excludes Hazard trees	-1 point

-4 – 0

Ecosystem Detriment
Score:_____

C. Mitigation Calculation

Due to the habitat value of native oaks and sycamores, these species will be replaced in-kind, with like native species.

Attributes	min	max
Vegetation Cover	0	2
Local Area Value	0	4
Ecosystems Benefits	1	4
Ecosystems Detriments	-4	0
Total Range	**-3**	**10**

Total 4 Attributes
Score:_____

Attribute Range	Mitigation Ratio
-3 - 2	1:1
3 - 5	2:1
6 - 10	3:1

Mitigation Ratio:_____

Canopy Cover sq ft **X** Ratio quotient = Amount Owed

_____

ATTACHMENT D

Invasive Plant Management Plan

2012-2022 SMP Mitigation

Invasive Plant Management Plan

1.0 PLAN OVERVIEW

Controlling the spread of invasive plant species is a critical element in improving the ecological health of our streams and watersheds. Invasive plants tend to thrive and spread aggressively, negatively altering resource allocation regimes, wildlife patterns, soil stability and water quality thus degrading habitat quality and the overall ecological value of a site. In addition, invasive plants can exacerbate flooding and fire danger, undermine structural assets, and obstruct access to roads, levees and trails.

The Invasive Plant Management Program (IPMP) will serve as compensatory mitigation for SMP (Stream Maintenance Program) vegetation impacts to upland, riparian, freshwater and tidal wetlands by eliminating or significantly controlling the population of invasive plant species from these affected habitats. The IPMP will be a two-pronged approach including: 1) a systematic program to control priority invasive plants throughout Santa Clara County; and 2) an opportunistic program to manage invasive plants within active individual SMP work sites. These two approaches will dovetail together to enhance the overall ecological health of our creeks and watersheds.

The IPMP may be implemented in any location within the coverage area of the SMP. Priority, however, will be given to conducting control work in locations that contain sensitive habitats, sensitive species and/or provide quality habitat for a variety of wildlife. When possible, the District will coordinate with adjacent landowners to try and accomplish a complementary and consistent approach to invasive plant management.

2.0 PLAN GOALS AND MITIGATION COMMITMENTS

The overall goal of the IPMP is to preserve and improve habitat within Santa Clara County streams and riparian corridors through removal of invasive plants. This will be achieved through early detection and systematic removal of invasive plants in existing high quality habitats, opportunistic removal of invasive plants in SMP work locations, as well as undertaking control efforts in currently degraded habitats to improve the overall ecological site condition.

A. Over the course of the 10 year permit, the systematic portion of the IPMP will target: 1) removal of

priority invasive plants in existing high quality habitats and 2) control efforts in currently degraded habitats to improve overall ecological site conditions. Mitigation needs and credit will be determined annually, dependent on the proposed work for the year and the associated impacts expected to be incurred in each habitat type, i.e., upland, riparian, freshwater and tidal wetland impacts. A proposal for mitigation credit and the associated acreage to be treated for this program will be submitted with the "Notice of Proposed Work".

B. The opportunistic portion of the IPMP will target removal of invasive plants at specific SMP work sites. This effort will be variable each year dependent on the number of project sites where invasive plant removal is feasible. Mitigation credit accrued will be used to compensate for on-site vegetation impacts or for ongoing vegetation maintenance activities. Proposed mitigation credit for each project site will be submitted with the annual "Notice of Proposed Work."

The IPMP plans to coordinate and collaborate with other regional control and early detection programs in order to stay apprised of regional issues (e.g., Bay Area Early Detection Network (BAEDN), California Invasive Plant Council (CAL-IPC), San Francisco Estuary Invasive Spartina Program (ISP), Arundo Del Norte, etc.). Coordination will also take place with other landowners in Santa Clara County to try and accomplish a complementary and consistent approach to invasive plant management throughout the County (ex., Don Edwards National Wildlife Refuge, Cities of Palo Alto, Mountain View and San Jose, etc.).

3.0 PLAN IMPLEMENTATION

A. Systematic Component

A priority matrix of invasive plant species has been developed which integrates and weights a variety of factors including: the 2006 CAL-IPC ratings, the anticipated rate of spread without management intervention, the feasibility of effective control, impacts to fish and wildlife, impacts to sensitive plant communities, increases in flood or fire danger, and aggressive growth patterns known to cause structural damage to flood control facilities or impede maintenance access (Table 1).

California Department of Food and Agriculture (CDFA), CAL-IPC, and BAEDN invasive plant databases will be consulted periodically to ensure the District's priority matrix is up to date. The matrix will also be reviewed and updated to tailor the list to specific occurrence data in Santa Clara County and establish the priority targets for the year.

Specific locations targeted for control activities will be selected based on the baseline inventory (See Section 4 below) as well as a variety of other factors including: quality of habitat, feasibility of control, access constraints, etc. Integrated Vegetation Management techniques will be employed (ex., mechanical, chemical, combination, etc.) to utilize the most effective method for each species while providing the greatest amount of protection to environmental resources.

Success criteria will be developed for each site, and/or for each individual target species. Eradication will be the ultimate goal for defined sites where conditions exist to make it a realistic goal. Exclusion or containment strategies may be used where an invasive poses a threat to a sensitive species or habitat type and complete eradication is deemed infeasible. These control strategies may also be used to suppress highly competitive invasive species and give existing native species the ability to thrive.

Control work for certain species may require several years of treatment to be effective. Repeat invasive plant management mitigation activities, within a two-year period will be accounted toward the original mitigation requirement. For infestations that require more than two years of treatment, the work on the site in year three and following will become available to be counted as mitigation for new SMP maintenance activities (at a 50% rate for the patch area).

Efforts will be made to encourage natural revegetation/recruitment at treatment sites, including suppression of other weed species. In areas where revegetation does not occur naturally within 2 years, a biological/horticultural assessment will be made to determine what impediments may exist to natural revegetation. In areas where revegetation potential exists, a plan will be developed to install site-appropriate vegetation. Mitigation credits for revegetation may be applied, consistent with SMP 2012 mitigation accounting.

Once the annual mitigation needs are determined, a proposal for mitigation credit and the associated acreage to be treated for this program will be submitted with the “Notice of Proposed Work”. IPMP may be combined with other forms of mitigation such as revegetation or land acquisition to encourage a holistic mitigation program that is sustainable in the long term.

B. Opportunistic Component

Invasive plant species are frequently found during field inspections and are often associated with other identified SMP work activities (i.e., bank repair sites, sediment removal sites, minor maintenance sites, etc.). In these instances, opportunistic control of invasive plants may enhance habitat quality and benefit the ecological landscape.

There is no specific target acreage for the opportunistic component of the Program. Credit for these removals will be on a case by case/ site by site basis. Mitigation credit gained through this portion of the program will be used to defray for on-site vegetation impacts or to compensate for ongoing vegetation maintenance activities. Proposed mitigation credit for each project site will be submitted with the annual "Notice of Proposed Work."

C. Coordination & Education

The District will coordinate and collaborate with other regional control and early detection programs in order to stay apprised of regional issues (e.g., BAEDN, CAL-IPC, ISP, Arundo Del Norte, etc.). The IPMP will document invasive species occurrence and control data and submit pertinent information to regional databases (e.g., CAL-IPC, Cal Flora, and BAEDN).

Coordination will also take place with other landowners in Santa Clara County to try and accomplish a complementary and consistent approach to invasive plant management throughout the County (ex., Don Edwards National Wildlife Refuge, Cities of Palo Alto, Mountain View and San Jose, etc.).

An informational brochure highlighting priority invasive species will be published which includes pictures, provides descriptions, and discusses the threats posed by each plant to help educate District field staff and the public about these species. Increased awareness will aid with early detection and/or identification of previously unidentified locations of these species. In addition, during control activities, informational postings will be placed at publicly accessible sites.

4.0 MONITORING

A. Baseline Inventory and Database Development

The county-wide vegetation mapping conducted in 2010 by Aerial Information Systems, Inc. (AIS) for the SMP will be used to develop a baseline inventory of invasive species in the SMP footprint. This data layer will be supplemented with pertinent information collected by District staff and regional databases (e.g., CAL-IPC, Cal Flora, etc.) to establish the Year 1 baseline inventory.

The inventory will be updated annually based on field inspection data collected by Vegetation Management staff, biologists, and Field Operations Administrators. Over the life of the program, important information will be collected regarding the distribution of invasive species in Santa Clara County watersheds, their overall ecological impact, the

efficacy of management efforts, and the best direction for future management to reduce the negative ecological impacts of invasive plants.

B. Treatment Monitoring

Treatment areas will be mapped with a GPS and tracked for long-term success at all programmatic and opportunistic control sites. This will help determine the efficacy of the particular treatment and determine if additional control work and/or a different technique will be necessary. Results of the treatment monitoring will be critical for prioritizing follow-up treatments and planning seasonal work.

5.0 REPORTING

A proposal for mitigation credit will be submitted annually with the "Notice of Proposed Work." This proposal will discuss the mitigation details of both the systematic and opportunistic components of the IPMP. Acreage of target species to be controlled as well as general locations of control activities will be discussed.

Annual summary reports will be submitted to the regulatory agencies providing details regarding the species treated, control methods used, and locations of treatment work. Recommendations will be provided, including future management needs and the feasibility of active revegetation, if necessary.

6.0 SCHEDULE

The IPMP will be implemented over the course of the 10 year permit. Specific project milestones include:

- Regional coordination will be ongoing upon initiation of the program.
- Baseline invasive plant inventory will be completed within the first two years of the program.
- Priority matrix of invasive plant species will be updated as needed.
- Proposal for mitigation credit will be submitted annually with the "Notice of Proposed Work"
- Control efforts for the opportunistic component will begin in year 1 of the program.
- Control efforts for the programmatic component will begin in Year 2 after the baseline inventory is complete.
- Mitigation status will be reported annually.

7.0 PLAN ADMINISTRATION

This program has been constructed for the sole purpose of meeting the mitigation requirements of the SMP.

As a mitigation element of the SMP, the IPMP is defined as a separate work category. While it has elements of vegetation management, revegetation and maintenance it is not subject to the limitations defined for these separate work activities. Since the IPMP is a mitigation element, the IPMP will have a higher level of biological oversight and resource protection than other "impact" program components.

ATTACHMENT E

Large Woody Debris

Management of Large Woody Debris in Santa Clara County Streams

Guidelines for Implementation

Stream Maintenance Program Renewal Project

Prepared by Watershed Management Division

Melissa Moore

February 9, 2010

Management of Large Woody Debris in Santa Clara County Streams

Guidelines for Implementation

Objective

Retain woody debris in streams throughout Santa Clara County in order to preserve the physical and biological processes associated with the natural recruitment of wood to waterways. This is the process of altering urban streams so that their behavior corresponds as closely as possible with that of natural streams while providing some measure of flood protection (Keller and Hoffman, 1977).

Location, Size and Description of Large Woody Debris

These guidelines pertain to the instream area which is defined as the stream channel within ordinary high water discharge demarcations. The term ordinary high water is defined by the Army Corps of Engineers (ACOE) as that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas. Furthermore, these guidelines will utilize established methods of defining and classifying large woody debris (LWD) as outlined in California Salmonid Stream Habitat Restoration Manual (CDFG, 1998).

During the initial biological survey of the woody debris site, the biologist will be responsible for recording the size and position of the wood in relation to the channel. Large woody debris is defined as having a minimum diameter of 12 inches (30.5 cm) with a minimum length of 6 feet (1.82 meters). The size criterion is divided into four categories based on the position of the woody debris as follows: 1) dead or downed, 2) dead and standing, 3) perched (on the bank and soon to be in the stream channel area) 4) live (either coniferous or deciduous). Management of the area beyond the instream zone, the recruitment zone, which encompasses the floodplain, is not incorporated in these guidelines.

Management Strategy

In order to effectively manage large woody debris in streams within the urban landscape of Santa Clara County, the District will use a four tiered, multi-disciplined approach. Each tier will be described within this document however, minor modifications based on site conditions may occur.

1) Retain LWD in the Channel

Watershed maintenance crews will identify sites in which woody debris is proposed for removal. Each site will be evaluated by a biologist to determine the ecological and geomorphic integrity the wood is providing to the stream channel. During the biological evaluation the size and position of the wood in

relation to the wetted channel should be described. Additionally, a GPS point or GIS coordinates of the wood should be recorded regardless of the fact that the wood may eventually be removed. Watershed engineers may be asked to evaluate the woody debris to determine the potential for bank erosion, channel incision or infrastructure safety. If a consensus is reached to leave the wood in place, the watershed personal may collectively decide if the woody debris will require additional monitoring.

2) Modify Instream LWD

If the LWD cannot be left in its original configuration and position within the wetted channel due to flooding, trash or erosion potential, the wood can be modified and left in place. Modification can include; removal of small, lateral branches which capture debris, changing position of the LWD to avoid excessive bank scour or reconfiguration of the LWD to avoid aggradations or channel incision in select locations. The most important consideration in the decision making process to modify the LWD, is to retain its biological and geomorphic integrity. If that is not a feasible option, watershed staff should consider removal or remove/replace alternatives.

3) Remove LWD and Replace

If the watershed staff decide the wood is an imminent flood risk or infrastructure safety is of great concern, the third tier in the decision making process is to remove the wood from its original location and replace it elsewhere within the watershed. Considerations for the new location of wood placement could be the presence of a floodplain, larger width/depth ratio, greater biological value (i.e. natural channel versus modified), or simply improved access.

4) Remove LWD

If all other avenues of wood management are exhausted, tiers 1-3, watershed staff may decide that the wood requires complete removal from the stream channel. Complete removal may occur in highly modified streams with low or zero tolerance for instream vegetation or structures such as LWD.

Mitigation for LWD

Mitigation for LWD would only be required in creeks that support anadramous fish; though management of LWD is desired in all Santa Clara creeks. As shown in Figure 1. Large Woody Debris Accounting Criteria, only wood that is protruding into the ordinary high water area would need to be calculated for mitigation purposes. This demarcation is used as it is the wood within the ordinary high water area that is able to create habitat within the waterway.

The Mitigation Approach Memorandum, Appendix C FSEIR, describes the mitigation requirements and methods to meet those requirements. Modification of these requirements may be made through the Biological Opinion of the National Marine Fisheries Service.

Work Window for LWD

LWD management will follow the same work windows as for vegetation management. Modification of these requirements may be made through the Biological Opinion of the National Marine Fisheries Service.

Monitoring LWD

The selection of when and what to monitor will be derived from any concerns that arose during the decision making process (tiers 1-3) to leave the wood in place. For example, if the potential for bank scour was cited as a chance of occurrence, the team may decide to install lateral scour bars into the bank. Painted rebar will be installed laterally into the stream bank at selected locations to determine if local scour occurs due to the presence of the wood in the channel. If excessive aggradations or channel incision is a concern for watershed staff, then scour chains can be installed in appropriate locations.

After a decision is reached to monitor the LWD, the biologist will be responsible for installation of the agreed upon monitoring tools (i.e. lateral scour bars, scour chains) and installation of the tree tag. All LWD that requires monitoring will be fitted with an aluminum tree tag and given a unique identifying number. An important component to monitoring LWD is to determine the flow rate at which the wood will move. If the wood moves from its original location during a storm event, the biologist will survey downstream locations for the LWD and determine the maximum discharge from the closest upstream gauge. This information can be utilized in future decision making processes to leave/remove LWD within a watershed context. Most geomorphic effects of wood in rivers arise from large, stable logs (Montgomery, 2003). Finding the threshold for size and movement will assist the watershed staff in long term management of wood in local urbanized drainages. If the LWD does move from its original location it will have to be reassessed for safety/flooding concerns.

After the watershed staff decides to monitor the wood, a determination on the frequency of the monitoring will occur. Factors to consider when deciding how often the biologist should monitor the LWD can be determined based on location of the LWD within the watershed, presence of a floodplain, water management upstream of LWD structure, the spatial relationship of LWD with urban infrastructure (i.e. bridges), or duration and amount of rainfall.

Database Management

Each request submitted by watershed maintenance staff for biological evaluation of LWD can be tracked in the database management system. The database can track what percentage of wood is left in place within a watershed, what is modified and what is removed. Effectively managing LWD overtime, can improve channel processes which will enhance habitat features as well as reduction of trucking and disposal costs of LWD.

Summary of Roles and Responsibilities

1) Watershed maintenance staff submits work request for removal of LWD
2) Biologist surveys wood to determine ecological/geomorphic integrity
3) Both maintenance staff and biologist determine if LWD stays in place. If both parties are not in agreement, consultation of a watershed engineer is required. Staff can then determine a course of action based on the four tiered approach.
4) If monitoring is required, the biologist assigned the original evaluation will be in charge of installation of monitoring devices and periodic monitoring.

5) The biologist is responsible for entry of all applicable data into the management system.

Literature Cited

CDFG. California Department of Fish and Game. 1998. California Salmonid Stream Habitat Restoration Manual. State of California Resources Agency. Third Edition.

Keller, E.A., and E.K. Hoffman. 1977. Urban streams: sensual blight or amenity. Journal of Soil and Water Conservation 32:237-242.

Montgomery, D.R., B.D. Collins and J.M. Buffington. 2003. Geomorphic Effects in Rivers. American Fisheries Society Symposium 37: 21-47.

Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

ATTACHMENT F

Best Management Practices (BMPs)

2012-2022 Stream Maintenance Program

Table 2-12. BMPs Listings

A. SECTION A –Pre-Project Planning and General BMPs

General BMPs are applicable program-wide, for most routine SMP maintenance activities. These measures include standard construction practices and impact avoidance measures that will minimize potential environmental impacts. These BMPs will be implemented by the stream maintenance crew, as appropriate and as overseen by site managers, for all activities associated with the maintenance program. The majority of these BMPs are implemented prior to and during maintenance operations, though the level of activity varies depending on the work type.

Other General BMPs are conducted prior to implementing maintenance activities on site. This group of measures includes procedures to identify site or maintenance constraints, such as biological or cultural resource surveys which coincide with permit compliance requirements. Site design constraints for sediment and bank stabilization activities in particular are also identified as part of the pre-project planning process.

BMP Number	BMP Title	BMP Description
GEN-1	In-Channel Work Window	All ground-disturbing maintenance activities (i.e., sediment removal, bank stabilization, tree removal, and mechanized vegetation management) occurring in the channel (below bankfull) will take place between June 15 and October 15. Requests for work window extensions must be submitted to the regulatory agencies by October 1st, listing the creek names and reaches where a work extension will occur. Work extensions vary per work activity. The agencies will provide a single response within one week. Significant rainfall applies after October 15. An extension through December 31 may apply if the following requirements are met and regulatory agency approval is received: For ground-disturbing activities: ▪ Work may continue if no significant rainfall, defined as greater than 0.5 inches per 24 hours within a local watershed, is either forecasted[1] or observed. Following October 15th, maintenance work shall cease for the season if such a rain event is forecasted or observed. Sediment removal ▪ Extended Work Window: 1. Creeks supporting anadromous fish: An extended work window may occur from October 15 through October 31, or until local rainfall of 0.5 inches or greater falls within the subject watershed within a 24-hour period, whichever occurs first. 2. Creeks not supporting anadromous fish: An extended work window may occur from October 15 through November 30th, or until local rainfall of 0.5 inches or greater falls within the subject watershed within a 24-hour period, whichever occurs first. ▪ Extended Work Window in Lower Quality Areas: 1. Sediment removal work may occur until December 31. 2. Work will only occur on Berryessa Creek (0-88+80; 232+70-236+00; 284+30-288+00), Lower Silver Creek (Reach 3 between Stations 37+40 and 381+19), Thompson Creek (0+00-10+00), Canoas Creek (0+00-390+00), Ross Creek (0+00-86+30), Calabazas Creek (35+00-105+00), and San Tomas

[1] Weather Forecasts. No phase of the project may be started if that phase and its associated erosion control measures cannot be completed prior to the onset of a storm event if that construction phase may cause the introduction of sediments into the stream. Seventy-two-hour weather forecasts from the National Weather Service or other localized and more detailed weather forecast service will be consulted prior to start up of any phase of the project that may result in sediment runoff to a stream.

BMP Number	BMP Title	BMP Description
		Aquino Creek (80+00-100+00) ~~can continue~~ with the following conditions: o site conditions are dry and access for all construction equipment and vehicles will not impact waterways; and ~~o~~ all work will stop if any rainfall is forecast for the next 72 hour period. 3. Work may occur after a significant rainfall event but no later than December 31. 4. Sites must be maintained in a rapidly winterizable[2] state (implement control measures BMP GEN-20). Bank stabilization projects may continue until the approved date stated below. Prior to a forecasted significant rainfall event (0.5 in/24 hrs), all incomplete bank stabilization projects must be winterized. 1. In Creeks Supporting Anadromous Fish o An extended work window may occur until October 31st for bank stabilization projects that will be 50% complete by October 15th. 2. In Creeks Not Supporting Anadromous Fish o An extended work window may occur until November 30th for projects that will be 50% complete by October 15th or until significant rainfall. o An extended work window may occur until November 30th for new bank stabilization projects that will be completed in five (5) days or less, or until significant rainfall. ▪ Instream hand pruning and hand removal of vegetation will occur year round, except when: o Wheeled or tracked equipment needs to access the site by crossing a creek, ponded area, or secondary channel; or o Work occurs in streams that support steelhead. In these streams instream vegetation maintenance will cease on December 31 or when local rainfall greater than 0.5 inches is predicted within a 24-hour period of planned activities, whichever happens first. Modification and removal of instream large woody debris will occur at any time of the year, and as further described in the NMFS Biological Opinion.
GEN-2	Instream Herbicide Application Work Window	Instream herbicide applications will take place between June 15 and October 31 for streams with steelhead, and June 15 to December 31 for non-steelhead streams or until the first occurrence of any of the following conditions; whichever happens first: ▪ local rainfall greater than 0.5 inches is forecasted within a 24-hour period from planned application events; or ▪ when steelhead begin upmigrating and spawning in the 14 steelhead creeks, as determined by a qualified biologist (typically in November/December), o A qualified biologist will determine presence/absence of sensitive resources in designated herbicide use areas and develop site-specific control methods (including the use of approved herbicide and surfactants). Proposed herbicide use would be limited to the aquatic formulation of glyphosate (Rodeo or equal). Surfactant use would be limited to non-ionic products, such as Agri-dex, Competitor, or another brand name using the same ingredients. Any modifications to these materials would require review and approval by NMFS and CDFG.

[2] Winterization is the process to maintain work sites with the appropriate BMP's to prevent erosion, sediment transport, and protect water quality. Winterization occurs upon completion of bank repairs or on incomplete projects after October 15 and prior to the forecast of significant rainfall, 0.5 inches or greater of local watershed rainfall within 24 hours. Winterization shall be completed prior to the occurrence of such actual significant rainfall.

BMP Number	BMP Title	BMP Description
		o A qualified fisheries biologist will review proposed herbicide application methods and stream reaches. The fisheries biologist would conduct a pre-construction survey (and any other appropriate data research) to determine whether the proposed herbicide application is consistent with SMP approvals concerning biological resources and determine which BMPs would be instituted for work to proceed. In addition, herbicide application requirements are as follows: ▪ no direct application into water; ▪ herbicide application shall not occur when wind conditions may result in drift; ▪ herbicide shall only be applied after the surfactant has a "wet" appearance on the target plants in order to avoid run off; and ▪ where permitted, surfactants shall be added to the spray solution prior to application.
GEN-3	Avoid Exposing Soils with High Mercury Levels	Sediment removal and bank stabilization projects in portions of the Guadalupe River watershed affected by historic mercury mining may expose soils containing mercury. 1. In specified maintenance reaches in the Guadalupe River Basin, soils that are likely to be disturbed or excavated shall be tested for mercury (Hg). Soils shall be remediated if: a. disturbed or excavated soils exposed to streamflow below the elevation of the 2.33-year flow event exceed 1 ppm Hg; or b. disturbed or excavated soils above the 2.33-year flow level exceed 20 ppm Hg. 2. Remediation may be accomplished either by: a. treating the site so that contaminated soils excavated for the purpose of bank stabilization shall not be susceptible to erosion; or b. further excavating contaminated soils and replacing them with clean fill or other bank stabilization materials that are free from contaminants. c. Soils with mercury concentrations exceeding 20 mg/kg shall be removed and disposed of in a Class I landfill following established work practices and hazard control measures. Soils with mercury concentrations less than 20 mg/kg will remain at the project site. 3. To ensure worker safety during sediment removal and bank stabilization projects with elevated mercury concentrations in the exposed surfaces, personal protective equipment will be required during project construction to maintain exposure below levels established by the Occupational Safety and Health Agency (OSHA).

Biological Resources

GEN-4	Minimize the Area of Disturbance	To minimize impacts to natural resources, soil disturbance will be kept to the minimum footprint necessary to complete the maintenance operation.
GEN-5	Mitten Crab Control Measure	Sediment from the San Francisco Bay Watershed, including that for reuse, cannot be moved to areas any farther south than Coyote Creek Golf Drive in south San Jose, and the intersection of McKean and Casa Loma Roads.
GEN-6	Minimize Impacts to Nesting Birds via Site Assessments and Avoidance Measures	1. For activities occurring between January 15 and August 31, project areas will be checked by a qualified biologist or Designated Individuals (DI – for limited ground nesting species surveys) for nesting birds within 2 weeks prior to starting work. If a lapse in project-related work of 2 weeks or longer occurs, another focused survey will be conducted before project work can be reinitiated. 2. If nesting birds are found, a buffer will be established around the nest and maintained until the young have

BMP Number	BMP Title	BMP Description
		fledged. Appropriate buffer widths are 0.5 mile for bald and golden eagles; 250 feet for other raptors and the least Bell's vireo, herons, and egrets; 25 feet for ground-nesting non-raptors; and 50 feet for non-raptors nesting on trees, shrubs and structures. A qualified biologist may identify an alternative buffer based on a site specific-evaluation. No work within the buffer will occur without written approval from a qualified biologist, for as long as the nest is active. 3. All vegetation management, sediment reuse, road grading, or other SMP activities in or immediately adjacent to suitable California clapper rail or Alameda song sparrow nesting habitat, as determined by a qualified biologist, shall not be conducted prior to September 1 (the non-nesting season). 4. If a pre-activity survey in high-quality San Francisco common yellowthroat breeding habitat (as determined by a qualified biologist) identifies more singing male San Francisco common yellowthroats than active nests, then the inconspicuous nests of this species might have been missed. In that case, maintenance activities in that area shall be delayed until the San Francisco common yellowthroat non-breeding season (i.e., August 16–March 14). 5. The boundary of each buffer zone will be marked with fencing, flagging, or other easily identifiable marking if work will occur immediately outside the buffer zone. 6. All protective buffer zones will be maintained until the nest becomes inactive, as determined by a qualified biologist. 7. If monitoring shows that disturbance to actively nesting birds is occurring, buffer widths will be increased until monitoring shows that disturbance is no longer occurring. If this is not possible, work will cease in the area until young have fledged and the nest is no longer active.
GEN-6.5	Protection of Nesting Least Bell's Vireos	1. To the extent feasible, SMP activities within woody riparian habitat along portions of lower Llagas Creek downstream from Highway 152, the Pajaro River from Llagas Creek downstream, and lower Uvas/Carnadeo Creek downstream from Hecker Pass Road shall be scheduled to occur outside of the least Bell's vireo nesting season (March 15 – July 31). 2. For activities within woody riparian habitat along the aforementioned creek reaches that will occur between March 15 and July 31, any work will be preceded by a focused survey for least Bell's vireos. Pre-activity surveys will consist of two site visits, conducted on separate days within 14 days before the initiation of maintenance activities in the given area, with at least one of these surveys occurring within 7 days before the initiation of such activities. Surveys will be conducted between dawn and 11:00 a.m., during mild weather conditions (i.e., not during excessive cold, heat, wind, or rain), within all riparian habitat in and within 250 feet of any proposed maintenance location along these reaches. The surveys will be conducted by a qualified biologist who is familiar with the visual and auditory identification of this species. 3. To minimize impacts to nesting least Bell's vireos and other birds, the biologist will not initially be looking for Bell's vireo nests during these surveys. Rather, the biologist will look and listen for individual vireos. If a least Bell's vireo is detected, it will be observed to determine whether it is actively nesting. The biologist will note the nest location, or if finding the actual nest could result in excessive disturbance or risk damaging the nest, the biologist will determine the approximate location, based on observation of birds carrying nesting material, carrying food, or repeatedly visiting a certain area. 4. If an active nest is found, a minimum 250-foot no-activity buffer will be established around the nest. If a territorial male is found but no nest can be detected, then the approximate centroid of the bird's area of activity will be the point from which the buffer will be applied. The required buffer may be reduced in areas where

BMP Number	BMP Title	BMP Description
		dense riparian forest occurs between the construction activities and the active nest or where sufficient barriers or topographic relief exists to protect the nest from excessive noise or other disturbance. The biologist will coordinate with the USFWS and CDFG to evaluate exceptions to the minimum no-activity buffer distance on a case-by-case basis. 5. No work will occur within the buffer without verification by a biologist that the nest is inactive and until any fledged young are no longer dependent on adults for food.
GEN-7	Protection of Burrowing Owls	1. Work within 250 feet of an occupied burrow will be delayed until after the nesting season. 2. If suitable burrowing owl habitat is identified where mowing is proposed, or active burrows are found, they will be marked in such a way that the mower can identify the locations of such burrows. Mowing can then occur anywhere beyond the 250 foot buffer zone. Within the 250 foot buffer zone mowing may be done to within 10 feet of an active burrow provided there are~~is~~ no burrowing owls active on the surface. An on-site monitor will observe the area in front of the mower from a safe vantage point while it is in operation. In areas within 10 ft of active burrows the vegetation may be removed by hand (e.g., weed-whackers). All mowing and hand-removal of vegetation within 250 ft of a burrow will be done as quickly as possible to minimize disturbance of burrowing owls. 3. All markers will be removed once mowing is complete. 4. For burrow destruction work, all burrows within the 250-foot buffer zone around known, occupied burrows will be inspected with a burrow camera prior to destruction to ensure no entrapment of burrowing owls. Burrows that are difficult to inspect due to intricate subterranean configuration or depth will be inspected in stages where the uninspected section of the burrow will be protected while the previously inspected section is excavated. If maintenance activities will directly impact occupied burrows the District will consult with the DFG and FWS on establishing alternative burrows (including artificial burrows) and a process for removing owls from the active burrow. No burrowing owls will be evicted from burrows during the nesting season.
GEN-8	Protection of Sensitive Fauna Species from Herbicide Use	Approved herbicides and adjuvants may be applied in habitat areas for sensitive wildlife species (including steelhead, California red-legged frog, California tiger salamander, salt marsh harvest mouse, and Bay checkerspot butterfly); all applications will occur in accordance with federal and state regulations. For sprayable or dust formulations: when the air is calm or moving away from sensitive wildlife habitat, applications will commence on the side nearest the habitat and proceed away from the habitat. When air currents are moving toward habitat, applications will not be made within 200 yards by air or 40 yards by ground upwind from occupied habitat. However, these distances may be modified for the control of invasive species on salmonid streams if the following measures are implemented: ▪ A qualified biologist will determine presence/absence of sensitive resources in designated herbicide use areas and develop site-specific control methods (including the use of approved herbicide and surfactants). Proposed herbicide use would be limited to the aquatic formulation of glyphosate (Rodeo or equal). Surfactant use would be limited to non-ionic products, such as Agri-dex, Competitor, or another brand name using the same ingredients. Any modifications to these materials would require review and approval by NMFS and CDFG. ▪ A qualified fisheries biologist will review proposed herbicide application methods and stream reaches. The fisheries biologist would conduct a pre-construction survey (and any other appropriate data research) to determine whether the proposed herbicide application is consistent with SMP approvals concerning

BMP Number	BMP Title	BMP Description
		biological resources and determine which BMPs would be instituted for work to proceed.
GEN-9	Avoid Impacts to Special-Status Plant Species and Sensitive Natural Vegetation Communities	A qualified botanist will identify special status plant species and sensitive natural vegetation communities and clearly map or delineate them as needed in order to avoid and/or minimize disturbance, using the DFG protocols and the *CNPS Botanical Survey Guidelines* to formulate the following protocols: 1. A qualified botanist will use the GIS database, CNDDB, and/or other suitable tools to identify special status plants and sensitive natural vegetation communities located within or near work areas. 2. Surveys of areas identified as sensitive natural communities or suitable habitat for special status plant species will be conducted by a qualified botanist prior to commencement of work. 3. Surveys will be conducted during the appropriate time of the year to adequately identify special-status plants that could occur on the site of proposed maintenance activities. 4. The qualified botanist will ensure avoidance and/or minimize impacts by implementing one or more of the following, as appropriate, per the botanist's recommendation: a) Flag or otherwise delineate in the field the special status plant populations and/or sensitive natural community to be protected; b) Allow adequate buffers around plants or habitat; the location of the buffer zone will be shown on the maintenance design drawings and marked in the field with stakes and/or flagging in such a way that exclusion zones are visible to maintenance personnel without excessive disturbance of the sensitive habitat or population itself (e.g., from installation of fencing). c) Time construction or other activities during dormant and/or non-critical life cycle period; d) Store removed sediment off site; and e) Limit the operation of maintenance equipment to established roads whenever possible. 5. No herbicides, terrestrial or aquatic, will be used in areas identified as potential habitat for special status plants species or containing sensitive natural communities, until a qualified botanist has surveyed the area and determined the locations of special status plant species present. 6. If special status plant species or sensitive communities are present, then a qualified botanist will determine if a given type of vegetation management method is ecologically appropriate for a given area. Alternative strategies based on the botanist's recommendations will be coordinated with appropriate staff. 7. All impacts to sensitive natural communities and special status plants identified by the qualified botanist will be avoided and/or minimized
GEN-10	Avoid Impacts to Bay Checkerspot Butterfly and Associated Critical Habitat	1. Areas supporting Bay checkerspot larval host plants will be identified by a qualified botanist and protected from disturbance to the extent feasible, by establishing buffer zones around individual plants or populations. The size of the buffer will be determined by a qualified botanist; the actual distance will depend on the plant species potentially affected and the type of disturbance. No herbicide will be applied to the buffer area, and to the extent feasible, maintenance personnel and equipment will not operate within such areas. 2. Herbicides may be used in serpentine areas that do not contain Bay checkerspot butterfly larval host plants or sensitive plant species and habitat when approved by a qualified botanist and for the following maintenance purposes: a) To protect sensitive species and habitat; b) To manage for control of invasive and non-native plants; and/or c) To maintain access to a facility.
GEN-11	Protection of Salt Marsh	1. A District qualified biologist will conduct a desk audit to determine whether suitable Salt Marsh Harvest Mouse

BMP Number	BMP Title	BMP Description
	Harvest Mouse and California Clapper Rail	(SMHM) or California Clapper Rail (CCR) habitat is present in or adjacent to a maintenance activity. 2. Within 7 days prior to work within the range of the Salt Marsh Harvest Mouse (SMHM) or California Clapper Rail (CCR), as depicted on the District's GIS layers, the proposed project area will be surveyed by a qualified biologist to identify specific habitat areas. Surveyed areas will include work locations and access routes. 3. To minimize or avoid the loss of individuals, activities within or adjacent to California clapper rail and salt marsh harvest mouse habitat will not occur within two hours before or after extreme high tides (6.5 feet or above) when the marsh plain is inundated, because protective cover for those species is limited and activities could prevent them from reaching available cover. 4. Specific habitat areas are vegetated areas of cordgass (*Spartina* spp), marsh gumplant (*Grindelia* spp.), pickleweed (*Sarcocornia pacifica*), alkali heath, (*Frankenia* sp.), and other high marsh vegetation, brackish marsh reaches of creek with heavy accumulations of bulrush thatch (old stands), and high water refugia habitat that may include annual grasses, and shrubs immediately adjacent to channels. 5. Within the identified specific habitat areas, vegetation will be removed by hand from areas to be directly impacted by the work activities if possible (hand removal of vegetation in some channels may not be possible). 6. Prior to the initiation of work each day for all vegetation management work, ground or vegetation disturbance, operation of large equipment, grading, sediment removal, and bank stabilization work and prior to expanding the work area, if suitable habitat occurs within the immediate work area, a qualified biologist will conduct a pre-construction survey of all suitable habitat that may be directly or indirectly impacted by the day's activities (work area, access routes, staging areas). a. If during the initial daily survey or during work activities a CCR is observed within or immediately adjacent to the work area (50 feet), initiation of work will be delayed until the CCR leaves the work area. b. If during the initial daily survey or during work activities a SMHM or similar rodent is observed within or immediately adjacent to the work area (50 feet), initiation of work will be delayed until a *Site Specific Species Protection Form* can be developed and implemented by a qualified biologist to protect the SMHM or similar rodent is developed and implemented by the qualified biologist. Acceptable plan activities may include one or more of the following activities: 1) establishment of a buffer zone at least 50 feet in radius from the rodent; 2) ongoing active monitoring, 3) construction of silt fence barrier between maintenance work and location of the rodent, 4) delay of work activity until the qualified biologist can contact DFG and USFWS for additional direction. 7. Mowing using heavy equipment (tractors, boom mowers, rider mowers) will not be conducted in habitat areas or within 50 feet of habitat areas. If mowing with hand equipment is necessary within 50 feet of habitat areas, an on-site monitor will observe the area in front of the mower from a safe vantage point while it is in operation. If SMHM are detected within the area to be mown, no mowing will occur in that area. If CCR are detected within the area to be mown, the mowing will stop until the individual(s) have left the work area. 8. See ANI-2 for additional restrictions.
GEN-12	Protection of Special-Status Amphibian and Reptile Species	1. A District qualified biologist will conduct a desk audit to determine whether suitable special-status amphibian or reptile habitat is present in or adjacent to a maintenance activity. 2. If the District Wildlife or Fisheries Biologist determines that a special-status amphibian or reptile could occur in the activity area, a qualified biologist will conduct one daytime survey within a 7 day period preceding the onset

BMP Number	BMP Title	BMP Description
		of maintenance activities. a. If a special-status amphibian or reptile, or the eggs or larvae of a special status amphibian or reptile, are found within the activity area during a pre-activity survey or during project activities, the qualified biologist shall notify the project proponent about the special-status species and conduct the following work specific activities: i. For minor maintenance activities and for vegetation removal activities that will take less than 1 day, the qualified biologist shall conduct a special status species survey on the morning of and prior to the scheduled work. A. If no special status species is found, the work may proceed. B. If eggs or larvae of a special status species are found, a buffer will be established around the location of the eggs/larvae and work may proceed outside of the buffer zone. No work will occur within the buffer zone. Work within the buffer zone will be rescheduled until the time that eggs have hatched and/or larvae have metamorphosed. C. If an active western pond turtle nest is detected within the activity area, a 50-foot buffer zone around the nest will be established and maintained during the breeding and nesting season (April 1 – August 31). The buffer zone will remain in place until the young have left the nest, as determined by a qualified biologist. D. If adults or non-larval juveniles of a special status species are found, one of the following two procedures will be implemented: i. If, in the opinion of the qualified biologist, capture and removal of the individual to a safe place outside of the work area is less likely to result in adverse effects than leaving the individual in place and rescheduling the work (e.g., if the species could potentially hide and be missed during a follow-up survey), the individual will be captured and relocated by a qualified biologist (with USFWS and/or CDFG approval, depending on the listing status of the species in question), and work may proceed. ii. If, in the opinion of the qualified biologist, the individual is likely to leave the work area on its own, and work can be feasibly rescheduled, a buffer will be established around the location of the individual(s) and work may proceed outside of the buffer zone. No work will occur within the buffer zone. Work within the buffer zone will be rescheduled. ii. For minor maintenance and vegetation removal activities that will take more than 1 day, the qualified biologist shall conduct a special-status species survey on each morning of and prior to the scheduled work commencing. E. If eggs or larvae of a special status species are found, a buffer will be established around the location of the eggs/larvae and work may proceed outside of the buffer zone. No work will occur within the buffer zone. Work within the buffer zone will be rescheduled until the time that eggs have hatched and/or larvae have metamorphosed. F. If an active western pond turtle nest is detected within the activity area, a ~~25~~50 ft-buffer zone around the nest will be established and maintained during the breeding and nesting season (April 1 – August 31). The buffer zone will remain in place until the young have left the nest, as determined by a qualified biologist. G. If adults or non-larval juveniles of a special status species are found, the individual will be captured and relocated by a qualified biologist (with USFWS and/or CDFG approval,

BMP Number	BMP Title	BMP Description
		depending on the listing status of the species in question), and work may proceed. iii. For Sediment Removal and Bank Stabilization Projects the wildlife or fisheries biologist in cooperation with the project proponent shall complete a *Site Specific Species Protection Form for the project*. Elements of the form include: work rescheduling, training work crews, daily surveys, establishment of buffers and buffer fencing, on-site monitoring, habitat modification in advance of work activities, capture and relocation of individual special-status species, methods of documentation, and reporting of results. b. If no special status amphibian or reptile is found within the activity area during a pre-activity survey, the work may proceed. c. During animal conflict management activities, if special status species are found within a burrow proposed for destruction, a qualified biologist will determine an appropriate buffer distance around that burrow to ensure adequate protection of the habitat. The buffer area may include not destroying adjacent burrows as that may damage subterranean networks of the occupied burrow or produce substrate vibrations which could interfere with prey detection mechanisms. If two consecutive follow up surveys are conducted (spaced 30 days apart) in which the burrow is found to be unoccupied, work can proceed as planned. A naturally found back filled burrow known to have been inhabited by a special-status species will be presumed to still be occupied by that species and a clearly delineated buffer demarcation of the burrow area will be in place for the duration of nearby work activities. In rare instances in which destruction of the burrow is not avoidable during animal conflict management, the animal will be relocated to a safe burrow outside the impact area, with USFWS and/or CDFG approval, depending on the listing status of the species in question. A biologist will observe the relocated animal until it is certain that the animal is not in immediate danger of desiccation or predation.
GEN-13	Protection of Bat Colonies	1. A District Wildlife Biologist will conduct a desk audit to determine whether suitable habitat (appropriate roost trees or anthropogenic structures) is present for bat colonies within 100 feet of the work site, staging areas, or access routes. 2. If potential bat colony habitat is determined to be present, within two weeks prior to the onset of work activities a qualified biologist will conduct a survey to look for evidence of a bat use. If evidence is observed, or if potential roost sites are present in areas where evidence of bat use might not be detectable (such as a tree cavity), an evening survey and/or nocturnal acoustic survey may be necessary to determine if the bat colony is active and to identify the specific location of the bat colony. 3. If an active bat maternity colony is present then the qualified biologist will make the following determinations: a. The work can proceed without unduly disturbing the bat colony b. There is a need for a buffer zone to prevent disturbance to the bat colony, and implementation of the buffer zone (determined on a case-by-case basis by a qualified biologist) will reduce or eliminate the disturbance to an acceptable level. c. Work cannot proceed without unduly disturbing the bat colony; thus, the work will be postponed until after July 31. 4. If a non-breeding bat hibernaculum is found in a tree or structure that must be removed or physically disturbed, the qualified biologist will consult with DFG prior to initiating any removal or exclusion activities.
GEN-14	Protection of San Francisco Dusky-footed Woodrat	1. Prior to work within riparian, oak woodland, or coyote brush scrub habitat, or the removal of any oak trees outside these habitats, a District Wildlife Biologist will conduct a desk audit to determine whether woodrats

BMP Number	BMP Title	BMP Description
		could be present within suitable habitat for San Francisco dusky-footed woodrat or is known to be present in or adjacent to a maintenance activity site. 2. If the District Wildlife Biologist determines that no San Francisco dusky-footed woodrat habitat is present, or there is habitat present but will not be affected by the maintenance activity, then no further action is required. 3. If the District Wildlife Biologist determines that suitable San Francisco dusky-footed woodrat habitat is present and may be affected by the maintenance activity, a qualified biologist shall conduct a pre-activity survey within 2 weeks prior to the start of work to determine if woodrat nests are in, or within 5 feet of, the immediate activity area. a. If woodrat nests are present at the site and will be affected by the work activity area, the District Wildlife Biologist in cooperation with the project proponent will evaluate the site specific situation. The Wildlife Biologist will then develop a site specific woodrat management plan to first avoid and second minimize take or injury of the woodrat(s). The woodrat management plan may include: establishment of buffers zones, installation of buffer zone fences, relocation of the woodrat nest, removal of the woodrat nest, and/or construction of artificial nests. Consideration will be given to the number of woodrat nests that may be affected by the work activity and the number in the project vicinity that may not be affected.
GEN-15	Salvage Native Aquatic Vertebrates from Dewatered Channels	If fisheries or native aquatic vertebrates are present when cofferdams, water bypass structures, and silt barriers are to be installed, a fish and native aquatic vertebrate relocation plan shall be implemented to ensure that fish and native aquatic vertebrates are not stranded. Relocation efforts will be based on the District's Fish Relocation Guidelines. Streams that support a sensitive species (i.e. steelhead) will require a relocation effort and/ or initial onsite monitoring by a qualified biologist depending on seasonal conditions: 1. In non-tidal channels, where water is to be diverted, prior to the start of work or during the installation of water diversion structures, native aquatic vertebrates shall be captured in the work area and transferred to another reach as determined by a qualified biologist. Timing of work in streams that supports a significant number of amphibians will be delayed until metamorphosis occurs to minimize impacts to the resource. Capture and relocation of aquatic native vertebrates is not required at individual work sites when site conditions preclude reasonably effective operation of capture gear and equipment. 2. Aquatic invertebrates will not be transferred (other than incidental catches) because of their anticipated abundance and colonization after completion of the repair work.
GEN-15.5	Avoidance of Impacts on the San Joaquin Kit Fox	1. A qualified District biologist will conduct a desk audit to determine whether an SMP activity will occur in an area where the San Joaquin kit fox could potentially occur (i.e., roughly east of Frazier Lake Road and south of Bloomfield Avenue), and in potential habitat for the species. 2. If the District biologist determines that an SMP activity could occur in an area that could potentially support a kit fox, the SCVWD will implement applicable pre-activity surveys and other measures in accordance with the USFWS's *San Joaquin Kit Fox Survey Protocol for the Northern Range*, as follows: a) Conduct a preconstruction/pre-activity survey no less than 14 days and no more than 30 days prior to the beginning of project implementation. Surveys shall identify kit fox habitat features on the project site and evaluate use by kit fox and, if possible, and assess the potential impacts to the kit fox by the proposed activity. The status of all dens shall be determined and mapped in accordance with the survey protocol. b) If a natal/pupping den is discovered within the project area or within 200 feet of the project boundary,

BMP Number	BMP Title	BMP Description
		the USFWS shall be immediately notified. Disturbance to all San Joaquin kit fox dens should be avoided to the maximum extent possible. Destruction of any known or natal/pupping kit fox den would require take authorization from the USFWS. c) The project proponent will establish exclusion zones around the kit fox dens, if determined to be present. The configuration of the exclusion should have a radius measured outward from the entrance or cluster of entrances. The following radii are minima to be applied: ▪ Potential den: 50 feet ▪ Known den: 100 feet ▪ Natal/pupping den: Service must be contacted (occupied and unoccupied) ▪ Atypical den: 50 feet. 3. If take of the San Joaquin kit fox will occur, take authorization from the USFWS and CDFG will be necessary.

General Maintenance Practices

GEN-16	In-Channel Minor Activities	For in-channel minor work activities, work will be conducted from the top of the bank if access is available and there are flows in the channel.
GEN-17	Employee/Contractor Training	All appropriate District staff and contractors will receive annual training on Stream Maintenance Program BMPs. The training will also include an overview of special-status species identification and habitat requirements. District staff and contractors will receive fact sheets to assist with in-the-field identification of special-status species and their habitats.
GEN-18	Paperwork Required On-site	1. Copies of regulatory permits related to the Stream Maintenance Program will be kept on-site and available for review, if requested by regulatory personnel. 2. Copies of the Stream Maintenance Program Manual and this BMP Manual will be kept on-site.
GEN-19	Work Site Housekeeping	1. District employees and contractors will maintain the work site in neat and orderly conditions on a daily basis, and will leave the site in a neat, clean, and orderly condition when work is complete. 2. Slash, sawdust, cuttings, etc. will be removed to clear the site of vegetation debris. As needed, paved access roads and trails will be swept and cleared of any residual vegetation or dirt resulting from the maintenance activity. 3. For activities that last more than one day, materials or equipment left on the site overnight will be stored as inconspicuously as possible, and will be neatly arranged. Any materials and equipment left on the site overnight will be stored to avoid erosion, leaks, or other potential impacts to water quality (see BMPs GEN-24). 4. The District's maintenance crews are responsible for properly removing and disposing of all debris incurred as a result of construction within 72 hours of project completion. 5. All trash that is brought to a project site during maintenance activities (e.g., plastic water bottles, plastic lunch bags, cigarettes) will be collected at the site daily.
GEN-20	Erosion and Sediment Control Measures	1. Soils exposed due to maintenance activities will be seeded and stabilized using hydroseeding, straw placement, mulching, and/or erosion control fabric. These measures will be implemented such that the site is stabilized and water quality protected prior to significant rainfall. The channel bed and areas below the Ordinary High Water Mark (OHWM) are exempt from this BMP. 2. The preference for erosion control fabrics will be to consist of natural fibers; however, steeper slopes and areas that are highly erodible may require more structured erosion control methods. No non-porous fabric will

BMP Number	BMP Title	BMP Description
		be used as part of a permanent erosion control approach. Plastic sheeting may be used to temporarily protect a slope from runoff, but only if there are no indications that special-status species would be impacted by the application. 3. Erosion control measures will be installed according to manufacturer's specifications. 4. Appropriate measures include, but are not limited to, the following: o Silt Fences o Straw Bale Barriers o Brush or Rock Filters o Storm Drain Inlet Protection o Sediment Traps o Sediment Basins o Erosion Control Blankets and Mats o Soil Stabilization (i.e. tackified straw with seed, jute or geotextile blankets, etc.) o Wood chips o Straw mulch 5. All temporary construction-related erosion control methods shall be removed at the completion of the project (e.g. silt fences). 6. Surface barrier applications installed as a method of animal conflict management, such as chain link fencing, woven geotextiles, and other similar materials, will be installed no longer than 300 feet, with at least an equal amount of open area prior to another linear installation; and only on one side of levee slopes. Inboard and outboard areas will only have installations set in an alternating pattern, such that no inboard and outboard levee faces would have erosion control blankets along the same levee stationing.
GEN-21	Staging and Stockpiling of Materials	1. To protect on-site vegetation and water quality, staging areas should occur on access roads, surface streets, or other disturbed areas that are already compacted and only support ruderal vegetation. Similarly, all maintenance equipment and materials (e.g., road rock and project spoil) will be contained within the existing service roads, paved roads, or other pre-determined staging areas. 2. Building materials and other maintenance-related materials, including chemicals and sediment, will not be stockpiled or stored where they could spill into water bodies or storm drains. Materials will not be stockpiled longer than seven (7) calendar days. 3. No runoff from the staging areas may be allowed to enter water ways, including the creek channel or storm drains, without being subjected to adequate filtration (e.g., vegetated buffer, swale, hay wattles or bales, silt screens). 4. The discharge of decant water to water ways from any on-site temporary sediment stockpile or storage areas is prohibited. 5. Wet material removed from an isolated creek reach may be pulled to the side of the channel (within the channel and below top of bank) and allowed to naturally drain prior to removal from the channel. Pulled material will be removed from the channel prior to deactivation of the site or forecast of rain. 6. During the wet season, no stockpiled soils will remain exposed, unless surrounded by properly installed and maintained (i.e., per manufacturer specifications) silt fencing or other means of erosion control. During the dry season; exposed, dry stockpiles will be watered, enclosed, covered, or sprayed with non-toxic soil

BMP Number	BMP Title	BMP Description
		stabilizers (GEN-24). 7. All pipes, culverts, or similar structures stored at a site within sensitive species areas, for one or more overnight periods shall be securely capped prior to storage or inspected before the pipe is subsequently moved. If any potential special-status species are observed within a pipe, a District biologist shall be consulted on what steps should be taken to protect the species. If a District biologist is on-site, they may remove the special status species from the pipes and relocate to the nearest appropriate and unaffected habitat.
GEN-22	Sediment Transport	To prevent sediment-laden water from being released back into waterways during transport of spoils to disposal locations, truck beds will be lined with an impervious material (e.g., plastic), or the tailgate blocked with wattles, hay bales, or other appropriate filtration material. Trucks may then drain excess water by slightly tilting the loads and allowing the water to drain out through the applied filter, but only within the active project area of the creek where the sediment is being loaded into the trucks or within an identified vegetated area (swale) that is separated from the creek.
GEN-23	Stream Access	District personnel will use existing access ramps and roads to the extent feasible. If necessary to avoid large mature trees, native vegetation, or other significant habitat features, temporary access points will be constructed in a manner that minimizes impacts according to the following guidelines: 1. Temporary access points will be constructed as close to the work area as possible to minimize equipment transport 2. In considering channel access routes, slopes of greater than 20 percent will be avoided, if possible. 3. Any temporary fill used for access will be removed upon completion of the project and pre-project topography will be restored to the extent possible. 4. When temporary access is removed, disturbed areas will be revegetated or filled with compacted soil, seeded, and/or stabilized with erosion control fabric immediately after construction to prevent future erosion. 5. Personnel will use the appropriate equipment for the job that minimizes impacts and disturbance to the stream bottom. Appropriately-tired vehicles, either tracked or wheeled, will be used depending on the site and maintenance activity.
GEN-24	On-Site Hazardous Materials Management	1. An inventory of all hazardous materials used (and/or expected to be used) at the worksite and the end products that are produced (and/or expected to be produced) after their use will be maintained by the worksite manager. 2. As appropriate, containers will be properly labeled with a “Hazardous Waste” label and hazardous waste will be properly recycled or disposed of off-site. 3. Contact of chemicals with precipitation will be minimized by storing chemicals in watertight containers with appropriate secondary containment to prevent any spillage or leakage. 4. Quantities of toxic materials, such as equipment fuels and lubricants, will be stored with secondary containment that is capable of containing 110% of the primary container(s). 5. Petroleum products, chemicals, cement, fuels, lubricants, and non-storm drainage water or water contaminated with the aforementioned materials will not contact soil and not be allowed to enter surface waters or the storm drainage system. 6. All toxic materials, including waste disposal containers, will be covered when they are not in use, and located as far away as possible from a direct connection to the storm drainage system or surface water. 7. Sanitation facilities (e.g., portable toilets) will be placed outside of the creek channel and floodplain. Direct

BMP Number	BMP Title	BMP Description
		connections with soil, the storm drainage system, and surface waters will be avoided. 8. Sanitation facilities will be regularly cleaned and/or replaced, and inspected daily for leaks and spills.
GEN-25	Existing Hazardous Materials	If hazardous materials, such as oil, batteries or paint cans, are encountered at the maintenance sites, the District will carefully remove and dispose of them according to applicable regulatory requirements. District staff will wear proper protective gear and store the waste in appropriate hazardous waste containers until it can be disposed at a hazardous waste facility.
GEN-26	Spill Prevention and Response	The District will prevent the accidental release of chemicals, fuels, lubricants, and non-storm drainage water into channels following these measures: 1. District field personnel will be appropriately trained in spill prevention, hazardous material control, and clean up of accidental spills. 2. Equipment and materials for cleanup of spills will be available on site and spills and leaks will be cleaned up immediately and disposed of according to applicable regulatory requirements. 3. Field personnel will ensure that hazardous materials are properly handled and natural resources are protected by all reasonable means. 4. Spill prevention kits will always be in close proximity when using hazardous materials (e.g., at crew trucks and other logical locations). All field personnel will be advised of these locations. 5. District staff will routinely inspect the work site to verify that spill prevention and response measures are properly implemented and maintained. *Spill Response Measures:* For small spills on impervious surfaces, absorbent materials will be used to remove the spill, rather than hosing it down with water. For small spills on pervious surfaces such as soil, the spill will be excavated and properly disposed rather than burying it. Absorbent materials will be collected and disposed of properly and promptly. If a hazardous materials spill occurs that cannot be contained or cleaned up with the onsite materials, the onsite District field personnel will be responsible for immediately initiating an emergency response sequence by notifying the proper authorities (i.e., District Emergency Response (ER) Team and public fire and hazmat agencies) of the release; taking appropriate defensive steps from a safe distance to secure the site to minimize damage to people, environment, and property (PEP); and deferring all other response activities to public emergency response agencies and/or the District Emergency Response (ER) Team or District ER Contractor. Depending on the nature of the release, the District ER Team's actions will include: urgent (responding within 2 hours of notification) field response site reconnaissance, emergency sequence initiation, defensive containment, release control, incident command; or priority (non 2-hour) field response site reconnaissance and clean-up operations. If a "reportable" spill of petroleum products occurs, the District's Stream Maintenance Implementation Program Manager will be notified and action taken to contact the appropriate safety and cleanup crews. A reportable spill is defined as when: ▪ a film or sheen on, or discoloration of, the water surface or adjoining bank/shoreline is observed; or ▪ a sludge or emulsion is deposited beneath the surface of the water or adjoining banks/shorelines (40 Code of Federal Regulations 110); or when ▪ another violation of water quality standards is observed. A written description of the reportable release must be submitted to the appropriate Regional Water Quality Control

BMP Number	BMP Title	BMP Description
		Board and the California Department of Toxic Substances Control (DTSC). This submittal must contain a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. If an appreciable spill has occurred, and results determine that project activities have adversely affected surface water or groundwater quality, a detailed analysis will be performed to the specifications of DTSC to identify the likely cause of contamination. This analysis will include recommendations for reducing or eliminating the source or mechanisms of contamination. Based on this analysis, the District or contractors will select and implement measures to control contamination, with a performance standard that surface and groundwater quality will be returned to baseline conditions. These measures will be subject to approval by the District, DTSC, and the Regional Water Quality Control Board.
GEN-27	Existing Hazardous Sites	Upon selection of maintenance project locations, the District will conduct a search for existing known contaminated sites, as part of its annual preparation of the Notice of Proposed Work (NPW), on the State Water Resource Control Board's GeoTracker Web site (http://www.geotracker.waterboards.ca.gov). The Geotracker search will only be performed for the District's ground disturbing activities. For any proposed ground disturbing maintenance sites located within 1,500 feet of any "open" sites where contamination has not been remediated, the District will contact the RWQCB case manager listed in the database. The District will work with the case manager to ensure maintenance activities would not affect cleanup or monitoring activities or threaten the public or environment.
GEN-28	Fire Prevention	1. All earthmoving and portable equipment with internal combustion engines will be equipped with spark arrestors. 2. During the high fire danger period (April 1–December 1), work crews will ~~: a) H~~have appropriate fire suppression equipment available at the work site.
GEN-29	Dust Management	The District will implement the Bay Area Air Quality Management District's (BAAQMD) required Dust Control Measures (http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines%20May%202011.ashx?la=en). Current measures stipulated by the BAAQMD Guidelines include the following: 1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day. 2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered. 3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited. 4. Water used to wash the various exposed surfaces (i.e., parking areas, staging areas, soil piles, graded areas, etc.) will not be allowed to enter the water way. 5. All vehicle speeds on unpaved roads shall be limited to 15 mph. 6. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used. 7. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points. 8. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's

BMP Number	BMP Title	BMP Description
		specifications. All equipment shall be checked by a certified visible emissions evaluator. 9. Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.
GEN-30	Vehicle and Equipment Maintenance	1. All vehicles and equipment will be kept clean. Excessive build-up of oil and grease will be prevented. 2. All equipment used in the creek channel will be inspected for leaks each day prior to initiation of work. Maintenance, repairs, or other necessary actions will be taken to prevent or repair leaks, prior to use. 3. Incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) will be checked for leaking oil and fluids. Vehicles or equipment visibly leaking operational fluids will not be allowed on-site. 4. No heavy equipment will operate in a live stream. This will not apply to activities for which no other option exists, such as sediment removal which cannot be conducted from top of bank, etc. In these cases, dewatering will be conducted as necessary, following the protocols in BMPs GEN-33 or GEN-34. 5. No equipment servicing will be done in the creek channel or immediate floodplain, unless equipment stationed in these locations cannot be readily relocated (i.e., pumps and generators). 6. If emergency repairs are required in the field, only those repairs necessary to move equipment to a more secure location, and that can be performed without releasing any material into the floodway or water, will be conducted in the channel or floodplain. 7. If necessary, all servicing of equipment done at the job site will be conducted in a designated, protected area to reduce threats to water quality from vehicle fluid spills. Designated areas will not directly connect to the ground, surface water, or the storm drain system. The service area will be clearly designated with berms, sandbags, or other barriers. Secondary containment, such as a drain pan, to catch spills or leaks will be used when removing or changing fluids. Fluids will be stored in appropriate containers with covers, and properly recycled or disposed of offsite.
GEN-31	Vehicle Cleaning	1. Equipment will be cleaned of any visible sediment or vegetation clumps before transferring and using in a different watershed to avoid spreading pathogens or exotic/invasive species. 2. Vehicle and equipment washing can occur on-site only as needed to prevent the spread of sediment, pathogens or exotic/invasive species. No runoff from vehicle or equipment washing is allowed to enter water bodies, including creek channels and storm drains, without being subjected to adequate filtration (e.g., vegetated buffers, straw wattles or bales, fiber rolls, and silt screens). The discharge of decant water from any on-site wash area to water bodies or to areas outside of the active project site is prohibited. Additional vehicle/equipment washing will occur at the approved wash area in the District's corporation yard.
GEN-32	Vehicle and Equipment Fueling	1. No fueling will be done in the channel (top-of-bank to top-of-bank) or immediate floodplain unless equipment stationed in these locations cannot be readily relocated (e.g., pumps and generators). 2. All off-site fueling sites (i.e., on access roads above the top-of-bank) will be equipped with secondary containment and avoid a direct connection to soil, surface water, or the storm drainage system. 3. For stationary equipment that must be fueled on-site, secondary containment, such as a drain pan or drop cloth, will be used to prevent accidental spills of fuels from reaching the soil, surface water, or the storm drain system.

BMP Number	BMP Title	BMP Description
Dewatering		
GEN-33	Dewatering for Non-Tidal Sites	When sediment removal and bank stabilization work area includes a flowing stream, the entire streamflow will be diverted around the work area by construction of a temporary dam and/or bypass. Where appropriate, stream flow diversions will occur via gravity driven systems. *A. Planning to avoid and minimize impacts to water quality and aquatic wildlife:* 1. For construction and monitoring of a stream flow bypass, the *Sediment Removal and Bank Stabilization Projects* checklist will be completed. 2. Recommendations by a qualified Fisheries Biologist to protect native fisheries and aquatic vertebrates will be incorporated into the bypass design. The recommendations may include but are not limited to: i. Screening the stream flow diversion source or pump to prevent entrainment of native fish or amphibian species. The screening dimensions will be appropriate to the species present. ii. Relocation of native aquatic vertebrates. This will include the methods to be used to capture and hold and move the aquatic vertebrates and a description of where the aquatic vertebrates will be relocated. 3. Depending on the channel configurations, sediment removal activities may occur where the flows are not bypassed around the work site as long as a berm is left between the work area and stream flows to minimize water quality impacts during excavation activities. The berm between the work and the live channel will be wide enough to prevent introduction of turbid water from the cell into the live channel. *B. Construction*: 1. The construction of facilities will be based on the water bypass plan. 2. Coffer dams will be installed both upstream and downstream of the work area to minimize impacts or the distance necessary to accomplish effective passive systems. 3. In streams where water may enter the construction site from downstream (reverse flow) additional coffer dams (downstream) may be necessary. When multiple coffer dams are constructed, the upstream dam will be constructed first. 4. Instream cofferdams will only be built from materials such as sandbags, earth fill, clean gravel, or rubber bladders which will cause little or no siltation or turbidity. 5. Plastic sheeting will be placed over k-rails, timbers, and earth fill to minimize water seepage into and out of the maintenance areas. The plastic sheets will be firmly anchored, using sandbags, to the streambed to minimize water seepage. 6. When pumping is necessary to dewater a work site, a temporary siltation basin and/or use of silt bags may be required to prevent sediment from re-entering the wetted channel. Pump intakes will be screened to prevent harm to aquatic wildlife. 7. If necessary to prevent erosion an energy dissipater will be constructed at the discharge point. 8. Timing of flow diversions will be coordinated with the completion of the dam structure to facilitate not drying up the downstream creek area and to minimize dry back conditions. *C. Implementation*: 1. Water flows downstream of the project site will be maintained to prevent stranding aquatic vertebrates.

BMP Number	BMP Title	BMP Description
		2. Water diverted around work sites and water detained by coffer dams will be protected from maintenance activity-related pollutants, such as soils, equipment lubricants or fuels. 3. The *Fish Relocation Guidelines* will be implemented to ensure that fish and other aquatic vertebrates are not stranded during construction and implementation of channel dewatering. a) Native aquatic vertebrates shall be captured in the work area and transferred to another reach as determined by a qualified biologist. Timing of work in streams that supports a significant number of amphibians will be delayed until metamorphosis occurs to minimize impacts to the resource. Capture and relocation of aquatic native vertebrates is not required at individual work sites when site conditions preclude reasonably effective operation of capture gear and equipment. b) Aquatic invertebrates will not be transferred (other than incidental catches) because of their anticipated abundance and colonization after completion of the repair work. 4. Filtration devices (silt bags attached to the end of discharge hoses and pipes to remove sediment from discharged water) or settling basins will be provided as necessary at discharge sites to ensure that the turbidity of discharged water is not visibly more turbid than the water in the channel upstream of the maintenance site. If increases in turbidity are observed, additional measures will be implemented such as a larger settling basin or additional filtration. If increases in turbidity persist, the District's Stream Maintenance Program Implementation Project Manager will be alerted since turbidity measurements may be required. 5. Water remaining in the work area will be removed by evaporation, seepage, or pumping. When pumping is required to dewater a site, the decanted water will be discharged with water bypassed around the site or in a separate erosion control – energy dissipation area/vegetated swale. The turbidity of discharged water will not be visibly more turbid than the receiving water. *Deconstruction*: 1. When maintenance is completed, the flow diversion structure will be removed as soon as possible. Impounded water will be released at a reduced velocity to minimize erosion, turbidity, or harm to downstream habitat. 2. Removal will normally proceed from downstream in an upstream direction. 3. When diversion structures are removed, the ponded water will be directed back into the low-flow channel in a phased manner to minimize erosion and downstream water quality impacts. Normal flows will be restored. 4. The area disturbed by flow bypass mechanisms will be restored to the pre-project condition at the completion of the project (to the extent practical). This may include, but is not limited to, recontouring the area and planting of riparian vegetation.

BMP Number	BMP Title	BMP Description
GEN-34	Dewatering in Tidal Work Areas	For tidal areas, a downstream cofferdam will be constructed to prevent the work area from being inundated by tidal flows. 1. Installation of cofferdams and fish exclusion measures will be installed at low tide when the channel and project site are at their driest. 2. It is preferable to not use any bypass pipes when work is being conducted on one side of the channel, if~~s~~ isolated by the cofferdam, and flows can continue on the other side of the creek channel without entering the project area. 3. If downstream flows cannot be diverted around the project site, the creek waters will be transmitted around the site through cofferdam bypass pipes. Waters discharged through tidal cofferdam bypass pipes will not exceed 50 NTUs over the background levels of the tidal waters into which they are discharged. 4. Cofferdams in tidal areas may be made from earthen or gravel material. If earth is used, the downstream and upstream faces will be covered by a protected covering (e.g., plastic or fabric) if needed to minimize erosion. A protected covering or sheeting will be placed on the water side of an earthen coffer dam to protect water quality. 5. When maintenance is completed, the cofferdams and bypass pipes will be removed as soon as possible but no more than 72 hours after work is completed. Flows will be restored at a reduced velocity to minimize erosion, turbidity, or harm to downstream habitat.
GEN-35	Pump/Generator Operations and Maintenance	When needed to assist in channel dewatering, pumps and generators will be maintained and operated in a manner that minimizes impacts to water quality and aquatic species. 1. Pumps and generators will be maintained according to manufacturers' specifications to regulate flows to prevent dryback or washout conditions. 2. Pumps will be operated and monitored to prevent low water conditions, which could pump muddy bottom water, or high water conditions, which creates ponding. 3. All pump intakes will be screened. Pumps in steelhead creeks will be screened according to NMFS criteria (http://www.swr.noaa.gov/sr/fishscrn.pdf) to prevent entrainment of steelhead.
Public Safety		
GEN-36	Public Outreach	The public will be informed of stream maintenance work prior to the start of work as part of the preparation of the NPW for all projects in the NPW: 1. Each spring, a newspaper notice will be published with information on the NPW work sites, approximate work dates, and contact information. 2. Neighborhood Work Notices will be distributed as part of the NPW preparation prior to the start of work. 3. Local governments (cities and County) will be notified of scheduled maintenance work. The NPW will be submitted to the public works departments, local fire districts, and the District's Flood Protection and Watershed Advisory Committees. 4. The District will post specific information on individual maintenance projects on the Stream Maintenance Web site: (http://valleywater.org/EkContent.aspx?id=379&terms=stream+maintenance) 5. For high profile projects, at the District's discretion, signs will be posted in the neighborhood to notify the public at least one week in advance of maintenance schedules, trail closures, and road/lane closures as necessary and as possible. Signage used at work sites will include contact information for lodging comments and/or complaints regarding the maintenance activities.
GEN-37	Implement Public Safety	The District will implement public safety measures during maintenance as follows:

BMP Number	BMP Title	BMP Description
	Measures	1. Construction signs will be posted at job sites warning the public of construction work and to exercise caution, as appropriate to public accessed areas. 2. Where work is proposed adjacent to a recreational trail, warning signs will be posted several feet beyond the limits of work. Signs will also be posted if trails will be temporarily closed. 3. If needed, a lane will be temporarily closed to allow for trucks to pull into and out of access points to the work site. 4. Temporary fencing, either the orange safety type or chain link, will be installed above repair sites on bank stabilization projects. 5. When necessary, District or contracted staff will provide traffic control and site security.
GEN-38	Minimize Noise Disturbances to Residential Areas	The District will implement maintenance practices that minimize disturbances to residential areas surrounding work sites. 1. With the exception of emergencies, work will be conducted during normal working hours. Maintenance activities in residential areas will not occur on Saturdays, Sundays, or District observed holidays except during emergencies, or with approval by the local jurisdiction and advance notification of surrounding residents. 2. Vehicles, generators and heavy equipment will be equipped with adequate mufflers. 3. Idling of vehicles will be prohibited beyond 5 minutes unless operation of the engine is required to operate a necessary system such as a power take-off (PTO).
GEN-39	Planning for Pedestrians, Traffic Flow, and Safety Measures	1. Work will be staged and conducted in a manner that maintains two-way traffic flow on public roadways in the vicinity of the work site. If temporary lane closures are necessary, they will be coordinated with the appropriate jurisdictional agency and scheduled to occur outside of peak traffic hours (7:00 – 10:00 a.m. and 3:00 – 6:00 p.m.) to the maximum extent practicable. Any lane closures will include advance warning signage, a detour route and flaggers in both directions. When work is conducted on public roads and may have the potential to affect traffic flow, work will be coordinated with local emergency service providers as necessary to ensure that emergency vehicle access and response is not impeded. 2. Bicycle and pedestrian facility closures will be scheduled outside of peak traffic hours (7:00 – 10:00 a.m. and 3:00 – 6:00 p.m.) to the maximum extent practicable. 3. Public transit access and routes will be maintained in the vicinity of the work site. If public transit will be affected by temporary road closures and require detours, affected transit authorities will be consulted and kept informed of project activities. 4. Adequate parking will be provided or designated public parking areas will be used for maintenance-related vehicles not in use through the maintenance period. 5. Access to driveways and private roads will be maintained. If brief periods of maintenance would temporarily block access, property owners will be notified prior to maintenance activities.

BMP Number	BMP Title	BMP Description
Cultural Resources		
GEN-40	Discovery of Cultural Remains or Historic or Paleontological Artifacts	Work in areas where remains or artifacts are found will be restricted or stopped until proper protocols are met. 1. Work at the location of the find will halt immediately within 50 feet of the find. A "no work" zone shall be established utilizing appropriate flagging to delineate the boundary of this zone, which shall measure at least 50 feet in all directions from the find. 2. The District shall retain the services of a Consulting Archaeologist or Paleontologist, who shall visit the discovery site as soon as practicable, and perform minor hand-excavation to describe the archaeological or paleontological resources present and assess the amount of disturbance. 3. The Consulting Archaeologist shall provide to the District and the Corps, at a minimum, written and digital-photographic documentation of all observed materials, utilizing the guidelines for evaluating archaeological resources for the California Register of Historic Places (CRHP) and National Register of Historic Places (NRHP). Based on the assessment, the District and Corps shall identify the CEQA and Section 106 cultural-resources compliance procedure to be implemented. 4. If the find appears to not meet the CRHP or NRHP criteria of significance, and the Corps archaeologist concurs with the Consulting Archaeologist's conclusions, construction shall continue while monitored by the Consulting Archaeologist. The authorized maintenance work shall resume at the discovery site only after the District has retained a Consulting Archaeologist to monitor and the Watershed Manager has received notification from the Corps to continue work. 5. If the find appears significant, avoidance of additional impacts is the preferred alternative. The Consulting Archaeologist shall determine if adverse impacts to the resources can be avoided. 6. When avoidance is not practical (e.g., maintenance activities cannot be deferred or they must be completed to satisfy the SMP objective), the District shall develop an Action Plan and submit it to the Corps within 48 hours of Consulting Archaeologist's evaluation of the discovery. The action Plan may be submitted via e-mail to (rstradford@spd.usace.army.mil). The Action Plan is synonymous with a data-recovery plan. It shall be prepared in accordance with the current professional standards and State guidelines for reporting the results of the work, and shall describe the services of a Native American Consultant and a proposal for curation of cultural materials recovered from a non-grave context. 7. The recovery effort will be detailed in a report prepared by the archaeologist in accordance with current archaeological standards. Any non-grave artifacts will be placed with an appropriate repository. 8. The Consulting Paleontologist will meet the Society for Vertebrate Paleontology's criteria for a "qualified professional paleontologist" (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995). 9. The paleontologist will follow the Society for Vertebrate Paleontology's guidelines for treatment of the artifact. Treatment may include preparation and recovery of fossil materials for an appropriate museum or university collection, and may include preparation of a report describing the finds. The District will be responsible for ensuring that paleontologist's recommendations are implemented. 10. In the event of discovery of human remains (or the find consists of bones suspected to be human), the field crew supervisor shall take immediate steps to secure and protect such remains from vandalism during periods when work crews are absent.) 11. Immediately notify the Santa Clara County Coroner and provide any information that identify the remains as Native American. If the remains are determined to be from a prehistoric Native American, or determined to be a

BMP Number	BMP Title	BMP Description
		Native American from the ethnographic period, the Coroner shall contact the Native American Heritage Commission (NAHC) within 24 hours of being notified of the remains. The NAHC then designates and notifies within 24 hours a Most Likely Descendant (MLD). The MLD has 24 hours to consult and provide recommendations for the treatment or disposition, with proper dignity, of the human remains and grave goods. 12. Preservation in situ is the preferred option. Human remains shall be preserved in situ if continuation of the maintenance work, as determined by the Consulting Archaeologist and MLD, will not cause further damage to the remains. The remains and artifacts shall be documented and the find location carefully backfilled (with protective geo-fabric if desirable) and recorded in District project files. 13. Human remains or cultural items exposed during maintenance that cannot be protected from further damage shall be exhumed by the Consulting Archaeologist at the discretion of the MLD and reburied with the concurrence of the MLD in a place mutually agreed upon by all parties.
GEN-41	Review of Projects with Native Soil	A cultural resources specialist will conduct a review and evaluation of those sites that would involve disturbance / excavation of native soil previously undisturbed by contemporary human activities to determine their potential for affecting significant cultural resources. The evaluation of the potential to disturb cultural resources will be based on an initial review of archival information provided by the California Historical Resources System/Northwest Information Center (CHRIS/NWIC) in regard to the project area based on a 0.25 mile search radius. It is recommended that this initial archival review be completed by a professional archaeologist who will be able to view confidential site location data and literature to arrive at a preliminary sensitivity determination. If necessary, a further archival record search and literature review (including a review of the Sacred Lands Inventory of the Native American Heritage Commission); and a field inventory of the project area will be conducted to determine the presence/absence of surface cultural materials associated with either prehistoric or historic occupation. The results along with any mitigation and/or management recommendations would be presented in an appropriate report format and include any necessary maps, figures, and correspondence with interested parties. A summary table indicating appropriate management actions (e.g., monitoring during construction, presence/absence testing for subsurface resources; data recovery, etc.) will be developed for each project site reviewed. The management actions will be implemented on site to avoid significant effects to cultural resources.

BMP Number	BMP Title	BMP Description
Utilities		
GEN-42	Investigation of Utility Line Locations	An evaluation of the locations of utility lines that could be affected by maintenance activities will be conducted annually as part of the preparation of the Notice of Proposed Work (NPW). Utilities will be avoided as much as possible. For maintenance areas with the potential for adverse effects on utility services, the following measures shall be implemented: 1. Utility excavation or encroachment permits shall be required from the appropriate agencies. These permits include measures to minimize utility disruption. The District and its contractors shall comply with permit conditions. Such conditions shall be included in construction contract specifications. 2. Utility locations shall be verified through a field survey (potholing) and use of the Underground Service Alert services. 3. Detailed specifications shall be prepared as part of the design plans to include procedures for the excavation, support, and/or fill of areas around utility cables and pipelines. All affected utility services shall be notified of the District's maintenance plans and schedule. Arrangements shall be made with these entities regarding protection, relocation, or temporary disconnection of services. 4. Residents and businesses in the project area shall be notified of planned utility service disruption 2 to 4 days in advance, in conformance with state standards. 5. Disconnected cables and lines shall be reconnected promptly.

B. SECTION B – Sediment Removal BMPs

This group of BMPs is intended to be implemented specifically during sediment removal activities to avoid potential impacts on biological resources.

BMP Number	BMP Title	BMP Description
SED-1	Groundwater Management	If high levels of groundwater (i.e., visible water) are encountered during excavations in a work area, the water will be pumped out of the work site or left within the work area if the work activity is not causing water quality degradation in a live stream. Water Quality monitoring would need to occur. If necessary to protect water quality, the extracted water will be discharged into specifically constructed infiltration basins, holding ponds, or areas with vegetation to remove sediment prior to the water re-entering a creek. Water discharged into vegetated areas or swales will be pumped in a manner that will not create erosion around vegetation.
SED-2	Prevent Scour Downstream of Sediment Removal	Sediment removal sites in the transport zone on alluvial fans may cause increased scour downstream if they experience scouring flows or rapid sediment accumulation after maintenance. After sediment removal, the channel will be graded so that the transition between the existing channel both upstream and downstream of the maintenance area is smooth and continuous between the maintained and non-maintained areas and does not present a sudden vertical transition (wall of sediment) or other blockage that could erode once flows are restored to the channel.
SED-3	Restore Channel Features	Low-flow channels within non-tidal streams will be contoured to facilitate fish passage and will emulate the pre-construction conditions as closely as possible, within the finished channel topography.
SED-4	Berm Bypass	Where sediment removal is accomplished without a bypass by removing alternating cells, the berm between the

BMP Number	BMP Title	BMP Description
		work and the live channel will be wide enough to prevent introduction of turbid water from the cell into the live channel.

C. SECTION C – Vegetation Management BMPs

These BMPs provide specific and detailed guidance on the variety of vegetation management procedures implemented by the District. BMPs for the following maintenance techniques are included: tree pruning, tree removal, plant removal, woody debris management, herbicide application, mowing, discing, flaming, and grazing. Practices will be implemented by fully trained and qualified field crews.

BMP Number	BMP Title	BMP Description
VEG-1	Minimize Local Erosion Increase from In-channel Vegetation Removal	To minimize the potential effect of localized erosion, the toe of the bank will be protected by leaving vegetation to the maximum extent possible and consistent with the maintenance guidelines or original design requirements.
VEG-2	Non-native Invasive Plant Removal	Invasive species (e.g. cape ivy [*Delairea odorata/Senecio mikanoides]*, arundo [*Arundo donax*]) will be disposed of in a manner that will not contribute to the further spread of the species. Cape ivy removed during a project shall be bagged and disposed of in a landfill. Arundo canes will be prevented from floating downstream or otherwise entering the creek or waterway.
VEG-3	Use Appropriate Equipment for Instream Removal	When using heavy equipment to cut or remove instream vegetation, low ground pressure equipment, such as tracked wheels will be utilized to reduce impacts to the streambed.
VEG-4	Use Flamers with Caution	1. A fire extinguisher, water supply and other appropriate fire suppression equipment will always be kept close to the work site in case of an emergency. 2. Propane tanks will be checked for leaks and proper functioning prior to and proceeding use of flaming equipment. The propane tank will be treated as a hazardous material.
VEG-5	Conduct Flaming During Appropriate Weather and Seasonal Conditions	Flamers will not be used during periods of high fire danger or in areas where fuel or climate conditions could accidentally ignite a fire.
VEG-6	Standard Grazing Procedures	1. Vegetation and areas to be preserved will be fenced off to exclude grazing animals. 2. Grazing animals will be excluded from stream channels, using fencing or other barriers.

D. SECTION D – Bank Stabilization BMPs

These BMPs provide additional guidance during implementation of bank stabilization projects to avoid impacts on biological and cultural resources. Review of the Post-Project Restoration BMPs in Section F is recommended because those measures will be implemented after bank stabilization projects are complete. The BMPs included in this section are implemented by the field crew and site manager.

BMP Number	BMP Title	BMP Description
BANK-1	Bank Stabilization Design to Prevent Erosion Downstream	To further prevent potential downstream erosion impacts due to bank stabilization, the site design will be adjusted to provide proactive protection of vulnerable areas within the reach of the worksite. Such measures include, but are not limited to, appropriately keyed-in coir logs, riparian planting, strategic placement of rock, and flow deflectors. Bank stabilization will include appropriate transition designs upstream and downstream of the work site to prevent potential erosion impacts.
BANK-2	Concrete Use Near Waterways	Concrete that has not been cured is alkaline and can increase the pH of the water.~~;~~ ~~f~~Fresh concrete will be isolated until it no longer poses a threat to water quality using the following appropriate measures: 1. Wet sacked concrete will be excluded from the wetted channel for a period of two weeks after installation. During that time, the wet sacked concrete will be kept moist (such as covering with wet carpet) and runoff from the wet sacked concrete will not be allowed to enter a live stream. 2. Poured concrete will be excluded from the wetted channel for a period of two weeks after it is poured. During that time, the poured concrete will be kept moist, and runoff from the wet concrete will not be allowed to enter a live stream. Commercial sealants (e.g., Deep Seal, Elasto-Deck Reservoir Grade) may be applied to the poured concrete surface where difficulty in excluding water flow for a long period may occur. If a sealant is used, water will be excluded from the site until the sealant is dry. 3. Dry sacked concrete will not be used in any channel. 4. An area outside of the channel and floodplain will be designated to clean out concrete transit vehicles.
BANK-3	Bank Stabilization Post-Construction Maintenance	The District may maintain or repair bank stabilization projects that are less than 2 years old that are damaged by winter flows. The District will notify the regulatory agencies 24 hours prior to beginning the work and the work will be reported as part of the Post-Construction Report submitted by January 15 of each year or if necessary, the subsequent year. Appropriate BMPs will be applied during maintenance repairs.

E. SECTION E – Post-Project Restoration BMPs

These BMPs will be implemented, as appropriate, on all sites that involve ground disturbance.

BMP Number	BMP Title	BMP Description
REVEG-1	Seeding	Sites where maintenance activities result in exposed soil will be stabilized to prevent erosion. Disturbed areas shall be seeded with native seed as soon as is appropriate after maintenance activities are complete. An erosion control seed mix may be applied to exposed soils, and down to the ordinary high water mark (OHWM). 1. The seed mix should consist of California native grasses (e.g., *Hordeum brachyantherum*, *Elymus glaucus*, and *Vulpia microstachyes*) or annual, sterile seed mix. 2. Temporary earthen access roads may be seeded when site and horticultural conditions are suitable, or have other appropriate erosion control measures in place (GEN-20).
REVEG-2	Planting Material	Revegetation and replacement plantings will consist of locally collected native species. Species selection will be based on surveys of natural areas on the same creek that have a similar ecological setting and/or as appropriate

BMP Number	BMP Title	BMP Description
		for the site location.

F. SECTION F – Management of Animal Damage Conflict BMPs

Methods of animal management included in the SMP are avoidance, biological controls, physical alterations, habitat alterations, and lethal controls. Of all these methods, implementation of lethal controls has the highest potential for environmental and biological impacts. Therefore, the animal management BMPs provided in this section focus on lethal controls. The application area for lethal controls will be identified during the annual planning process (see the Biological Resource Planning BMPs) and guided as directed by wildlife biologists. Species habitat areas are defined by the District's GIS species mapping, updated CNDDB and known local biological information and are included in the SMP Update Subsequent EIR.

BMP Number	BMP Title	BMP Description
ANI-1	Avoid Redistribution of Rodenticides	Carcass surveys will be conducted periodically when acute poisons and first generation anticoagulants are used. The frequency of the carcass surveys will be specific to the type of rodenticide used, to minimize secondary poisoning impacts: • Acute toxins – Daily carcass surveys, beginning the first day after application until the end of the baiting period for acute toxins used above-ground. • Anticoagulants - Within 7 days of installation of first generation anticoagulant bait, and weekly thereafter. Anytime a carcass is found, daily carcass surveys will begin for as long as carcasses are found until no carcasses are found during a daily survey. Once no carcasses are found, carcass surveys will return to the weekly carcass survey timeline maximum from the date of initial installation of an anticoagulant bait station. To verify that the frequency of carcass surveys is adequate, a biologist will conduct daily carcass surveys 2 times per year over one baiting cycle. Based on the results of these surveys, the timing of carcass surveys will be adjusted if necessary. Any spilled bait will be cleaned up immediately.
ANI-2	Prevent Harm to the Salt Marsh Harvest Mouse and California Clapper Rail	1. No rodenticides or fumigants will be used within the range of the SMHM or CCR as identified on District range maps. 2. Methods of rodent control within SMHM or CCR habitat will be limited to live trapping. All live traps shall have openings measuring no smaller than 2 inches by 1 inch to allow any SMHM that inadvertently enter the trap to easily escape. All traps will be placed outside of pickleweed areas and above the high tide line.
ANI-3	Burrowing Owl, Bald Eagle and Golden Eagle Buffer Zone	Per the California Department of Fish and Game's 2008 *Guidance for Burrowing Owl Conservation*, a 656-yard buffer will be established around known burrowing owl locations where no rodenticides or fumigants (including smoke bombs) will be used. A 0.5-mile buffer will be established around known bald eagle and golden eagle nesting locations where no rodenticides will be used.
ANI-4	Animal Control in Sensitive Amphibian Habitat	1. Fumigants will not be used within the habitat areas of special status amphibians. 2. The use of bait stations within the potential habitat areas of California red-legged frog, California tiger

BMP Number	BMP Title	BMP Description
		salamander, or foothill yellow-legged frog will be limited to bait stations specifically designed to prevent entry by these species. 3. Any live traps will allow California red-legged frogs, California tiger salamanders, or foothill yellow-legged frogs to safely exit (e.g., by having openings measuring no smaller than 2 inches by 1 inch).
ANI-5	Slurry Mixture near Waterways	All slurry type mixes used to fill rodent burrows will be prevented from entering any waterway by using appropriate erosion control methods and according to the manufacturer's specifications. If the creek bed is dry or has been dewatered, any material that has entered the channel will be removed.

G. SECTION G – Use of Pesticides

Pesticides may be used for vegetation management or control of animal damage.

BMP Number	BMP Title	BMP Description
HM-4	Posting and Notification for Pesticide Use	Posting of areas where pesticides are used will be performed in compliance with District Policy Ad-8.2 Pesticide Use as follows: 1. Posting will be performed in compliance with the label requirements of the product being applied. 2. In addition, posting will be provided for any products applied in areas used by the public for recreational purposes, or those areas readily accessible to the public, regardless of whether the label requires such notification. In doing this, the District ensures that exposure risk is minimized further by adopting practices that go beyond the product label requirements. (The posting method may be modified to avoid destruction of bait stations or scattering of rodenticide.) 3. These postings will notify staff and the general public of the date and time of application, the product's active ingredients, and common name, and the time of allowable re-entry into the treated area. 4. Signs will not be removed until after the end of the specified re-entry interval. 5. Right-to-know literature on the product will be made available to anyone in the area during the re-entry period. 6. A District staff contact phone number will be posted on the sign, including a cellular phone number. 7. Notification of pesticide activities will be made as required by law. Also, the District will maintain records of neighbors with specific needs relative to notification before treatment of an adjacent area so that such needs are met.

Source: Data compiled by Horizon Water and Environment in 2011

ATTACHMENT G

Sediment Characterization Plans
Regional Water Quality Control Boards
Central Coast and
San Francisco Bay

SEDIMENT CHARACTERIZATION PLAN

FOR THE
SANTA CLARA VALLEY WATER DISTRICT
MULTI-YEAR STREAM MAINTENANCE PROGRAM
-CENTRAL COAST REGION-

Revised by

Ray Fields
Project Manager
Stream Stewardship Unit

Shree Dharasker
Engineering Unit Manager
Stream Stewardship Unit

Under the Direction of

Ann Draper
Assistant Operating Officer
Watershed Stewardship Division

November 2011

TABLE OF CONTENTS

Introduction

The Santa Clara Valley Water District (District) conducts sediment removal, vegetation management, bank protection repairs, minor maintenance, and canal maintenance activities in channels/creeks for the purpose of alleviating the potential for local flooding problems and to meet the requirements of the Federal Emergency Management Agency for flood protection. Under the aforementioned activities of the Multi-Year Stream Maintenance Program (SMP), channel/creek sediment is often removed as a result of these activities. In order to effectively manage the removal and disposal of the sediments removed as a result of these activities, it is necessary to characterize the chemical and physical properties of the sediments (or also known as creek material as some of the tested material is from the creek banks or stockpiles, etc.). This characterization allows the District to (1) effectively plan for disposal of the sediments and (2) assist with determining the best management practices (BMP) to implement in order to avoid and minimize impacts to water quality, aquatic life, and beneficial uses. The sediment characterization plan proposed for the District's Multi-Year Stream Maintenance Program, as presented herein, is a result of the District's sediment testing and evaluation effort, and continuous improvement process based on guidance from regulatory agencies and other stakeholders, since 1997.

Purpose

According to the Basin Plan, the Regional Board establishes and enforces Waste Discharge Requirements (WDR) for point and nonpoint source of pollutants at levels necessary to meet numerical and narrative water quality objectives. The sediment tests performed by the District each year, as part of its SMP based on the historic occurrence of pollutants within Santa Clara Valley streams, in accordance with the Basin Plan water quality objectives, and the Regional Board's WDR through a stakeholder process. The stakeholder process and lessons learned meetings involved participation of the Regional Board, the California State Department of Fish and Game (DFG), the U.S. Environmental Protection Agency (EPA), the U.S. Army Corps of Engineers (Corps), and various environmental organizations which assisted the District in continuous evaluation and improvement of the sediment characterization plan.

There are four main reasons for characterizing the sediments described as follows:

Landfill Acceptance

Landfills require creek sediment to be characterized before they accept the material for disposal.

Reuse Sites

Reuse sites are considered places that are not within the immediate vicinity (within 500 feet upstream or downstream) of the sediment excavation. These places can range from (but are not limited to) ponds, creek banks, or maintenance roads. These reuse sediments are approved by the Regional Board in advance of placement of the material. Material reused within the 500 feet upstream or downstream, and less than 500 cubic yards, is done without sediment testing.

The Central Coast Bay Regional Water Quality Control Board

The Regional Board has required characterization of the materials to determine if the proposed disposal method is acceptable. The Regional Board must ensure that the disposal of the material will not pose a threat to the waters of the state. The Regional Board is interested in determination of total mercury and polychlorinated biphenyls (PCB's) in residual sediment after sediment removal.

The California Department of Fish and Game

DFG requests that the materials be characterized to determine if they will adversely impact fish and wildlife as the removal operations may cause sediments to be re-suspended and migrate downstream where it may have an impact on fish and wildlife. DFG defers to the Water Board for the determination of suitability for creek material removal.

Scope

Under the SMP, sediment will only be tested using the San Francisco Bay Regional Water Quality Control Board's (Regional Board) Benificail Reuse of Dredged Materials (for consistency with the San Francisco Board): Sediment Screening and Testing Guidelines (May 2000) to facilitate any beneficial reuse of sediment generated by the District at its proposed. The physical and chemical properties of sediments tested by the District include metals, pesticides and organophosphorous compounds, polychlorinated biphenyls, polynuclear aromatic hydrocarbons, moisture content, chloride, pH, total sulfides, ammonia, and toxicity (in some cases).

This sampling plan documents sampling and analytical procedures which will be utilized for the creek sites under the SMP. It is not intended to be a full characterization of all the stream sediments. The Sediment Characterization Plan is primarily designed to characterize sediment designated for removal (using composite, continuous core and residual sediment sampling methods). Residual sediment samples will only be collected in an attempt to characterize the sediment that may be subject to erosion and transport during flows.

The Sediment Characterization Plan addresses the following sampling methods designed to meet the overall objectives of landfill acceptance, sediment reuse at alternative sites, water quality protection, and fish and wildlife protection:

1. Composite sediment sampling
2. Continuous Core sampling
3. Residual sediment sampling

Objectives

The specific objectives of the Sediment Characterization Plan are as follows:

1. Characterize the sediments for acceptance by landfills.

2. Characterize the sediments to determine their suitability for reuse at alternative disposal sites (i.e., non-landfill reuse sites).

3. Compliance with regulatory requirements for the sediment removal activities.

4. Provide data for evaluation of the feasibility of long-term disposal, reuse, and recycling opportunities for sediment generated by the District.

Sampling Methods

This section describes the frequency of sampling and the location of sample collection at the SMP sites involving sediment removal activities. From both the regulatory and scientific perspectives, the primary objectives of a sampling plan for a solid material are twofold: namely, (1) to collect samples that are representative samples as exhibiting average properties of the whole solid material and (2) to collect samples that will allow measurements of the chemical properties of the waste that are both accurate and precise.

Sediment samples will be collected for characterization of sediment designated for removal and analyzed in accordance with the contaminants listed on Table 4 Recommended Sediment Chemistry Screening Guidelines for Beneficial Reuse of Dredged Material (Re-use Guidelines) from the (SF) Regional Boards Basin Plan. Sampling parameters/analytes listed in Table 4 may be modified after a history of sampling is obtained. This may result in not requiring monitoring for some of these contaminants under certain situations or at certain locations, or adding more parameters/analytes if deemed necessary by the Executive Officer of the Regional Board.

Reliable information concerning the chemical properties of a solid waste is needed for the purpose of comparing chemical properties with applicable regulatory thresholds. For chemical information to be reliable, it must be accurate and precise. Accuracy is usually achieved by incorporating some form of randomness into the selection process for the samples that generate the data. Precision is most often obtained by selecting an appropriate number of samples.

For this Sediment Characterization Plan, the District will utilize a systematic random sampling technique generated by the sediment sampling database, in which all sampling points from a population are randomly selected. The advantages of systematic random sampling over other sampling techniques are the ease with which samples are identified, and collected, an increase in precision, and to collect representative data on chemical properties. All samples shall be collected in accordance with the U.S. EPA Guidelines and sampling methodologies. The methods of analyses and detection limits must be appropriate for the expected concentrations. Specific methods of analyses must be identified. If methods other than U.S. EPA – approved methods of Standard Methods are used, the exact methodology must be submitted for review and approved by the Executive Officer of the Regional Board.

Composite Sediment Samples

The purpose of composite sediment sampling is to conduct the widest range of characterization along the project sites' lengths and widths in order to capture the most variation of the area. This broader scope of randomly generated 4 point sampling will give a greater sense of the variability of the channel material than a specific sample point.

Composite Sample Collection Frequency

In order to characterize the sediment, one composite, which consists of 4 random

samples, in-situ sample shall be collected and analyzed approximately every 4,000 cys. Approximately one sample shall be collected every 1,000 cys. These samples will be composited together by the laboratory. The length of the channel is also taken into consideration as the District's database will generate sampling points based on the length of the project area. As such, projects with long project lengths will have sample points farther apart in order to better characterize the variability in sediment contaminants along the entire length of the worksite.

Composite Sample Locations

The location of each sample at the Sediment Removal Program sites must be selected in the following three dimensions: (1) the creek station, or the location along the length of the creek; (2) the location along the creek cross section; and (3) the depth below ground surface (bgs). With these parameters, a sample point is randomly generated. The rationale for selection of a sampling location in all three dimensions is described below:

Composite Sample Depth

The sampling depth of the composite samples are also randomly generated varied from surface sampling to maximum excavation depth of the proposed project.

Continuous Core Sediment Samples

The purpose of continuous core sampling is to take samples at selected locations (e.g. below outfalls, depression areas of the creek, likely contaminated areas) where the highest likelihood of contamination exists in the project site. This type of sample is not taken on the banks (above the toe of the channel) nor from stockpiles, only from within toe to toe of the channel.

Continuous Core Sample Collection Frequency

One continuous core sample is taken every 4000 cubic yards per project site.

Continuous Core Sample Locations

The location of the sample is determined in the field upon attempting to locate areas of depression or outfalls within the project site. As these features are not always apparent, the location will sometimes have to be placed in the most likely areas of these features.

Continuous Core Sample Depth

The depth of the sample is randomly generated by the District's sediment sampling database and printed on the sediment sampling plan generated in the office and used out in the field.

Residual Sediment Samples

The purpose of residual sediment sampling is to conduct limited characterization of sediment left behind after sediment removal from earthen channels and creeks. The exposed sediment in the channel/creek bottom will be sampled and analyzed for total mercury and PCB.

Residual Sample Collection Frequency

Residual sediment samples will be collected at one every 4000 cys on earthen channels.

Residual Sample Locations

This type of sample will be collected at each earthen channel/creek site. The location of the residual sample will coincide with the continuous core sample.

Residual Sample Depth

The samples will be collected from within 1 foot below the planned maximum depth of excavation for that project.

Sampling Procedures

This section describes the field sampling procedures. All samples shall be collected in accordance with U.S. EPA Guidelines and sampling methodologies. The methods of analyses and detection limits must be appropriate for expected concentrations. Specific methods of analyses must be identified. If methods other than U.S. EPA approved methods of Standard Methods are used, the exact methodology must be submitted for review and approved by the Executive Officer.

Sample Collection

All samples shall be collected by means of a hand trowel, a hand auger, or another sampling method approved by the regulatory agencies. The individual collecting the sample will have the discretion of choosing the sampling method which is the most efficient to perform.

Sampling will be conducted in accordance with the methods described below:

Hand Trowel Procedure

1. Remove vegetation and woody debris from the ground surface.
2. If collecting a subsurface sample, use a shovel to dig down to the desired sampling interval.
3. Use a stainless-steel hand trowel to collect soil.
4. Place soil in an appropriate sampling container.
5. Replace all excavated soils to their original location (i.e., backfill the sampling hole).

Hand Auger Procedure

1. Remove vegetation and woody debris from the ground surface.
2. Use the hand auger to advance down to the top of the sampling interval.

3. Use a hand auger to collect soil from the desired depth.

4. Use a clean (decontaminated) tool to scoop the soil out of the auger and place in an appropriate sampling container.

5. Replace all excavated soils to their original location (i.e., backfill the sampling hole).

6. If hand auger refusal is encountered, sample will be collected from an alternate location.

Sample Containers and Sample Volumes

All samples shall be collected using wide-mouthed glass jars or other sampling containers as directed or supplied by the laboratory.

Sampling volume and number of containers necessary shall be specified by the District's contract of internal laboratory. It is anticipated that multiple containers of sediment will need to be collected at each location.

Decontamination Procedures

All equipment used to collect soil samples (hand trowel or hand auger) shall be decontaminated prior to collecting each sample, on-site. Equipment shall be decontaminated by at least rinsing the equipment twice with water, drying and then visually inspecting to ensure that there are no residual particles from the previous sample. The final rinse shall be with de-ionized or distilled water.

Sample Preservation

All samples shall be immediately preserved in accordance with the EPA sampling and testing procedures. This is most commonly done by placing the samples in an insulated cooler with ice. Samples may also be stored in a refrigerator.

The laboratory shall immediately record the temperature of the sample containers upon receipt of the samples, if required by the EPA sampling and testing procedures for the contaminants that are being analyzed.

Chain of Custody Procedures

Standard chain of custody procedures shall be used throughout the sampling collection procedures. A chain of custody shall be prepared for all samples. Each individual who has responsibility for the samples is required to sign the chain of custody upon relinquishing the samples to another party. The receiving party taking custody of samples shall also sign the chain of custody form.

When in the field, samples shall always be in sight of the individual responsible for the samples, or the samples shall be stored within a locked vehicle. If the samples are stored in an office prior to delivery to the laboratory, the samples shall be stored in a secure location. Applicable sample storage and preservation procedures shall be followed.

Survey of Sampling Locations

All sampling locations will be identified by Geographic Information Stationing.

Analytical Procedures

Every sediment sample location shall be sampled for the full list of parameters/analytes listed in Table 4 for the Reuse Guidelines. Sampling parameters/analytes listed in Table 4 may be modified after a history of sampling is obtained. This may result in not requiring monitoring for some of these contaminants under certain situations or at certain locations, or adding more parameters/analytes if deemed necessary by the Executive Officer.

Rational for Analytical Test Method Selection

The rationale used for selecting test methods is based largely on the laboratory's ability to meet the detection limit requirements of the Table 4. All methods are EPA standards but may vary from time to time (based on changes from the EPA). Although, the driving force behind the selection of the test methods will be (SF) Regional Board's Re-use Guidelines.

Moisture Content

Sediments in creeks naturally contain moisture; moisture content may fluctuate during the year and is dependent on creek flows, groundwater elevation, and other local conditions. The moisture content of in-situ soils will be higher than the moisture content of excavated sediments, due to the natural process of evaporation and infiltration.

Analysis of moisture content is required for Class III landfill acceptance for wet soils. In addition, it is necessary to measure the moisture content in order to determine the dry weight concentrations of constituents within the sediment.

Selected Test Method and Frequency of Testing

All samples except residual sediment samples shall be analyzed for moisture content by EPA Method 160.3 or the most current prescribed method.

Toxicity

Creek sediments may be toxic due to nonpoint source pollutants which may have been deposited into the creeks. Toxicity is of concern if the sediment is to be reused. Sediment toxicity test will be conducted only on composite samples from sites where the waters may not be controlled during sediment removal operations due to tidal action; therefore toxicity sampling shall only be conducted on sediment removal projects which would not divert the water around the project site during excavation.

Selected Test Method and Frequency of Testing

All samples in tidal areas only, except residual sediment samples, shall be tested for toxicity by means of a toxicity screening bioassay, by the test method specified in California Code of Regulations, Title 22. The samples will be tested using Eohaustorius estuarius species, unless otherwise specified by the EPA.

Methyl-Mercury Testing

Past mining operations allowed mining tailing and debris discharge to some creeks and this has increased mercury levels in sediments and soils in those watersheds, specifically the Guadalupe Watershed.

Selected Test Method and Frequency of Testing

Only the following creeks will be required to have the additional analysis of methyl mercury be performed for all composite samples, in accordance with EPA 1630:

Guadalupe Creek
Los Gatos Creek
Alamitos Creek
Randol Creek.

Quality Control

A QA/QC plan is an important component of a monitoring program involving extensive field sampling and laboratory analyses. The two objectives of the QA/QC plan are: 1) to provide a means of ongoing control and evaluation of the sampling and analysis procedures; and 2) to quantify data precision and accuracy for use in data interpretation. Duplicate samples are no longer required. The QA/QC plan will be followed in all phases of the monitoring program including sampling and validation reporting. QA/QC requirements are noted below.

The District will utilize a sampling contractor or internal staff to conduct field sampling. The assigned field staff and/or contractor will be responsible for managing all field sampling equipment. The actual assignment of sampling areas and analysis are given to the sampling staff by the Stream Maintenance Program Project Manager (PM). Verification of equipment, analysis, chain of custodies, etc. will also be conducted by the PM.

All equipment used for field sampling will be kept in good working order and if required will be tested and/or calibrated before leaving the office. Verification of working order/calibration (if necessary) should be re-verified, visually, upon arrival at the site to ensure the instruments are in proper working condition.

Laboratory

Whichever laboratory is used to perform analysis under this sediment sampling plan, they must be certified by the State of California Department of Health Services under the Environmental Laboratory Accreditation Program. For sub-labs that are out of state, they must hold current certification in their state's accreditation program. Further, the contract lab is required to perform their own quality control tests with the results published in the final lab report.

Reporting

Upon receipt of the analytical results from the laboratory, the District will submit the results to the Regional Board for review and approval. This will happen in the following manner:

The District shall attempt compile the results in 2 to 3 submittals to the Regional Board

1. For ease of review, only the contaminants that test above the Regional Board's Table 4 detection limits will be reported to the reviewing staff member of the Regional Board
2. The entirety of the results, for detected and non-detected, shall be maintained in the District's database and made available upon request. Further, the signed lab copy of the results shall be maintained for no less than 3 years by the District

3. The Regional Board shall review the detected contaminants and approve them for excavation and reuse. For project site sediments that are going to landfill, the Regional Board is only required to approve the removal of the material as the landfill will approve acceptance to their disposal facility.

Attachment A

Table 4: Recommended Sediment Chemistry Screening Guidelines for Beneficial Reuse of Dredged

ANALYTE	Wetland Surface Material		Wetland Foundation Material	
	Concentration	Decision Basis	Concentration	Decision Basis
METALS (mg/kg)				
Arsenic	15.3	Ambient Values	70	ER-M
Cadmium	0.33	Ambient Values	9.6	ER-M
Chromium	112	Ambient Values	370	ER-M
Copper	68.1	Ambient Values	270	ER-M
Lead	43.2	Ambient Values	218	ER-M
Mercury	0.43	Ambient Values	0.7	ER-M
Nickel	112	Ambient Values	120	ER-M
Selenium	0.64	Ambient Values		
Silver	0.58	Ambient Values	3.7	ER-M
Zinc	158	Ambient Values	410	ER-M
ORGANOCHLORINE PESTICIDES/PCBS (µg/kg)				
DDTS, sum	7.0	Ambient Values	46.1	ER-M
Chlordanes, sum	2.3	TEL	4.8	PEL
Dieldrin	0.72	TEL	4.3	PEL
Hexachlorocyclohexane, sum	0.78	Ambient Values		
Hexachlorobenzene	0.485	Ambient Values		
PCBs, sum	22.7	ER-L	180	ER-M
POLYCYCLIC AROMATIC HYDROCARBONS (µg/kg)				
PAHs, total	3,390	Ambient Values	44,792	ER-M
Low molecular weight PAHs, sum	434	Ambient Values	3,160	ER-M
High molecular weight PAHs, sum	3,060	Ambient Values	9,600	ER-M
1-Methylnaphthalene	12.1	Ambient Values		
1-Methylphenanthrene	31.7	Ambient Values		
2,3,5-Trimethylnaphthalene	9.8	Ambient Values		
2,6-Dimethylnaphthalene	12.1	Ambient Values		
2-Methylnaphthalene	19.4	Ambient Values	670	ER-M
2-Methylphenanthrene		Ambient Values		
3-Methylphenanthrene		Ambient Values		
Acenaphthene	26.0	Ambient Values	500	ER-M
Acenaphthylene	88.0	Ambient Values	640	ER-M
Anthracene	88.0	Ambient Values	1,100	ER-M
Benz(a)anthracene	412	Ambient Values	1,600	ER-M
Benzo(a)pyrene	371	Ambient Values	1,600	ER-M
Benzo(e)pyrene	294	Ambient Values		
Benzo(b)fluoranthene	371	Ambient Values		
Benzo(g,h,i)perylene	310	Ambient Values		
Benzo(k)fluoranthene	258	Ambient Values		
Biphenyl	12.9	Ambient Values		
Chrysene	289	Ambient Values	2,800	ER-M
Dibenz(a,h)anthracene	32.7	Ambient Values	260	ER-M
Fluoranthene	514	Ambient Values	5,100	ER-M
Fluorene	25.3	Ambient Values	540	ER-M
Indeno(1,2,3-c,d)pyrene	382	Ambient Values		
Naphthalene	55.8	Ambient Values	2,100	ER-M
Perylene	145	Ambient Values		
Phenanthrene	237	Ambient Values	1,500	ER-M
Pyrene	665	Ambient Values	2,600	ER-M

SEDIMENT CHARACTERIZATION PLAN

FOR THE
SANTA CLARA VALLEY WATER DISTRICT
MULTI-YEAR STREAM MAINTENANCE PROGRAM
-SAN FRANCISCO REGION-

Revised by

Ray Fields
Project Manager
Stream Stewardship Unit

Shree Dharasker
Engineering Unit Manager
Stream Stewardship Unit

Under the Direction of

Ann Draper
Assistant Operating Officer
Watershed Stewardship Division

November 2011

TABLE OF CONTENTS

Introduction

The Santa Clara Valley Water District (District) conducts sediment removal, vegetation management, bank protection repairs, minor maintenance, and canal maintenance activities in channels/creeks for the purpose of alleviating the potential for local flooding problems and to meet the requirements of the Federal Emergency Management Agency for flood protection. Under the aforementioned activities of the Multi-Year Stream Maintenance Program (SMP), channel/creek sediment is often removed as a result of these activities. In order to effectively manage the removal and disposal of the sediments removed as a result of these activities, it is necessary to characterize the chemical and physical properties of the sediments (or also known as creek material as some of the tested material is from the creek banks or stockpiles, etc.). This characterization allows the District to (1) effectively plan for disposal of the sediments and (2) assist with determining the best management practices (BMP) to implement in order to avoid and minimize impacts to water quality, aquatic life, and beneficial uses. The sediment characterization plan proposed for the District's Multi-Year Stream Maintenance Program, as presented herein, is a result of the District's sediment testing and evaluation effort, and continuous improvement process based on guidance from regulatory agencies and other stakeholders, since 1997.

Purpose

According to the Basin Plan, the Regional Board establishes and enforces Waste Discharge Requirements (WDR) for point and nonpoint source of pollutants at levels necessary to meet numerical and narrative water quality objectives. The sediment tests performed by the District each year, as part of its SMP are based on the historic occurrence of pollutants within Santa Clara Valley streams, in accordance with the Basin Plan water quality objectives, and the Regional Board's WDR through a stakeholder process. The stakeholder process and lessons learned meetings involved participation of the Regional Board, the California State Department of Fish and Game (DFG), the U.S. Environmental Protection Agency (EPA), the U.S. Army Corps of Engineers (Corps), and various environmental organizations which assisted the District in continuous evaluation and improvement of the sediment characterization plan.

There are four main reasons for characterizing the sediments described as follows:

Landfill Acceptance

Landfills require creek sediment to be characterized before they accept the material for disposal.

Reuse Sites

Reuse sites are considered places that are not within the immediate vicinity (within 500 feet upstream or downstream) of the sediment excavation. These places can range from (but are not limited to) ponds, creek banks, or maintenance roads. These reuse sediments are approved by the Regional Board in advance of placement of the material. Material reused within the 500 feet upstream or downstream, and less than 500 cubic yards, is done without sediment testing.

The San Francisco Bay Regional Water Quality Control Board

The Regional Board has required characterization of the materials to determine if the proposed disposal method is acceptable. The Regional Board must ensure that the disposal of the material will not pose a threat to the waters of the state. The Regional Board is interested in determination of total mercury and polychlorinated biphenyls (PCB's) in residual sediment after sediment removal.

The California Department of Fish and Game

DFG requests that the materials be characterized to determine if they will adversely impact fish and wildlife as the removal operations may cause sediments to be re-suspended and migrate downstream where it may have an impact on fish and wildlife. DFG defers to the Water Board for the determination of suitability for creek material removal.

Scope

Under the SMP, sediment will only be tested using the San Francisco Bay Regional Water Quality Control Board's (Regional Board) Benificail Reuse of Dredged Materials: Sediment Screening and Testing Guidelines (May 2000) to facilitate any beneficial reuse of sediment generated by the District. The physical and chemical properties of sediments tested by the District include metals, pesticides and organophosphorous compounds, polychlorinated biphenyls, polynuclear aromatic hydrocarbons, moisture content, chloride, pH, total sulfides, ammonia, and toxicity (in some cases).

This sampling plan documents sampling and analytical procedures which will be utilized for the creek sites under the SMP. It is not intended to be a full characterization of all the stream sediments. The Sediment Characterization Plan is primarily designed to characterize sediment designated for removal (using composite, continuous core and residual sediment sampling methods). Residual sediment samples will only be collected in an attempt to characterize the sediment that may be subject to erosion and transport during flows.

The Sediment Characterization Plan addresses the following sampling methods designed to meet the overall objectives of landfill acceptance, sediment reuse at alternative sites, water quality protection, and fish and wildlife protection:

1. Composite sediment sampling
2. Continuous Core sampling
3. Residual sediment sampling

Objectives

The specific objectives of the Sediment Characterization Plan are as follows:

1. Characterize the sediments for acceptance by landfills.

2. Characterize the sediments to determine their suitability for reuse at alternative disposal sites (i.e., non-landfill reuse sites).

3. Compliance with regulatory requirements for the sediment removal activities.

4. Provide data for evaluation of the feasibility of long-term disposal, reuse, and recycling opportunities for sediment generated by the District.

Sampling Methods

This section describes the frequency of sampling and the location of sample collection at the SMP sites involving sediment removal activities. From both the regulatory and scientific perspectives, the primary objectives of a sampling plan for a solid material are twofold: namely, (1) to collect samples that are representative samples as exhibiting average properties of the whole solid material and (2) to collect samples that will allow measurements of the chemical properties of the waste that are both accurate and precise.

Sediment samples will be collected for characterization of sediment designated for removal and analyzed in accordance with the contaminants listed on Table 4 Recommended Sediment Chemistry Screening Guidelines for Beneficial Reuse of Dredged Material (Re-use Guidelines) from the Regional Boards Basin Plan. Sampling parameters/analytes listed in Table 4 may be modified after a history of sampling is obtained. This may result in not requiring monitoring for some of these contaminants under certain situations or at certain locations, or adding more parameters/analytes if deemed necessary by the Executive Officer of the Regional Board.

Reliable information concerning the chemical properties of a solid waste is needed for the purpose of comparing chemical properties with applicable regulatory thresholds. For chemical information to be reliable, it must be accurate and precise. Accuracy is usually achieved by incorporating some form of randomness into the selection process for the samples that generate the data. Precision is most often obtained by selecting an appropriate number of samples.

For this Sediment Characterization Plan, the District will utilize a systematic random sampling technique generated by the sediment sampling database, in which all sampling points from a population are randomly selected. The advantages of systematic random sampling over other sampling techniques are the ease with which samples are identified, and collected, an increase in precision, and to collect representative data on chemical properties. All samples shall be collected in accordance with the U.S. EPA Guidelines and sampling methodologies. The methods of analyses and detection limits must be appropriate for the expected concentrations. Specific methods of analyses must be identified. If methods other than U.S. EPA – approved methods of Standard Methods are used, the exact methodology must be submitted for review and approved by the Executive Officer of the Regional Board.

Composite Sediment Samples

The purpose of composite sediment sampling is to conduct the widest range of characterization along the project sites' lengths and widths in order to capture the most variation of the area. This broader scope of randomly generated 4 point sampling will give a greater sense of the variability of the channel material than a specific sample point.

Composite Sample Collection Frequency

In order to characterize the sediment, one composite, which consists of 4 random samples, in-situ sample shall be collected and analyzed approximately every 4,000 cys. Approximately one sample shall be collected every 1,000 cys. These

samples will be composited together by the laboratory. The length of the channel is also taken into consideration as the District's database will generate sampling points based on the length of the project area. As such, projects with long project lengths will have sample points farther apart in order to better characterize the variability in sediment contaminants along the entire length of the worksite.

Composite Sample Locations

The location of each sample at the Sediment Removal Program sites must be selected in the following three dimensions: (1) the creek station, or the location along the length of the creek; (2) the location along the creek cross section; and (3) the depth below ground surface (bgs). With these parameters, a sample point is randomly generated. The rationale for selection of a sampling location in all three dimensions is described below:

Composite Sample Depth

The sampling depth of the composite samples are also randomly generated varied from surface sampling to maximum excavation depth of the proposed project.

Continuous Core Sediment Samples

The purpose of continuous core sampling is to take samples at selected locations (e.g. below outfalls, depression areas of the creek, likely contaminated areas) where the highest likelihood of contamination exists in the project site. This type of sample is not taken on the banks (above the toe of the channel) nor from stockpiles, only from within toe to toe of the channel.

Continuous Core Sample Collection Frequency

One continuous core sample is taken every 4000 cubic yards per project site.

Continuous Core Sample Locations

The location of the sample is determined in the field upon attempting to locate areas of depression or outfalls within the project site. As these features are not always apparent, the location will sometimes have to be placed in the most likely areas of these features.

Continuous Core Sample Depth

The depth of the sample is randomly generated by the District's sediment sampling database and printed on the sediment sampling plan generated in the office and used out in the field.

Residual Sediment Samples

The purpose of residual sediment sampling is to conduct limited characterization of sediment left behind after sediment removal from earthen channels and creeks. The exposed sediment in the channel/creek bottom will be sampled and analyzed for total mercury and PCB.

Residual Sample Collection Frequency

Residual sediment samples will be collected at one every 4000 cys on earthen channels.

Residual Sample Locations

This type of sample will be collected at each earthen channel/creek site. The location of the residual sample will coincide with the continuous core sample.

Residual Sample Depth

The samples will be collected from within 1 foot below the planned maximum depth of excavation for that project.

Sampling Procedures

This section describes the field sampling procedures. All samples shall be collected in accordance with U.S. EPA Guidelines and sampling methodologies. The methods of analyses and detection limits must be appropriate for expected concentrations. Specific methods of analyses must be identified. If methods other than U.S. EPA approved methods of Standard Methods are used, the exact methodology must be submitted for review and approved by the Executive Officer.

Sample Collection

All samples shall be collected by means of a hand trowel, a hand auger, or another sampling method approved by the regulatory agencies. The individual collecting the sample will have the discretion of choosing the sampling method which is the most efficient to perform.

Sampling will be conducted in accordance with the methods described below:

Hand Trowel Procedure

1. Remove vegetation and woody debris from the ground surface.
2. If collecting a subsurface sample, use a shovel to dig down to the desired sampling interval.
3. Use a stainless-steel hand trowel to collect soil.
4. Place soil in an appropriate sampling container.
5. Replace all excavated soils to their original location (i.e., backfill the sampling hole).

Hand Auger Procedure

1. Remove vegetation and woody debris from the ground surface.
2. Use the hand auger to advance down to the top of the sampling interval.

3. Use a hand auger to collect soil from the desired depth.

4. Use a clean (decontaminated) tool to scoop the soil out of the auger and place in an appropriate sampling container.

5. Replace all excavated soils to their original location (i.e., backfill the sampling hole).

6. If hand auger refusal is encountered, sample will be collected from an alternate location.

Sample Containers and Sample Volumes

All samples shall be collected using wide-mouthed glass jars or other sampling containers as directed or supplied by the laboratory.

Sampling volume and number of containers necessary shall be specified by the District's contract of internal laboratory. It is anticipated that multiple containers of sediment will need to be collected at each location.

Decontamination Procedures

All equipment used to collect soil samples (hand trowel or hand auger) shall be decontaminated prior to collecting each sample, on-site. Equipment shall be decontaminated by at least rinsing the equipment twice with water, drying and then visually inspecting to ensure that there are no residual particles from the previous sample. The final rinse shall be with de-ionized or distilled water.

Sample Preservation

All samples shall be immediately preserved in accordance with the EPA sampling and testing procedures. This is most commonly done by placing the samples in an insulated cooler with ice. Samples may also be stored in a refrigerator.

The laboratory shall immediately record the temperature of the sample containers upon receipt of the samples, if required by the EPA sampling and testing procedures for the contaminants that are being analyzed.

Chain of Custody Procedures

Standard chain of custody procedures shall be used throughout the sampling collection procedures. A chain of custody shall be prepared for all samples. Each individual who has responsibility for the samples is required to sign the chain of custody upon relinquishing the samples to another party. The receiving party taking custody of samples shall also sign the chain of custody form.

When in the field, samples shall always be in sight of the individual responsible for the samples, or the samples shall be stored within a locked vehicle. If the samples are stored in an office prior to delivery to the laboratory, the samples shall be stored in a secure location. Applicable sample storage and preservation procedures shall be followed.

Survey of Sampling Locations

All sampling locations will be identified by Geographic Information Stationing.

Analytical Procedures

Every sediment sample location shall be sampled for the full list of parameters/analytes listed in Table 4 for the Reuse Guidelines. Sampling parameters/analytes listed in Table 4 may be modified after a history of sampling is obtained. This may result in not requiring monitoring for some of these contaminants under certain situations or at certain locations, or adding more parameters/analytes if deemed necessary by the Executive Officer.

Rational for Analytical Test Method Selection

The rationale used for selecting test methods is based largely on the laboratory's ability to meet the detection limit requirements of the Table 4. All methods are EPA standards but may vary from time to time (based on changes from the EPA). Although, the driving force behind the selection of the test methods will be Regional Board's Re-use Guidelines.

Moisture Content

Sediments in creeks naturally contain moisture; moisture content may fluctuate during the year and is dependent on creek flows, groundwater elevation, and other local conditions. The moisture content of in-situ soils will be higher than the moisture content of excavated sediments, due to the natural process of evaporation and infiltration.

Analysis of moisture content is required for Class III landfill acceptance for wet soils. In addition, it is necessary to measure the moisture content in order to determine the dry weight concentrations of constituents within the sediment.

Selected Test Method and Frequency of Testing

All samples except residual sediment samples shall be analyzed for moisture content by EPA Method 160.3 or the most current prescribed method.

Toxicity

Creek sediments may be toxic due to nonpoint source pollutants which may have been deposited into the creeks. Toxicity is of concern if the sediment is to be reused. Sediment toxicity test will be conducted only on composite samples from sites where the waters may not be controlled during sediment removal operations due to tidal action; therefore toxicity sampling shall only be conducted on sediment removal projects which would not divert the water around the project site during excavation.

Selected Test Method and Frequency of Testing

All samples in tidal areas only, except residual sediment samples, shall be tested for toxicity by means of a toxicity screening bioassay, by the test method specified in California Code of Regulations, Title 22. The samples will be tested using Eohaustorius estuarius species, unless otherwise specified by the EPA.

Methyl-Mercury Testing

Past mining operations allowed mining tailing and debris discharge to some creeks and this has increased mercury levels in sediments and soils in those watersheds, specifically the Guadalupe Watershed.

Selected Test Method and Frequency of Testing

Only the following creeks will be required to have the additional analysis of methyl mercury be performed for all composite samples, in accordance with EPA 1630:

Guadalupe Creek
Los Gatos Creek
Alamitos Creek
Randol Creek.

Quality Control

A QA/QC plan is an important component of a monitoring program involving extensive field sampling and laboratory analyses. The two objectives of the QA/QC plan are: 1) to provide a means of ongoing control and evaluation of the sampling and analysis procedures; and 2) to quantify data precision and accuracy for use in data interpretation. Duplicate samples are no longer required. The QA/QC plan will be followed in all phases of the monitoring program including sampling and validation reporting. QA/QC requirements are noted below.

The District will utilize a sampling contractor or internal staff to conduct field sampling. The assigned field staff and/or contractor will be responsible for managing all field sampling equipment. The actual assignment of sampling areas and analysis are given to the sampling staff by the Stream Maintenance Program Project Manager (PM). Verification of equipment, analysis, chain of custodies, etc. will also be conducted by the PM.

All equipment used for field sampling will be kept in good working order and if required will be tested and/or calibrated before leaving the office. Verification of working order/calibration (if necessary) should be re-verified, visually, upon arrival at the site to ensure the instruments are in proper working condition.

Laboratory

Whichever laboratory is used to perform analysis under this sediment sampling plan, they must be certified by the State of California Department of Health Services under the Environmental Laboratory Accreditation Program. For sub-labs that are out of state, they must hold current certification in their state's accreditation program. Further, the contract lab is required to perform their own quality control tests with the results published in the final lab report.

Reporting

Upon receipt of the analytical results from the laboratory, the District will submit the results to the Regional Board for review and approval. This will happen in the following manner:

The District shall attempt compile the results in 2 to 3 submittals to the Regional Board

1. For ease of review, only the contaminants that test above the Regional Board's Table 4 detection limits will be reported to the reviewing staff member of the Regional Board

2. The entirety of the results, for detected and non-detected, shall be maintained in the District's database and made available upon request. Further, the signed lab copy of the results shall be maintained for no less than 3 years by the District

3. The Regional Board shall review the detected contaminants and approve them for excavation and reuse. For project site sediments that are going to landfill, the Regional Board is only required to approve the removal of the material as the landfill will approve acceptance to their disposal facility.

Attachment A

Table 4: Recommended Sediment Chemistry Screening Guidelines for Beneficial Reuse of Dredged

ANALYTE	Wetland Surface Material		Wetland Foundation Material	
	Concentration	Decision Basis	Concentration	Decision Basis
METALS (mg/kg)				
Arsenic	15.3	Ambient Values	70	ER-M
Cadmium	0.33	Ambient Values	9.6	ER-M
Chromium	112	Ambient Values	370	ER-M
Copper	68.1	Ambient Values	270	ER-M
Lead	43.2	Ambient Values	218	ER-M
Mercury	0.43	Ambient Values	0.7	ER-M
Nickel	112	Ambient Values	120	ER-M
Selenium	0.64	Ambient Values		
Silver	0.58	Ambient Values	3.7	ER-M
Zinc	158	Ambient Values	410	ER-M
ORGANOCHLORINE PESTICIDES/PCBS (µg/kg)				
DDTS, sum	7.0	Ambient Values	46.1	ER-M
Chlordanes, sum	2.3	TEL	4.8	PEL
Dieldrin	0.72	TEL	4.3	PEL
Hexachlorocyclohexane, sum	0.78	Ambient Values		
Hexachlorobenzene	0.485	Ambient Values		
PCBs, sum	22.7	ER-L	180	ER-M
POLYCYCLIC AROMATIC HYDROCARBONS (µg/kg)				
PAHs, total	3,390	Ambient Values	44,792	ER-M
Low molecular weight PAHs, sum	434	Ambient Values	3,160	ER-M
High molecular weight PAHs, sum	3,060	Ambient Values	9,600	ER-M
1-Methylnaphthalene	12.1	Ambient Values		
1-Methylphenanthrene	31.7	Ambient Values		
2,3,5-Trimethylnaphthalene	9.8	Ambient Values		
2,6-Dimethylnaphthalene	12.1	Ambient Values		
2-Methylnaphthalene	19.4	Ambient Values	670	ER-M
2-Methylphenanthrene		Ambient Values		
3-Methylphenanthrene		Ambient Values		
Acenaphthene	26.0	Ambient Values	500	ER-M
Acenaphthylene	88.0	Ambient Values	640	ER-M
Anthracene	88.0	Ambient Values	1,100	ER-M
Benz(a)anthracene	412	Ambient Values	1,600	ER-M
Benzo(a)pyrene	371	Ambient Values	1,600	ER-M
Benzo(e)pyrene	294	Ambient Values		
Benzo(b)fluoranthene	371	Ambient Values		
Benzo(g,h,i)perylene	310	Ambient Values		
Benzo(k)fluoranthene	258	Ambient Values		
Biphenyl	12.9	Ambient Values		
Chrysene	289	Ambient Values	2,800	ER-M
Dibenz(a,h)anthracene	32.7	Ambient Values	260	ER-M
Fluoranthene	514	Ambient Values	5,100	ER-M
Fluorene	25.3	Ambient Values	540	ER-M
Indeno(1,2,3-c,d)pyrene	382	Ambient Values		
Naphthalene	55.8	Ambient Values	2,100	ER-M
Perylene	145	Ambient Values		
Phenanthrene	237	Ambient Values	1,500	ER-M
Pyrene	665	Ambient Values	2,600	ER-M

ATTACHMENT H

Water Quality Monitoring Plans
Regional Water Quality Control Boards
Central Coast and
San Francisco Bay

WATER QUALITY MONITORING PLAN

FOR THE
SANTA CLARA VALLEY WATER DISTRICT
MULTI-YEAR STREAM MAINTENANCE PROGRAM
-CENTRAL COAST REGION-

Revised by

Ray Fields
Project Manager
Stream Stewardship Unit

Shree Dharasker, P.E.
Engineering Unit Manager
Stream Stewardship Unit

Under the Direction of

Ann Draper
Assistant Operating Officer
Watershed Stewardship Division

November 2011

TABLE OF CONTENTS

Introduction

The purpose of the Stream Maintenance Program (SMP) is to alleviate local flooding problems and to meet the requirements of the Federal Emergency Management Agency for flood protection. To ensure compliance with the Central Coast Bay Regional Water Quality Control Board's (Regional Board) Waste Discharge Requirements (WDRs) field water quality parameters will be measured/observed by the Santa Clara Valley Water District (District) during SMP operations using active diversions, which include pH, turbidity, temperature and dissolved oxygen. This plan has been revised based on field conditions encountered during the years of operation of the SMP.

Purpose

The purpose of the Self-Monitoring Program is to verify compliance with the effluent and receiving water limitations issued under the WDRs by the Board. The plan also includes procedures for record keeping and reporting, to provide the documentation of compliance with receiving water requirements and prohibitions in the WDRs. This includes field/data reporting forms, sample collection, and formal annual reports to the Regional Board. A water quality monitoring report will be submitted to the Regional Board and other agencies/organizations (if requested) after the completion of each year's active diversion operations, in accordance with the Regional Board's WDRs.

Scope

The scope of this plan is to outline the process, means and verification of monitoring water quality during SMP projects that use active diversions for all 4 authorized types of construction (Bank Protection, Minor Maintenance, Vegetation Management and Sediment Removal).

Definition of Terms

Grab sample: an individual sample collected in a short period of time not exceeding 15 minutes. They are to be used primarily in determining compliance with effluent and receiving water limits. Grab samples only represent the condition that exists at the time the water and effluent are collected.

Point of discharge: the location point at which water diverted around the active site is discharged into **non-tidal** waters of the State.

Active site: the confine of a SMP activity occurring on a waterway in which a pump is being used to divert water around the project site.

Duly authorized representative: one who is

a. Authorization is made in writing by a principal executive officer, or

b. Authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity (e.g., field supervisor, project manager, chief engineer).

Downstream discharge/Effluent water: the water that flows out of a diversion, the discharged water (passive or active diversion)

Upstream water: water from a river or stream that is being diverted around a project site, from the upper end of the project site

Receiving water: any water body that actually or potentially receives surface or ground water at the point of discharge, which passes over, through, or under dredged sediment during placement, dewatering, settling/consolidation, and excavation/removal activities – the water body that receives the discharge

Active diversion: any method of diverting water around a project site other than non-mechanical means.

Passive diversion: the method of diverting water around a project site using no mechanical means. As well, working in channel where the project is being conducted outside of the live stream because of a natural buffer, such as excavating in pockets of sediment, will be considered a passive diversion.

Specifications for Sampling and Analyses

The District will perform sampling and analyses in accordance with the following conditions and requirements included in the WDRs issued by the Regional Board. Two types of data collection will be conducted at the sites - water quality observations and water quality analyses using field instruments. No laboratory analyses will be conducted.

Water Quality Standard Observations:

Standard observations of surface water conditions shall be conducted upstream and downstream of the active project area to visually detect impacts of the water diversion. The following standard observations of the receiving waters will be collected on every day of operation on the field reporting form (Appendix A):

1. Floating and suspended materials of waste origin (to include oil, grease, or other material that may come from the diversion/project site) presence or absence and size of the affected area. Note what will be done if there is presence of material coming from or caused by the diversion.
2. Discoloration and turbidity: description of color, source, distance of travel and wind direction
3. Odor: presence or absence, characterization, source, distance of travel, and wind direction
4. Hydrographic condition including: depth of water columns, sampling depths, time and height of corrected low and high tides
5. Weather condition including: air temperature, wind direction and velocity (speed), and precipitation

Water Quality Analysis using Field Instruments:

Water Quality Testing:

Water Quality data will be collected by direct immersion of the instrument probe into the water column, or directly immersed into collection apparatus. The sample will be immediately analyzed on site for constituents in Table 1. Samples shall be collected with accurately calibrated field measurement instrument(s) and the results logged.

Table 1

Constituents	**Type of Sample**	**Units**
Turbidity	Grab/Dip	NTUs
pH	Grab/Dip	Not Applicable
Dissolved Oxygen	Grab/Dip	mg/l
Temperature	Grab/Dip	Degrees Fahrenheit

Water Quality Testing Locations

Samples will be collected at a distance of 100 feet (or at a location that is most representative of the typical undisturbed condition) upstream of the beginning of the active diversion and 100 feet (or at a location that is most representative of surface water affected by the diversion) directly downstream from the point of discharge into the receiving water of the non-tidal sites. The samples will not be taken during a rainstorm event or subsequent runoff event. Samples of the discharge from temporary storage sites (if utilized) are to be collected as near as possible to the point of discharge without compromising the safety of personnel. Wherever possible, the probes will collect data from 1 foot below the surface.

Water Quality Testing Frequency

At every active diversion site, water quality samples shall be collected at least twice daily. Each sample set collected at the upstream and downstream locations must be taken within no more than a half an hour of each other (unless some outstanding circumstance exists).

Background Sampling (pre-construction baseline sampling):

Prior to the installation of an active diversion and/or its components, at least 1 day of background water samples (two samples per day evenly spaced during working hours) will be collected. If there is a change in stream conditions (eg. storm event) while there is a shutdown of the active diversion, new baseline sampling shall be conducted.

Operational Sampling:

Water quality samples will be collected at the active diversion sites, at least two samples per day, evenly spaced during the work hours, with the first sample collected no earlier than 1 hour after work has commenced each day.

Background Sampling (post-construction baseline sampling):

After the removal of an active diversion and/or its components (either/or when pumps are shutoff and water is reintroduced into the project site), at least 1 day of background water samples (two samples per day evenly spaced during working hours) will be collected at a minimum of 100 feet upstream of the planned placement of the active diversion. The samples will be representative of typical undisturbed conditions and will not be taken during a rainstorm or subsequent runoff event.

Stock Pile Sampling

Water draining from a temporary sediment stockpile will be sampled on every day that there is a discharge which enters into a live stream. Sampling will be conducted at all points of discharge/runoff. The sample will be immediately analyzed on site for constituents in Table 1.

What is an Exceedance?

An exceedance is where the receiving (downstream) water quality sample result for constituent(s) analyzed on site show an exceedance of the upstream water sample results, as specified in Table 2.

TABLE 2

Parameter	**Exceedance Limit**
pH	>0.5 units deviation from background (upstream)
Dissolved Oxygen	minimum of 5.0 mg/l for tidal waters or non-tidal warm water Minimum 7.0 mg/l for non-tidal cold waters *or* no change if background <5.0 mg/l
Turbidity	Should not increase greater than 5 NTUs if background ≤50 NTUs and 10 percent if background >50 NTUs
Temperature	The temperature of any cold or warm freshwater habitat shall not be increased by more than 5°F (2.8°C) above the upstream temperature

What to do if there is an Exceedance

If any water quality monitoring sample results in an exceedance, then the District will implement the following process to correct the exceedance:

1. Confirmation samples will be taken within 2 hours following the exceedance. Sampling every 2 hours will continue until the exceedance has been corrected. All constituents will continue to be monitored.
2. Immediately implement procedures to identify the source of the exceedance.
3. Once the source of the exceedance has been identified, immediately implement procedures to correct the source of the exceedance.

Exceptions

The Regional Board recognizes that even with BMPs and appropriate equipment and methods, turbidity levels may momentarily exceed the limitations defined in the WDRs during the initial stage of such activities as (a) culvert invert cleaning for panel placement; (b) streambed preparation for bladder dam placement; (c) initial flow discharge in constructed bypass channels; (d) removal of panels and bladder dams; (e) placement and removal of coffer dams; and (f) installation and removal of corrective action measures. The following describes specific activities and duration of exceedance allowances:

According to the WDRs issued by the Regional Board, at any given site, an exceedance of the turbidity limit during an activity described in SMP activities (a) through (d) above, for a duration of not more than four (4) hours, will not be considered a "violation" in the context of enforcement or the need to take corrective action. The District will take all reasonable actions to limit the duration and magnitude of such exceedance events. Water quality impacts shall be avoided/minimized to the maximum extent practicable.

According to the WDRs issued by the Regional Board, at any given site, an exceedance of the turbidity limit during an activity described in SMP activities (e) and (f) above will not be considered a "violation" in the context of enforcement or the need to take corrective action provided the duration of exceedance is:

Not More Than	**For Channel Widths**
4 hours	Less than 100 feet wide
6 hours	100 to 150 feet wide
8 hours	More than 150 feet wide

The District will take all reasonable actions to limit the duration and magnitude of such exceedance events.

Violation Reporting

If any receiving (downstream) water limit for a constituent(s) is exceeded as specified in Table 2 for more than a 2 hour period (after the first 2 hour confirmation sampling), then dredging will be terminated until the cause of the exceedance has been corrected. If after 6 hours the exceedance has not been alleviated, this will be considered a violation and must immediately be reported out to the Regional Board Executive Officer via the Regional Board case manager, by telephone.

For any other violations, the District will notify the Regional Board immediately whenever violations are detected at which time flood control activities (SMP project) will be terminated and the activity will not resume until the District has provided the Regional Board with a corrective action plan, acceptable to the Executive Officer that provides alternative methods of compliance.

Records to be Maintained

Written reports, calibration and maintenance records, and other records shall be maintained by the District and accessible at all times. Records shall be kept at the District for a minimum of 3 years. Records shall include notes and observations for each sample as follows:

a. Identification of sampling site by creek name, cross street, and item number (if available from the annual reports).

b. Date and time of sampling.

c. Date and time analyses are started and completed and the name of person conducting analyses.

f. Data and results of analyses and/or observations.

Records shall include a map or maps of the site showing the location of the project(s) and water sampling locations, coffer dams, discharge pipes, access ramps, etc.

Quality Assurance and Quality Control

The QA/QC portion of the WDR is an important component of the monitoring program involving, at the core of compliance, quality assurance of field sampling. As such, this section describes the 2 major elements of the QA/QC plan which are (1) field sampling to ensure compliance with WDR criteria and (2) reporting of that compliance.

District utilizes sampling contractors and/or internal staff to conduct water quality sampling for the SMP projects. These monitors will use District approved field sampling instruments and sampling equipment. As field sampling is the ultimate means of ensuring compliance with WDR requirements, it is imperative to have operating procedures that show the field sampling is being conducted in a manner that will collect analysis in an accurate way. In order to do this, the following criteria must be followed:

1. All personnel conducting monitoring must read the relevant SMP best management practices, this WDR plan, the CCRWQCB Board Order, and manufacture calibration/instruction manuals for all sampling instruments used
2. The SMP Project Manger must train personnel conducting this activity on all aspects of water quality monitoring
3. Verification document signed that the relevant documents have been read and additional training has occurred

All this documentation will be held with the SMP Project Manager, for a period of three years. Further, all equipment will be tested and calibrated, in accordance with the equipment's manufacture requirements, at least once a week to ensure the instruments are in proper working condition.

The reporting of the compliance/non-compliance of each project meeting the WDR criteria is captured in an end of season report that is submitted to the Regional Board, see "Final Monitoring Report".

Reporting

Responsible Entity

The SMP Project Manager (PM) is responsible for implementing this Plan as required in the WDRs issued by the Regional Board for the SMP. The PM will evaluate the data for compliance with the requirements of the WDR and will inform the Watershed Field Operations of any noncompliance event in order for them to take immediate corrective action.

Reports to the Regional Board

Permit Violations

The District shall notify the Regional Board staff in writing within five business days of all violations. Written reports shall include time and date of incident, duration, estimate of discharge or bypass volume, and documentation of sampling results/observations determining compliance status. The report shall also include detailed discussions of reasons for noncompliance and specific steps that were or will be taken to correct the failure and prevent it from re-occurring.

Final Monitoring Report

Upon completion of active diversion activities, a draft annual monitoring report will be filed with the Regional Board within 60 days of completion of all work, permitted activities end no later than October 30th.

The report will include:

1. Certification Statement
2. Introduction
3. Compliance Summary
4. Purpose and Scope
5. Description of Work Performed
6. Water Quality Sampling Data by Individual Site
7. Maps – County level showing where monitoring activities occurred

Embedded within these sections:

1. A transmittal letter which includes a summary of all violations of WDRs, any changes to the project design, and any unplanned releases or failures that occurred during the active diversion operations
2. The report shall provide: the magnitude of the releases or failures; any discharge limit exceedances; dates of all exceedances, cause of the failure, releases or other violations; any corrective actions taken or planned; and the dates of completion of corrective action

Final Report

Within 30 days after receipt of agency comments on the draft report, a final monitoring report will be filed with the Regional Board. The final report will be signed by the Chief Operating Officer of the Watersheds or a duly authorized representative of that person.

report will be signed by the Chief Operating Officer of the Watersheds or a duly authorized representative of that person.

Field Reporting Forms

APPENDIX A

Stream Maintenance Program Data Reporting Form

Creek Name/Item Number	Sample Date/Time	Direction	Turbidity	Dissolved Oxygen	pH	Temperature	Activity Monitored

Stream Maintenance Program Calibration Form

Instrument Identifiaction	Time of Calibration	Date of Calibration	Issues

Field Observation Reporting Form

Site Information

Site Name	Site Location	Date

Standard Observations

Weather

Air Temperature	Precipitation (Heavy/Light)	Wind Direction/Speed

Visual

Floating Suspended Materials — Present Absent

Turbidity/Discoloration — Present Absent

If present, what is the suspected source?

Water Depth — U/S D/S

If present, Site Foreman Notified? _____ Time/Name_____

Odor

Present Absent

If present, describe suspected source and estimate of affected area (wind direction and travel distance)

If present, Site Foreman Notified? _____ Time/Name_____

Flow (FOR NON TIDAL SITES)

Estimated rate (cubic feet per second)

Tides (FOR TIDAL SITES) from NOAA tide chart

Time	Height

WATER QUALITY MONITORING PLAN

FOR THE
SANTA CLARA VALLEY WATER DISTRICT
MULTI-YEAR STREAM MAINTENANCE PROGRAM
-SAN FRANCISCO REGION-

Revised by

Ray Fields
Project Manager
Stream Stewardship Unit

Shree Dharasker, P.E.
Engineering Unit Manager
Stream Stewardship Unit

Under the Direction of

Ann Draper
Assistant Operating Officer
Watershed Stewardship Division

November 2011

TABLE OF CONTENTS

Introduction

The purpose of the Stream Maintenance Program (SMP) is to alleviate local flooding problems and to meet the requirements of the Federal Emergency Management Agency for flood protection. To ensure compliance with the San Francisco Bay Regional Water Quality Control Board's (Regional Board) Waste Discharge Requirements (WDRs) field water quality parameters will be measured/observed by the Santa Clara Valley Water District (District) during SMP operations using active diversions, which include pH, turbidity, temperature and dissolved oxygen. This plan has been revised based on field conditions encountered during the years of operation of the SMP.

Purpose

The purpose of the Self-Monitoring Program is to verify compliance with the effluent and receiving water limitations issued under the WDRs by the Board. The plan also includes procedures for record keeping and reporting, to provide the documentation of compliance with receiving water requirements and prohibitions in the WDRs. This includes field/data reporting forms, sample collection, and formal annual reports to the Regional Board. A water quality monitoring report will be submitted to the Regional Board and other agencies/organizations (if requested) after the completion of each year's active diversion operations, in accordance with the Regional Board's WDRs.

Scope

The scope of this plan is to outline the process, means and verification of monitoring water quality during SMP projects that use active diversions for all 4 authorized types of construction (Bank Protection, Minor Maintenance, Vegetation Management and Sediment Removal).

Definition of Terms

Grab sample: an individual sample collected in a short period of time not exceeding 15 minutes. They are to be used primarily in determining compliance with effluent and receiving water limits. Grab samples only represent the condition that exists at the time the water and effluent are collected.

Point of discharge: the location point at which water diverted around the active site is discharged into **tidal or non-tidal** waters of the State.

Active site: the confine of a SMP activity occurring on a waterway in which a pump is being used to divert water around the project site.

Duly authorized representative: one who is

a. Authorization is made in writing by a principal executive officer, or

b. Authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity (e.g., field supervisor, project manager, chief engineer).

Downstream discharge/Effluent water: the water that flows out of a diversion, the discharged water (passive or active diversion)

Upstream water: water from a river or stream that is being diverted around a project site, from the upper end of the project site

Receiving water: any water body that actually or potentially receives surface or ground water at the point of discharge, which passes over, through, or under dredged sediment during placement, dewatering, settling/consolidation, and excavation/removal activities – the water body that receives the discharge

Active diversion: any method of diverting water around a project site other than non-mechanical means.

Passive diversion: the method of diverting water around a project site using no mechanical means. As well, working in channel where the project is being conducted outside of the live stream because of a natural buffer, such as excavating in pockets of sediment, will be considered a passive diversion.

Specifications for Sampling and Analyses

The District will perform sampling and analyses in accordance with the following conditions and requirements included in the WDRs issued by the Regional Board. Two types of data collection will be conducted at the sites - water quality observations and water quality analyses using field instruments. No laboratory analyses will be conducted.

Water Quality Standard Observations:

Standard observations of surface water conditions shall be conducted upstream and downstream of the active project area to visually detect impacts of the water diversion. The following standard observations of the receiving waters will be collected on every day of operation on the field reporting form (Appendix A):

1. Floating and suspended materials of waste origin (to include oil, grease, or other material that may come from the diversion/project site) presence or absence and size of the affected area. Note what will be done if there is presence of material coming from or caused by the diversion.
2. Discoloration and turbidity: description of color, source, distance of travel and wind direction
3. Odor: presence or absence, characterization, source, distance of travel, and wind direction
4. Hydrographic condition including: depth of water columns, sampling depths, time and height of corrected low and high tides
5. Weather condition including: air temperature, wind direction and velocity (speed), and precipitation

Water Quality Analysis using Field Instruments:

Water Quality Testing:

Water Quality data will be collected by direct immersion of the instrument probe into the water column, or directly immersed into collection apparatus. The sample will be immediately analyzed on site for constituents in Table 1. Samples shall be collected with accurately calibrated field measurement instrument(s) and the results logged.

Table 1

Constituents	**Type of Sample**	**Units**
Turbidity	Grab/Dip	NTUs
pH	Grab/Dip	Not Applicable
Dissolved Oxygen	Grab/Dip	mg/l
Temperature	Grab/Dip	Degrees Fahrenheit

Water Quality Testing Locations

Samples will be collected at a distance of 100 feet (or at a location that is most representative of the typical undisturbed condition) upstream of the beginning of the active diversion and 100 feet (or at a location that is most representative of surface water affected by the diversion) directly downstream from the point of discharge into the receiving water of the non-tidal sites. For tidal sites, water samples will be collected only at the point of discharge on the receiving waters (with no upstream collection). The samples will not be taken during a rainstorm event or subsequent runoff event. For sites that straddle both freshwater and tidal areas, tidal sampling protocol will be followed. Samples of the discharge from temporary storage sites (if utilized) are to be collected as near as possible to the point of discharge without compromising the safety of personnel. Wherever possible, the probes will collect data from 1 foot below the surface (tidal and non-tidal sites)

Water Quality Testing Frequency

At every active diversion site, water quality samples shall be collected at least twice daily. Each sample set collected at the upstream and downstream locations must be taken within no more than a half an hour of each other (unless some outstanding circumstance exists).

Background Sampling (pre-construction baseline sampling):

Prior to the installation of an active diversion and/or its components, at least 1 day of background water samples (two samples per day evenly spaced during working hours) will be collected. If there is a change in stream conditions (eg. storm event) while there is a shutdown of the active diversion, new baseline sampling shall be conducted.

Operational Sampling:

Water quality samples will be collected at the active diversion sites, at least two samples per day, evenly spaced during the work hours, with the first sample collected no earlier than 1 hour after work has commenced each day.

Background Sampling (post-construction baseline sampling):

After the removal of an active diversion and/or its components (either/or when pumps are shutoff and water is reintroduced into the project site), at least 1 day of background water samples (two samples per day evenly spaced during working hours) will be collected at a minimum of 100 feet upstream of the planned placement of the active diversion. The samples will be representative of typical undisturbed conditions and will not be taken during a rainstorm or subsequent runoff event.

Stock Pile Sampling

Water draining from a temporary sediment stockpile will be sampled on every day that there is a discharge which enters into a live stream. Sampling will be conducted at all points of discharge/runoff. Stockpile(s) must meet SMP Best Management Practice 1.8 and San Francisco Regional Water Quality Control Board – Board Order Condition D.2 standards. The sample will be immediately analyzed on site for constituents in Table 1.

What is an Exceedance?

An exceedance is where the receiving (downstream) water quality sample result for constituent(s) analyzed on site show an exceedance of the upstream water sample results, as specified in Table 2.

TABLE 2

Parameter	**Exceedance Limit**
pH	>0.5 units deviation from background (upstream)
Dissolved Oxygen	minimum of 5.0 mg/l for tidal waters or non-tidal warm water Minimum 7.0 mg/l for non-tidal cold waters *or* no change if background <5.0 mg/l
Turbidity	Should not increase greater than 5 NTUs if background ≤50 NTUs and 10 percent if background >50 NTUs
Temperature	The temperature of any cold or warm freshwater habitat shall not be increased by more than 5°F (2.8°C) above the upstream temperature

What to do if there is an Exceedance

If any water quality monitoring sample results in an exceedance, then the District will implement the following process to correct the exceedance:

1. Confirmation samples will be taken within 2 hours following the exceedance. Sampling every 2 hours will continue until the exceedance has been corrected. All constituents will continue to be monitored.
2. Immediately implement procedures to identify the source of the exceedance.
3. Once the source of the exceedance has been identified, immediately implement procedures to correct the source of the exceedance.

Exceptions

The Regional Board recognizes that even with BMPs and appropriate equipment and methods, turbidity levels may momentarily exceed the limitations defined in the WDRs

during the initial stage of such activities as (a) culvert invert cleaning for panel placement; (b) streambed preparation for bladder dam placement; (c) initial flow discharge in constructed bypass channels; (d) removal of panels and bladder dams; (e) placement and removal of coffer dams; and (f) installation and removal of corrective action measures. The following describes specific activities and duration of exceedance allowances:

According to the WDRs issued by the Regional Board, at any given site, an exceedance of the turbidity limit during an activity described in SMP activities (a) through (d) above, for a duration of not more than four (4) hours, will not be considered a "violation" in the context of enforcement or the need to take corrective action. The District will take all reasonable actions to limit the duration and magnitude of such exceedance events. Water quality impacts shall be avoided/minimized to the maximum extent practicable.

According to the WDRs issued by the Regional Board, at any given site, an exceedance of the turbidity limit during an activity described in SMP activities (e) and (f) above will not be considered a "violation" in the context of enforcement or the need to take corrective action provided the duration of exceedance is:

Not More Than	**For Channel Widths**
4 hours	Less than 100 feet wide
6 hours	100 to 150 feet wide
8 hours	More than 150 feet wide

The District will take all reasonable actions to limit the duration and magnitude of such exceedance events.

Violation Reporting

If any receiving (downstream) water limit for a constituent(s) is exceeded as specified in Table 2 for more than a 2 hour period (after the first 2 hour confirmation sampling), then dredging will be terminated until the cause of the exceedance has been corrected. If after 6 hours the exceedance has not been alleviated, this will be considered a violation and must immediately be reported out to the Regional Board Executive Officer via the Regional Board case manager, by telephone.

For any other violations, the District will notify the Regional Board immediately whenever violations are detected at which time flood control activities (SMP project) will be terminated and the activity will not resume until the District has provided the Regional Board with a corrective action plan, acceptable to the Executive Officer that provides alternative methods of compliance.

Records to be Maintained

Written reports, calibration and maintenance records, and other records shall be maintained by the District and accessible at all times. Records shall be kept at the District for a minimum of 3 years. Records shall include notes and observations for each sample as follows:

a. Identification of sampling site by creek name, cross street, and item number (if available from the annual reports).

b. Date and time of sampling.

c. Date and time analyses are started and completed and the name of person conducting analyses.

f. Data and results of analyses and/or observations.

Records shall include a map or maps of the site showing the location of the project(s) and water sampling locations, coffer dams, discharge pipes, access ramps, etc.

Quality Assurance and Quality Control

The QA/QC portion of the WDR is an important component of the monitoring program involving, at the core of compliance, quality assurance of field sampling. As such, this section describes the 2 major elements of the QA/QC plan which are (1) field sampling to ensure compliance with WDR criteria and (2) reporting of that compliance.

District utilizes sampling contractors and/or internal staff to conduct water quality sampling for the SMP projects. These monitors will use District approved field sampling instruments and sampling equipment. As field sampling is the ultimate means of ensuring compliance with WDR requirements, it is imperative to have operating procedures that show the field sampling is being conducted in a manner that will collect analysis in an accurate way. In order to do this, the following criteria must be followed:

1. All personnel conducting monitoring must read the relevant SMP best management practices, this WDR plan, the SFRWQCB Board Order, and manufacture calibration/instruction manuals for all sampling instruments used
2. The SMP Project Manger must train personnel conducting this activity on all aspects of water quality monitoring
3. Verification document signed that the relevant documents have been read and additional training has occurred

All this documentation will be held with the SMP Project Manager, for a period of three years. Further, all equipment will be tested and calibrated, in accordance with the equipment's manufacture requirements, at least once a week to ensure the instruments are in proper working condition.

The reporting of the compliance/non-compliance of each project meeting the WDR criteria is captured in an end of season report that is submitted to the Regional Board, see "Final Monitoring Report".

Reporting

Responsible Entity

The SMP Project Manager (PM) is responsible for implementing this Plan as required in the WDRs issued by the Regional Board for the SMP. The PM will evaluate the data for compliance with the requirements of the WDR and will inform the Watershed Field Operations of any noncompliance event in order for them to take immediate corrective action.

Reports to the Regional Board

Permit Violations

The District shall notify the Regional Board staff in writing within five business days of all violations. Written reports shall include time and date of incident, duration, estimate of discharge or bypass volume, and documentation of sampling results/observations determining compliance status. The report shall also include detailed discussions of reasons for noncompliance and specific steps that were or will be taken to correct the failure and prevent it from re-occurring.

Final Monitoring Report

Upon completion of active diversion activities, a draft annual monitoring report will be filed with the Regional Board within 60 days of completion of all work, permitted activities end no later than October 30th.

The report will include:

1. Certification Statement
2. Introduction
3. Compliance Summary
4. Purpose and Scope
5. Description of Work Performed
6. Water Quality Sampling Data by Individual Site
7. Maps – County level showing where monitoring activities occurred

Embedded within these sections:

1. A transmittal letter which includes a summary of all violations of WDRs, any changes to the project design, and any unplanned releases or failures that occurred during the active diversion operations
2. The report shall provide: the magnitude of the releases or failures; any discharge limit exceedances; dates of all exceedances, cause of the failure, releases or other violations; any corrective actions taken or planned; and the dates of completion of corrective action

Final Report

Within 30 days after receipt of agency comments on the draft report, a final monitoring report will be filed with the Regional Board. The final

report will be signed by the Chief Operating Officer of the Watersheds or a duly authorized representative of that person.

Field Reporting Forms

APPENDIX A

Stream Maintenance Program Data Reporting Form

Creek Name/Item Number	Sample Date/Time	Direction	Turbidity	Dissolved Oxygen	pH	Temperature	Activity Monitored

Stream Maintenance Program Calibration Form

Instrument Identifiaction	Time of Calibration	Date of Calibration	Issues

Field Observation Reporting Form

Site Information

Site Name	Site Location	Date

Standard Observations

Weather

Air Temperature	Precipitation (Heavy/Light)	Wind Direction/Speed

Visual

Floating Suspended Materials — Present Absent

Turbidity/Discoloration — Present Absent

Water Depth — U/S D/S

If present, what is the suspected source?

If present, Site Foreman Notified? _____ Time/Name_____

Odor

Present Absent

If present, describe suspected source and estimate of affected area (wind direction and travel distance)

If present, Site Foreman Notified? _____ Time/Name_____

Flow (FOR NON TIDAL SITES)

Estimated rate (cubic feet per second)

Tides (FOR TIDAL SITES) from NOAA tide chart

Time	Height