DRAFT MANUAL

LIVERMORE STREAM MAINTENANCE PROGRAM

April 2015

PREPARED FOR:

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LIVERMORE
CALIFORNIA

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Acronyms and Abbreviations

ACCWP	Alameda Countywide Clean Water Program
ACRCD	Alameda County Resource Conservation District
Agreement	Multi-Party Master Agreement
BA	biological assessment
BAAQMD	Bay Area Air Quality Management District
basin plan	water quality control plan
Bay Area	San Francisco Bay Area
BMPs	best management practices
BO	Biological Opinion
Cal-IPC	California Invasive Plant Council
CCCFCWCD	Contra Costa County Flood Control and Water Conservation District
CCR	California Code of Regulations
CDD	Community Development Department
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
CIPs	capital improvement projects
City	City of Livermore
CMP	corrugated metal pipe
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
Construction General Permit	General Permit for Discharges of Storm Water Associated with Construction Activity
CSC	California Species of Special Concern lists
CWA	Clean Water Act
DPR	California Department of Pesticide Regulation
DPS	distinct population segments
EA	environmental assessment
EACCS	East Alameda County Conservation Strategy
Eagle Act	Bald and Golden Eagle Protection Act
EBRPD	East Bay Regional Park District
EIR	environmental impact report
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	federal Endangered Species Act
FEMA	Federal Emergency Management Agency
FIRMs	flood insurance rate maps
FR	Federal Register
General Permit	Statewide General National Pollutant Discharge Elimination System Permit for the Discharge of Aquatic Pesticides for Aquatic Weed Control in Waters of the United States (General Permit No. CAG 990005)
GIS	geographic information systems
gpm	gallons per minute

HCPs	habitat conservation plans
I-580	Interstate 580
IP	Individual Permit
IS	Initial Study
LARPD	Livermore Area Recreation and Parks District
LPC	Las Positas College
LWD	large woody debris
MBTA	Migratory Bird Treaty Act
MEP	Maximum Extent Practicable
mg/L	milligrams per liter
MND	Mitigated Negative Declaration
MRP	Municipal Regional Permit
MS4s	municipal separate storm sewer systems
NAHC	Native American Heritage Commission
NCCPs	natural community conservation plans
ND	negative declaration
NEPA	National Environmental Protection Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWPs	nationwide permits
OHWM	ordinary high water mark
Porter-Control Act	Porter-Cologne Water Quality Control Act
ppm	parts per million
PRC	Public Resource Code
RCDs	Resource Conservation Districts
RCP	reinforced concrete pipe
Regional Boards	Regional Water Quality Control Boards
RGPs	Regional general permits
RMA	Routine Maintenance Agreement
RWQCBs	Regional Water Quality Control Boards
SAA	Streambed Alteration Agreement
RWQCB	Regional Water Quality Control Board
SFPUC	San Francisco Public Utilities Commission
SHPO	State Historic Preservation Officer
Small MS4 General Permit	General Permit for the Discharge of Storm Water from Small Municipal Separate Storm Sewer Systems WQO No. 2003-0005-DWQ
SMMP	Stream Maintenance Master Plan
SMP	Stream Maintenance Program
sq km	square kilometers
SSC	California Species of Special Concern lists
State Water Board	State Water Resources Control Board
SUSMP	Standard Urban Stormwater Mitigation Plan
SWMP	Stormwater Management Program
SWPPP	sormwater pollution prevention plan
SWQMP	Stormwater Quality Management Plan

TDS	total dissolved solids
TMDLs	total maximum daily loads
UCC	Urban Creeks Council
UGB	Urban Growth Boundary
USC	U.S. Code
USGS	U.S. Geological Survey
WDRs	Waste Discharge Requirements
Zone 7	Zone 7 of the Alameda County Flood Control and Water Conservation District

Chapter 1
Introduction and Program Summary

1.1 Program Background and Need

The Stream Maintenance Program (SMP) was developed by the City of Livermore (City) to improve and define the management and maintenance of engineered and modified flood control channels and non-modified natural creeks within the City's SMP Area as depicted within this document. The SMP establishes programmatic guidance to conduct maintenance activities and avoid and minimize environmental impacts. The SMP also provides the organizational framework to oversee routine creek and channel maintenance activities and ensure the program is compliant with the terms and conditions of its permits.

Compliance with federal environmental laws and regulations such as the federal Endangered Species Act (ESA) and Clean Water Act (CWA), and state laws and regulations administered by the California Department of Fish and Wildlife (CDFW) and the San Francisco Bay Regional Water Quality Control Board (RWQCB) has required an increasingly extensive authorization process.

The time, effort, and costs of the annual permitting process were key factors in developing the SMP. Prior to the SMP, each individual maintenance project underwent separate permit approval. This typically involved submitting between one to two individual permit applications to various regulatory agencies per year. The annual permitting process required a 10 to 18 month planning and application process for a work period that typically lasted only 3 to 4 months or less. Likewise, the costs of annual permitting often exceeded the costs of the maintenance work itself.

Other areas that needed maintenance but required more extensive environmental analysis were often deferred due to attempts to acquire federal funding to complete the necessary technical studies. When funding was not forthcoming the technical studies and environmental analysis were often delayed due to workload constraints. As a result, doing the bulk of the environmental review and analysis up front will save a great deal of time and money and make annual maintenance possible within current workload constraints.

Similarly, the work effort and time commitment for the regulatory agencies has also become heavy. The result has been a decrease in the annual permitting efficiency for both the City and the regulatory agencies.

Beside the time and effort requirements for the annual permitting of maintenance projects, there was also a loss of maintenance efficiency and resource protection with planning projects individually. The SMP was developed to provide consistent program actions, avoid and minimize program impacts, characterize Planning Area resources, develop suitable mitigation, and provide oversight across the SMP Area. An integrated SMP will better utilize time and funding, and offer a regional approach to resource management versus incremental permitting on a project-by-project basis.

1.2 Program Purpose and Objectives

The primary purpose of the SMP is to provide an efficient and organized program to conduct stream maintenance activities, comply with all relevant environmental regulations, and maintain flood capacity while enhancing the Planning Area's natural resources. The SMP has been developed carefully to balance these goals of flood protection, permitting, and protecting and enhancing natural resources.

The following list summarizes the SMP objectives:

- Provide adequate flood protection and conveyance capacity for creeks and channels within the SMP Area;
- Use a systemic and scientific understanding of the watershed and individual stream reaches to guide maintenance activities;
- Use the stream system understanding to develop informed maintenance approaches that avoid and minimize environmental impacts;
- Improve communication, coordination, and permitting efficiency between regulatory agencies and the City through an open and collaborative program notification and reporting process;
- Develop an adaptable and sustainable program that can respond to changing environmental, maintenance, and regulatory conditions;
- Provide an administratively stable program that provides transparency in oversight and implementation of program activities;
- Obtain long-term permits providing coverage of program activities under Federal and State regulations such as ESA and CWA; and
- Comply with the requirements of the California Environmental Quality Act (CEQA) and National Environmental Protection Act (NEPA) (where appropriate).

The purpose of this SMP Manual is to establish and define the overall maintenance program and describe the program's maintenance activities, natural resources, and approaches to avoid or minimize impacts to environmental resources. This SMP Manual is intended for use by City maintenance staff, engineers, and resource managers, as well as environmental regulatory agency staff and other watershed stakeholders.

This SMP Manual provides a description of the activities that will be conducted as part of the SMP. As such, this manual serves as the description of activities permitted by the relevant regulatory agencies. The evaluation of program environmental impacts is addressed through a parallel Initial Study/Mitigated Negative Declaration (MND) developed in compliance with CEQA. The SMP IS/MND uses the description of program activities in this manual as the basis for its evaluation.

The SMP is envisioned to be a flexible program subject to periodic revisions reflecting improved understanding of resource conditions, maintenance technologies, or management practices over time.

1.3 Planning Area and SMP Area Creeks

The City of Livermore conducts planning activities within the "Planning Area." Figure 1-1 (see Appendix A) presents the Planning Area located in the City of Livermore, Alameda County, California. The Planning Area includes City limits, plus the areas the City owns by Doolan Canyon, the area between Portola Avenue and Interstate 580, and Sycamore Grove Park.

SMP activities will occur within the "SMP Area," which is defined as the limit of maintenance activities (i.e., the area within which maintenance activities could occur). The primary creeks and channels included in the SMP Area are Arroyo Las Positas, Altamont Creek, Arroyo Seco, Arroyo Mocho, and Arroyo del Valle. Secondary tributary creeks and channels include the Realigned Arroyo Las Positas, Cottonwood Creek, Collier Creek, and Kellogg Creek, as well as other unnamed tributaries and concrete channels. Table 1-1 lists all of the creek and channel reaches, individual reach lengths, and figure sheet references where associated vegetation mapping is depicted. In total, approximately 42.8 miles of stream are included in the SMP Area.

1.3.1 Ownership and Easements

The SMP Area streams managed under the SMP are owned by the City, the Alameda County Flood Control and Water Conservation District Zone 7 (Zone 7), Livermore Area Recreation and Parks District (LARPD), or by a private landowner (see Figure 1-2 in Appendix A). The City owns and/or maintains for private entities approximately 24.1 miles (56.6% of SMP Area streams), Zone 7 owns approximately 10 miles (23.4%), and LARPD owns approximately 7.1 miles (16.6%). In addition, Zone 7 partially owns (i.e., owns portions of a given stream cross-section based on parcel boundaries) approximately 0.8 mile (1.8%), and has drainage easements on approximately 0.8 mile (1.8%).

The City has a Recreational Use License Agreement in place with Zone 7 to conduct maintenance of stream channels where the City also maintains an access easement for recreational trails that follow the channel. This agreement is long-standing (initiated in 1968 and re-issued in 2005) and allows the City to use Zone 7 facilities to construct, improve, maintain and operate facilities for parks and recreation purposes. The Agreement has a term of 25 years, and may be renewed in 25-year increments.

Privately owned reaches are not regularly maintained by the City, but the City will implement maintenance actions to clear debris or excess vegetation at the request of the landowner and if the City determines that the site requires maintenance. LARPD may manage reaches it owns or reaches owned by the City according to established management agreements between the City and LARPD.

1.3.2 Stream Type

There are two main types of streams found in the SMP Area: natural creeks and engineered/ modified channels. The following sections describe these two stream types.

1.3.2.1 Natural Creeks

Natural creeks are non-engineered and non-modified creek systems. Natural creeks may require maintenance activities to maintain flow conveyance and reduce the flooding hazard. Maintenance

work in natural creeks typically involves clearing debris or vegetation that is causing a flow obstruction.

1.3.2.2 Engineered and Modified Channels

Engineered Channels

Engineered channels are channels that were designed and built to convey a design discharge. In the SMP Area, engineered channels have typically been built with a trapezoidal cross-sectional shape. Most of the engineered channels have earthen banks and beds; however, some channels have hardened banks and beds. Bed and bank hardening typically occurs at or near road and culvert crossings to protect these structures. Structures such as access roads, drop inlet culverts, outfalls, flap gates, and road crossing culverts constructed in association with the engineered channels also require routine maintenance.

Modified Channels

Modified channels are natural creek channels with existing earthen beds and banks that have been modified either through vegetation removal, in-channel grading, or channel widening or straightening to improve flow conveyance. Though modified, these channels are not engineered or constructed according to specific design criteria to convey a discharge of a particular magnitude.

1.4 Overview of SMP Approach

This SMP Manual was developed with past maintenance lessons in mind to create an improved program that would maintain creeks and channels more effectively, would provide greater environmental protection and benefits, and would be more time and cost efficient for both the City and regulatory agency staff. The development of the SMP benefited from review of other stream maintenance programs, most notably the Sonoma County Water Agency's SMP program which was the model for this City of Livermore SMP.

The central tenet of the SMP approach is that management activities are conducted using an informed and systemic approach to minimize stream impacts while providing necessary flow conveyance. A thorough understanding of the physical and biological stream system is at the core of this informed approach. The SMP utilizes an analytic and targeted approach to understand the degree of maintenance work actually required for a given situation.

While the analysis of maintenance problems may be focused, the development of solutions is watershed-wide in perspective. For example, the SMP approach considers how to reduce in-stream sediment loads from erosion "hot spots" in the watershed lands upstream that are introducing large amounts of sediment to the stream system downstream (see the integrated watershed mitigation program described in Chapter 8, *Program Mitigation*).

The SMP employs a more comprehensive watershed approach than the current project-by-project annual process. The watershed approach of the SMP manages creeks and channels with an understanding of the overall stream system and its physical and biological processes. The SMP approach considers each site and reach as a component within a watershed system integrating upstream inputs and downstream outputs. Such a perspective enables improved management of resources across the whole watershed system. For example, consideration of sensitive habitats,

sediment sources in the upper watershed areas, or the most efficient way to manage a stream corridor's vegetation are all improved in planning and implementing maintenance through a broader program.

1.5 Program Activities

The Stream Maintenance Program has three primary activities: sediment management, vegetation management, and bank stabilization. In addition to the three core SMP activities, the SMP also involves other smaller and infrequent maintenance activities such as bridge maintenance, culvert repair or replacement, access road and trail maintenance, and trash and debris removal. The SMP also includes the transport and disposal of collected sediment and vegetation. SMP activities are summarized below and described in more detail in Chapter 5, *Maintenance Activities*.

1.5.1 Sediment Management

Sediment management refers to the removal of excess sediment from constructed flood protection facilities such as culverts and storm drain outlets. The Tri-Valley floor has historically been a depositional area, and sediment management has consistently been a concern within the SMP Planning Area creeks and channels. Sediment removal will be localized at individual crossings, culverts, outlets, other in-channel facilities, or other individual reaches where sediment accumulation is determined to be a concern. All creek and channel sediment removal activities will follow the impact avoidance and minimization approach and principles described in Chapter 4 and will incorporate the best management practices described in Chapter 7 and presented in Table 7-1.

The SMP primarily involves sediment removal to maintain storm flow conveyance from adjacent streets into the creek and channel system. There are currently 149 storm drain outlets and 50 road and bridge crossings in City-operated creeks and channels that require routine maintenance for flood protection. In some instances, such as the stretch of Arroyo Las Positas above its confluence with Altamont Creek, the SMP also includes reestablishment of channel capacity through sediment and vegetation removal focused on maintaining an open low flow stream within the wider channel flood zone. One of the objectives of the City General Plan is to maintain the creeks in as natural state as possible while maintaining the health and safety of the community. Every creek reach will be evaluated for opportunities to provide for habitat restoration benefits.

Sediment removed from City facilities will be used on-site where possible and allowable or for other projects nearby. If it is unsuitable for use locally it will be hauled off-site to suitable upland disposal sites or to the Altamont Landfill. Sediment reuse and disposal activities are essential to the completion of the sediment removal, bank stabilization, and vegetation removal activities of the Program. The City anticipates that on average the SMP will involve removing between 1,000 and 2,000 cubic yards of sediment per year; the Holmes Street bridge average annual gravel removal alone accounts for approximately 1,000 cubic yards of this sediment. More detail on sediment disposal activities is provided in the following chapters.

1.5.2 Vegetation Management

Vegetation management refers to the trimming and removal of potentially problematic vegetation in creeks and channels and ancillary flood control facilities. Vegetation management activities are conducted to maintain flow conveyance capacity, establish a canopy of riparian trees, and control

invasive vegetation. Vegetation management and removal activities are relatively consistent from year to year, though locations change depending on recent growth and blockages. Vegetation management also includes the planting of new trees and shrubs in creeks and channels in accordance with the SMP's restoration and mitigation program (see Chapter 8, *Program Mitigation*).

1.5.3 Bank Stabilization

Bank stabilization involves the repair and stabilization of eroded or eroding stream or reservoir banks. Bank stabilization activities occur in creeks and channels, including culvert outlets in streams. All bank stabilization activities will follow the impact avoidance and minimization approach and principles described in Chapter 4 and will incorporate the best management practices described in Chapter 7 and presented in Table 7-1.

Similar to the sediment removal activities described above, the number of new bank stabilization projects undertaken in a given year depends on weather and hydrologic conditions during recent years. Over the past ten years, the City has only implemented one bank stabilization project. With permits in place, it is estimated that upwards of three bank stabilization projects could occur over the ten-year SMP program term. The need for bank stabilization is more likely in wet years when banks shear or slump due to bank soil saturation, high soil pore water pressure, and high stream velocities.

1.5.4 Bridge Maintenance

Bridge maintenance consists of repairing existing bridges (e.g., concrete patching or localized reinforcement), treatment of scour erosion around bridge structures, painting, graffiti removal and cleaning. Such maintenance will require foot and vehicle access into the creek or channel bottom.

1.5.5 Other Maintenance Activities

Other Program maintenance activities include:

- in-kind repair and replacement of culverts;
- irrigation system maintenance;
- maintaining creek and channel access roads and trails for accessibility; and
- removing trash and debris from creeks and channels.

1.5.6 Activities Not Covered in the SMP

Activities not covered under the SMP include:

- maintenance activities on streams outside of those documented herein within the SMP Area for which no maintenance agreement exists;
- new culvert projects;
- bridge replacement projects;
- capital improvement projects (CIPs) intended to increase capacity beyond the original flood conveyance design or to replace bridges;

- emergency activities and procedures (described further below); and
- the Springtown Golf Course Water Diversion (described further below).

A situation is considered an "emergency" if it is a sudden, unexpected occurrence involving a clear and imminent danger that demands immediate action to prevent or mitigate loss of or damage to life, health, property, or essential public services (Public Resource Code [PRC] Section 21060.3). Although emergency situations will not be covered in the SMP, the City will make every effort to follow the guidance provided in the SMP when implementing activities under emergency conditions, and will also abide by the reporting protocols established by the regulatory agencies for emergency situations. Deferred maintenance projects that create a situation that demands immediate action does not fall under the definition of emergency. Routine activities shall be prioritized and every effort shall be made to maintain flows throughout the system per the SMP such that urgent treatment is avoided.

Routine stream maintenance does not include projects that would alter the designed flood conveyance capacity of a creek or channel. Large construction projects and CIPs that cost over $100,000 are not considered routine stream maintenance and are not included in the SMP. However, future CIPs may consider using, or adapting, the SMP to cover their maintenance needs and mitigation once their project becomes operational and requires maintenance.

1.5.6.1 Springtown Golf Course Diversion

The Springtown Golf Course's primary irrigation water supply has historically been raw water from the adjacent Altamont Creek. A retention pond located next to the maintenance hut near holes three and four is used to store raw water diverted from Altamont Creek. The retention pond water is pumped into the Springtown Golf Course water distribution system to provide irrigation for the golf course.

In order to complete the diversion, a seasonal barricade has been operated between April 15 and October 15 under prior regulatory agency approvals. Materials used for the seasonal barricade are pre-fabricated plastic barricades that are filled with water after being placed in the creek. The plastic barricades are easily installed and removed allowing for minimal disturbance to the creek bed. While the diversion is not covered under the SMP, the best management practices (BMPs) identified in Table 7-1 will be applied to water diversion activities where appropriate and consistent with water diversion permits.

1.6 Impact Avoidance and Minimization

The informed approach of the SMP not only requires a clear understanding of the location, extent, and specifics of maintenance activities; it also requires an understanding of the stream system's natural and aquatic resources. As described in this manual (Chapter 3), the SMP includes a discussion of the environmental setting in the SMP Area, including vegetative land cover types and sensitive species.

Chapter 4, *Pre-Maintenance Planning Approach and Impact Avoidance*, describes how planning measures are taken to avoid and reduce impacts before any maintenance work occurs. The following maintenance principles were developed as guidelines to avoid and minimize environmental impacts of the program. Chapter 4 provides additional detail on how these principles are used.

1. No Unnecessary Intervention
2. Understand the System and Its Processes
3. Consider Adjacent Land Uses
4. Apply System Understanding to Maintenance Actions
5. Manage for Incremental Ecologic Improvement
6. Integrate Maintenance Activities towards Sustainability (to reduce frequency of maintenance)

When applied, these principals determine when action is needed, consider the natural function of the system, provide an understanding of local physical constraints, identify sensitive habitats, consider watershed processes, identify the maintenance activities needed at the reach and site scale, and seek solutions to minimize the on-going need for maintenance activities at a particular site or reach.

The maintenance activities described in Chapter 5 incorporate a range of measures to minimize undesired effects that could not be entirely avoided through the pre-maintenance planning approaches described in Chapter 4. These additional measures are described in Chapter 7, *Impact Reduction, Minimization Measures, and Best Management Practices (BMPs)*.

Measures to protect natural resources, as well as "good-neighbor" policies were drafted to reduce the effects of maintenance activities. Table 7-1 organizes these measures and BMPs according to program activities and specific environmental resources. Taken together, the pre-maintenance planning measures described in Chapter 4 and the maintenance activity based measures described in Chapter 7 provide a comprehensive and integrated approach to avoiding and minimizing program impacts.

1.7 Program Mitigation

Through the use and application of avoidance and minimization measures and maintenance principals described above, potential impacts are greatly reduced. However, potential impacts that are not reduced through avoidance measures may require mitigation. The mitigation program for the SMP is described in Chapter 8.

The City of Livermore SMP mitigation approach was developed based on the recently-permitted Sonoma County Water Agency SMP and the East Alameda County Conservation Strategy (EACCS; see Section 2.14.1 for more detail). The approach was refined through multiple discussions with agency representatives from the San Francisco Bay RWQCB, CDFW, USFWS, and U.S. Army Corps of Engineers (USACE). Meetings were held with individual agencies and also as a group to develop the SMP mitigation approach. The mitigation strategy will result in no net loss of the extent of jurisdictional waters, both in respect to acreage and linear feet of jurisdictional waters.

The mitigation approach follows a three-tiered system where mitigation opportunities are sought first on-site at the project location (Tier 1), and second in other SMP Area reaches (Tier 2). Tier 3 mitigation will occur regardless of the location of Tier 1 and 2 mitigation and is intended to address temporal loss. The three-tier mitigation approach ensures that mitigation is first and foremost directed to compensate for the impacts occurring at the specific project reach, then expanded if

necessary to consider reaches within the SMP Area and the watershed as a whole should opportunities within the project reach be insufficient to compensate for impacts.

Tier 1 mitigation is implemented on-site within the specific project reach where maintenance work is conducted. On-site mitigation is designed to address impacts in the immediate maintenance project area. On-site mitigation actions are intended to enhance and restore the stream and aquatic functions, as well as species habitat, that were impacted through the maintenance activities in kind. Tier 1 mitigation, at a minimum, will restore the beneficial uses and ecological functions and values that were provided by a site in its pre-maintenance condition to the extent practicable. In addition, where opportunities exist, it may provide additional benefits.

Tier 2 mitigation is similar to Tier 1 mitigation in seeking in-kind mitigation in streams and channels that have undergone maintenance in the SMP Area. However, Tier 2 mitigation is applied at other SMP Area streams and channels, and is therefore not on-site. Tier 2 mitigation is sought when there are no suitable opportunities for enhancement or restoration in a maintenance reach and the next best opportunity is to pursue in-kind mitigation at a neighboring reach that does afford an opportunity for mitigation.

Tier 3 mitigation is off-site mitigation that provides compensation for temporal loss in the form of enhancement of Beneficial Uses. Off-site mitigation projects provide restorative and mitigating watershed solutions that address SMP impacts. Examples of off-site mitigation projects include native riparian plant revegetation, large woody debris installation, invasive plant removal, bioengineering/erosion control, and watershed-based sediment or other contaminant reduction actions. Tier 3 mitigation will be funded by an amount that is equal to or greater than 10% of the annual SMP activity budget.

Chapter 8 provides additional details on the SMP's mitigation program.

1.8 Program Management

1.8.1 SMP Work Cycle

Implementation, administration and oversight of the SMP are described in Chapter 9. The SMP will be managed as an annual cycle of activities. Stream reconnaissance and assessment begins in late winter or early spring, followed by the development of the maintenance work plan. During the spring months, the year's maintenance projects are further refined and described, appropriate mitigation is identified, and the relevant regulatory agencies overseeing program permitting are notified. Projects are then implemented during the summer season, when the creeks and channels are at their driest. During the fall, and before the end of the year, an annual summary report of the year's maintenance, mitigation, and monitoring activities is sent to the permitting agencies.

1.8.2 Program Tracking

An important component in managing the SMP is to continue to maintain a central data management system. Data management is required throughout the SMP work cycle including: organizing the initial stream assessment and inventory; characterizing reach conditions; identifying maintenance needs; identifying sensitive habitats, invasive plant species populations, or other environmental considerations; documenting the implemented maintenance activities; documenting

and tracking the implementation of restoration and mitigation activities; monitoring the on-going status of mitigation activities; and tracking all regulatory reporting requirements. The SMP database organizes all of this information and other data including geographic information systems (GIS) mapping, and aerial photography. This SMP database provides a consistent and transparent way to monitor overall program activities, permitting compliance and track habitat and canopy development.

1.8.3 Program Reporting

As described above, at the conclusion of each year's maintenance season a summary report is developed and submitted to the appropriate regulatory agencies. This report includes: a summary of the year's maintenance projects describing what activities occurred and where; a description and confirmation of the restoration and mitigation activities implemented during the current year mitigation; a status and monitoring report of on-going mitigation activities initiated during previous seasons; and other program updates as necessary. The report may include additional information on SMP Area conditions, activities employed, the effectiveness of certain activities, possible recommendations for future maintenance, or suggestions to improve the program's implementation and management.

1.8.4 Program Review

Following the submittal of the annual maintenance report, regulatory agency staff are invited to a review meeting to discuss the events, maintenance activities, and lessons learned over the past work cycle. Every 5 years, the City and the permitting agencies will review the SMP for its overall effectiveness. This review will include an assessment of maintenance activities conducted to date, BMPs employed, adequacy of the SMP Mitigation Program, SMP data management, adequacy of SMP adaptive updates and revisions, and overall program coordination and communication between the City and the regulatory permitting agencies. The program will be flexible to accommodate new resource information, management standards, and maintenance technology over time. As envisioned, the SMP will be a "living program" that is updated and modified as needed.

1.8.5 Program Commitment

Essential to SMP program success is the City's commitment to dedicate the required resources and staffing necessary to effectively administer, oversee, implement, and monitor the SMP. The City SMP Manager will be the Community Development Department (CDD) Director or his/her designee. The CDD Director has the authority to dedicate the resources necessary to ensure program success including overseeing implementation of the Manual and compliance with program permitting.

1.9 Program Permitting and CEQA/NEPA Compliance

As described above in Section 1.1, prior to the development of the SMP the permitting of stream maintenance activities was conducted on a project-by-project approach for all of the individual projects in a given year. This required abundant time, effort, and cost for the City and the regulatory agencies, and was inefficient in that most of the maintenance activities were routine and repetitive. Additionally, conducting projects individually limited the opportunities to conserve and protect natural resources through a broader watershed approach. For these reasons the City sought

programmatic long term permits to provide regulatory compliance. The regulatory context for the SMP and the program's permitting approach are described in Chapter 2, *Environmental Regulations and Compliance*, and summarized in the paragraph below.

The City is seeking approval of long-term permits for routine stream maintenance activities in creeks and channels under the jurisdiction of the USACE, including Waters of the United States and special aquatic sites (wetlands) pursuant to Section 404 of the CWA. An Individual Permit (IP) will grant general authorization and set conditions for routine stream maintenance activities subject to jurisdiction of the USACE for a 10 year period. In addition, the City and USACE will be required to comply with requirements under Section 7 of the ESA for federally listed species for which the City is seeking a programmatic Biological Opinion. The San Francisco Bay RWQCB will oversee compliance with Waste Discharge Requirements (WDRs) and water quality certifications under Section 401 of the CWA for waters of the state through a 5-year permit with a defined process for renewal for another 5-year term. The City will also seek a Routine Maintenance Agreement (RMA) with CDFW for stream maintenance activities in compliance with Fish and Game Code Section 1602, the Streambed Alteration program. In addition, the City will seek a California Endangered Species Act (CESA) Section 2081 permit from CDFW. The effectiveness of the overall program will be reviewed in 5 years as part of the permit renewal process.

CEQA compliance is triggered by the activity's direct and indirect physical change in the environment and the issuance of permits by state regulatory agencies including the San Francisco Bay RWQCB and CDFW. CEQA is also triggered by the discretionary action of the Livermore City Council approval of the SMP via adoption of the SMP Manual, the implementation of which may result in environmental impacts. Thus, the City is the lead agency responsible for complying with CEQA. Compliance with CEQA is being met through the development of an IS/MND for the SMP Manual. The IS/MND will evaluate the environmental impacts of the maintenance activities proposed in the SMP Manual. The IS/MND will be developed to address the needs of each regulatory agency to grant permits, as well as provide the necessary CEQA compliance to allow the Livermore City Council to approve the SMP.

The issuance by USACE of a CWA Section 404 individual permit constitutes a federal action. Therefore, USACE must comply with NEPA. USACE will be the lead agency undertaking NEPA compliance. Similar to CEQA, the SMP Manual will provide the basis for developing the project description for NEPA compliance. NEPA compliance led by the USACE will meet environmental compliance requirements for permitting actions conducted by all federal agencies granting permits for the SMP, provided that the project description is the same for all issued permits (i.e., separate NEPA documents are not required to address USACE or USFWS permits).

1.10 SMP Manual Organization

This SMP Manual is organized into the following chapters:

- **Chapter 1, *Introduction and Program Summary*,** provides an overview of the SMP including describing the program's purpose, area, maintenance activities, impact avoidance, mitigation, and permitting approaches.
- **Chapter 2, *Environmental Regulations and Compliance*,** describes the federal, state, and local regulations that are applicable to the SMP, reviews regulatory agencies and their permitting responsibilities for the SMP, and presents the program's compliance and permitting approach.

- **Chapter 3, *Environmental Setting*,** describes the physical and biological resource conditions in and surrounding the SMP Area that influence the SMP activities. This setting includes descriptions of topography, landforms, geology, hydrology, water quality, natural communities and vegetation, and wildlife in the SMP Area and surrounding environs.
- **Chapter 4, *Pre-Maintenance Planning Approach and Impact Avoidance*,** describes how planning measures are taken to avoid and reduce impacts are before any maintenance work occurs. This chapter presents the guiding principles and approach of the program to avoid and minimize environmental impacts.
- **Chapter 5, *Maintenance Activity Descriptions*,** describes the primary program activities including sediment management, bank stabilization, and vegetation management activities, and secondary program activities of road maintenance, debris removal, fence repair, etc.
- **Chapter 6, *Estimated Maintenance Activity Impacts*,** describes impacts that could potentially occur through implementation of the SMP.
- **Chapter 7, *Impact Reduction and Minimization*,** presents additional best management practices (BMPs) to protect natural resources, provide good neighbor policies, and other measures to reduce the effects of maintenance activities.
- **Chapter 8, *Program Mitigation*,** describes the SMP's three tier mitigation approach, including the integrated watershed mitigation program to mitigate remaining impacts that were not effectively avoided or minimized.
- **Chapter 9, *Program Management*,** describes SMP administration and oversight including the implementation of the SMP annual work cycle, data management, regulatory agency notification and reporting, and program review.
- **Chapter 10, *Literature Cited*,** provides a listing of the reference materials and documents used in the development of this SMP Manual and it's supporting planning studies.
- **Chapter 11, *List of Preparers*,** describes the agencies and individuals who participated in preparation of this document.

All chapter figures can be found in Appendix A. Tables are located at the end of the corresponding chapter.

Table 1-1. SMP Reaches, Lengths, Coordinates, and Figure Numbers

Creek or Channel Name	Reach Name	Reach Length	Coordinates (Center of each Reach)		Figure Number
			Latitude	Longitude	
Altamont Creek	AC-1	797.6	37.695342 N	-121.838633 W	3-18
	AC-2	4,473.6	37.723144 N	-121.737024 W	3-15, 3-16, 3-17, 3-18
	AC-3	1,547.9	37.723206 N	-121.729887 W	3-14, 3-15
	AC-4	891.8	37.723368 N	-121.725743 W	3-13, 3-14
	AC-5	3,662.2	37.724346 N	-121.719154 W	3-11, 3-12, 3-13
	AC-6	1,677.7	37.722184 N	-121.712823 W	3-10, 3-11
	AC-7	5,378.5	37.721634 N	-121.704770 W	3-8, 3-9, 3-10
Altamont Creek Tributary	ACT-1	1,124.8	37.724679 N	-121.724566 W	3-20, 3-21
	ACT-2	3,043.8	37.727772 N	-121.720913 W	3-19, 3-20
Arroyo Del Valle	ADV-1	6,382.7	37.649044 N	-121.796546 W	3-22, 3-23, 3-24, 3-25, 3-26
	ADV-2	3,006.9	37.645671 N	-121.784934 W	3-26, 3-27
	ADV-3	4,091.2	37.641609 N	-121.780174 W	3-27, 3-28, 3-29
	ADV-4	2,817.5	37.636421 N	-121.772651 W	3-29, 3-30, 3-31
	ADV-5	8,329.4	37.635059 N	-121.765884 W	3-31, 3-32, 3-33, 3-34
	ADV-6	1,581.4	37.627281 N	-121.756858 W	3-34, 3-35, 3-36
	ADV-7	2,524.8	37.620628 N	-121.760192 W	3-36, 3-38
	ADV-8	2,281.5	37.624305 N	-121.762535 W	3-36, 3-37
	ADV-9	913.7	37.623073 N	-121.761474 W	3-36, 3-37, 3-38
	ADV-10	3,704.1	37.629177 N	-121.772842 W	3-46, 3-47, 3-48
	ADV-11	4,991.1	37.630187 N	-121.779006 W	3-41, 3-42, 3-43, 3-44
	ADV-12	3,388.2	37.626621 N	-121.778381 W	3-42, 3-43, 3-44, 3-45
	ADV-13	1,438.2	37.624286 N	-121.780113 W	3-44, 3-45
	ADV-14	2,326.0	37.625228 N	-121.785270 W	3-39, 3-40
	ADV-15	1,896.5	37.646743 N	-121.753005 W	3-49, 3-50
Arroyo Las Positas	ALP-1	6,164.3	37.695342 N	-121.838633 W	3-81, 3-80, 3-79, 3-78, 3-77
	ALP-2	5,320.6	37.697606 N	-121.825075 W	3-77, 3-76, 3-75, 3-74
	ALP-3	4,505.4	37.696232 N	-121.811795 W	3-74, 3-73, 3-72
	ALP-4	3,235.5	37.699462 N	-121.801802 W	3-71, 3-70
	ALP-5	5,419.6	37.700997 N	-121.791092 W	3-69, 3-68, 3-67
	ALP-6	4,640.5	37.697446 N	-121.778803 W	3-67, 3-66, 3-65
	ALP-7	5,057.5	37.701548 N	-121.766703 W	3-64, 3-63, 3-62
	ALP-8	7,314.8	37.710052 N	-121.753186 W	3-62, 3-61, 3-60, 3-59, 3-58, 3-57
	ALP-9	780.3	37.716712 N	-121.746889 W	3-57
	ALP-10	1,994.1	37.714374 N	-121.744137 W	3-56,
	ALP-11	1,493.7	37.716356 N	-121.743296 W	3-57, 3-55
	ALP-12	2,051.8	37.715875 N	-121.737565 W	3-55, 3-54
	ALP-13	1,191.0	37.715660 N	-121.732302 W	3-53,
	ALP-14	956.4	37.714399 N	-121.729024 W	3-53, 3-52
	ALP-15	1,021.2	37.713992 N	-121.725835 W	3-52

Creek or Channel Name	Reach Name	Reach Length	Coordinates (Center of each Reach)		Figure Number
			Latitude	Longitude	
	ALP-16	1,977.2	37.712931 N	-121.721289 W	3-52, 3-51
Arroyo Las Positas Tributary	ALPT-1	2,300.9	37.704031 N	-121.796373 W	3-86, 3-85
	ALPT-2	759.6	37.705398 N	-121.794679 W	3-85
	ALPT-3	4,149.2	37.711505 N	-121.793659 W	3-85, 3-84, 3-83, 3-82,
Arroyo Mocho	AM-1	1,890.3	37.678488 N	-121.803930 W	3-101
	AM-2	2,637.3	37.679295 N	-121.797876 W	3-101, 3-100, 3-99
	AM-3	4,757.4	37.677952 N	-121.797237 W	3-101, 3-100, 3-99, 3-98
	AM-4	1,617.0	37.679622 N	-121.791168 W	3-99, 3-98
	AM-5	3,305.8	37.674826 N	-121.785166 W	3-98, 3-97, 3-96
	AM-6	3,851.8	37.672280 N	-121.774035 W	3-96, 3-95, 3-94, 3-93
	AM-7	2,323.9	37.671411 N	-121.764884 W	3-93, 3-92
	AM-8	3,864.9	37.670166 N	-121.755219 W	3-92, 3-91, 3-90
	AM-9	1,687.8	37.666766 N	-121.747375 W	3-90, 3-89, 3-88
	AM-10	2,768.0	37.663608 N	-121.740915 W	3-88, 3-87
Arroyo Seco	AS-1	2,949.4	37.704605 N	-121.751457 W	3-117, 3-116
	AS-2	2,157.6	37.701852 N	-121.744517 W	3-117, 3-115
	AS-3	749.6	37.699483 N	-121.740976 W	3-115, 3-115
	AS-4	2,505.0	37.696307 N	-121.737446 W	3-115, 3-114, 3-113
	AS-5	2,034.3	37.690915 N	-121.733333 W	3-112, 3-111
	AS-6	449.8	37.687573 N	-121.732842 W	3-93,
	AS-7	2,437.6	37.685651 N	-121.728677 W	3-111, 3-110, 3-109
	AS-8	2,152.3	37.682780 N	-121.721725 W	3-110, 3-109. 3-108, 3-107
	AS-9	1,285.3	37.680426 N	-121.716859 W	3-107, 3-106
	AS-10	927.9	37.680152 N	-121.713220 W	3-106
	AS-11	2,092.4	37.677749 N	-121.709878 W	3-106, 3-105
	AS-12	665.6	37.675698 N	-121.706737 W	3-105, 3-104
	AS-13	1,450.5	37.674941 N	-121.704470 W	3-104
	AS-14	3,157.8	37.672059 N	-121.701195 W	3-104, 3-103, 3-102
	AS-15	1,079.5	37.669604 N	-121.697392 W	3-102
Collier Canyon Creek	CCC-1	433.5	37.696963 N	-121.809471 W	3-126
	CCC-2	1,085.8	37.699008 N	-121.809445 W	3-126, 3-125
	CCC-3	2,303.0	37.703034 N	-121.807797 W	3-125, 3-124, 3-123
	CCC-4	703.4	37.706747 N	-121.805503 W	3-123
	CCC-5	523.5	37.708316 N	-121.804667 W	3-122
	CCC-6	3,739.6	37.712663 N	-121.801340 W	3-122, 3-121, 3-119, 3-118
	CCC-7	3,159.4	37.713146 N	-121.806011 W	3-122, 3-121, 3-120
Cottonwood Creek	CC-1	1,035.0	37.700369 N	-121.831070 W	3-142
	CC-2	883.8	37 42’43.408” N	-121 49’24.34” W	3-142
Granada Channel	GC-1	1,397.3	37.673612 N	-121.795845 W	3-130, 3-129, 3-128
	GC-2	3,380.0	37.667211 N	-121.794387 W	3-128, 3-127

Table 1-1. Continued

Creek or Channel Name	Reach Name	Reach Length	Coordinates (Center of each Reach)		Figure Number
			Latitude	Longitude	
Ravenswood Drainage Swales	–	2,368.7	34" 39'6.563" N	-121 46'12.259" W	3-143
Realigned Arroyo Las Positas	RALP-1	5,377.3	37.695417 N	-121.727071 W	3-141, 3-140, 3-139, 3-138, 3-137
	RALP-2	1,298.5	37.696812 N	-121.716508 W	3-137
	RALP-3	6,616.8	37.694189 N	-121.705911 W	3-136, 3-135, 3-134, 3-133, 3-132, 3-131
	RALP-4	1,803.8	37.692264 N	-121.693959 W	3-131, 3-132
	RALP-5	490.4	37.692831 N	-121.690100 W	3-131
	RALP-6	546.5	37.693063 N	-121.688346 W	3-131
Bear Creek Basins	–	–	37.72905 N	-121.71475 W	3-144, 3-145
			37.728199 N	-121.71471 W	
			37.728138 N	-121.71202 W	
			37.725628 N	-121.71317 W	
			37.725147 N	-121.71263 W	
			37.729588 N	-121.71332 W	
			37.72229 N	-121.71328 W	
			37.727337 N	-121.71438 W	

Chapter 2
Environmental Regulations and Compliance

2.1 Background and Regulatory Guidance

This chapter describes the principal federal and state environmental regulations, policies, and local resource management plans applicable to maintenance activities of the SMP. This chapter also summarizes the procedures to comply with these regulations, policies, and plans.

As introduced in Chapter 1, SMP activities generally include sediment management, vegetation management, and bank stabilization. Depending on the activity type, where the activity occurs, and how the activity is implemented, different permits or environmental compliance may be required. The City has developed utility master plans including a Storm Drain Master Plan, Sewer, Water and Recycled Water Master Plans and Facilities Design Guidelines which are referenced herein as applicable. The City also, jointly with the Alameda County Clean Water Program, holds a Municipal Regional Permit (MRP) with the San Francisco Bay RWQCB (Order R2-2011-0083 amending Order R2-2009-0074, National Pollutant Discharge Elimination System [NPDES] Permit No. CAS612008), which regulates discharges into the storm drain system. The only activity in the SMP related to the Storm Drain System is the clearing of storm drain outfalls. This maintenance activity must be compliant with both the MRP and this SMP manual.

To develop the SMP Manual and receive guidance on permitting approaches, the City worked with representatives from the USACE, San Francisco Bay RWQCB, the CDFW, and the USFWS. This chapter describes the principal federal and state environmental regulations, policies, and local resource management plans applicable to maintenance activities of the SMP. This chapter also summarizes the procedures to comply with these regulations, policies, and plans.

Regulatory agency representatives provided direction on the goals and objectives of the SMP, as well as reviewed all chapters of the manual. Permitting approaches were also discussed at group and agency-specific meetings.

The remainder of this chapter presents the regulations and regulatory agency jurisdictions applicable to implementation of the SMP, and the general permitting or compliance approach of the SMP.

2.2 Clean Water Act

The CWA is the primary federal law that protects the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. The CWA operates on the principle that all discharges into the nation's waters are unlawful unless specifically authorized by a permit. The following paragraphs provide details on specific sections of the CWA that are relevant for the SMP.

2.2.1 Section 404—Fill Placement in Waters and Wetlands

CWA Section 404 regulates the discharge of dredged and fill materials into waters of the United States. "Discharge of dredged material" and "discharge of fill material" are defined at 33 Code of

Federal Regulations (CFR) 323.2. "Waters of the United States" (waters of the U.S.) include all navigable waters, their tributaries and some isolated waters, as well as any adjacent wetlands to the aforementioned waters (33 CFR §328.3).

Before actions are carried out that would result in discharge of dredge or fill material to waters of the U.S., a delineation of jurisdictional waters of the United States is usually required, following USACE protocols (Environmental Laboratory 1987; U.S. Army Corps of Engineers 2008). The purpose of the delineation is to determine whether the areas where these actions would take place encompass wetlands or other waters of the United States which qualify for CWA protection. These include any or all of the following:

- Areas below the ordinary high water mark (OHWM)[1] of a stream, including non-perennial streams with a defined bed and bank and any stream channel that conveys natural runoff, even if it has been realigned; and
- Seasonal and perennial wetlands, including coastal wetlands.

A stream is a long, narrow body of flowing water that occupies a channel with defined bed and bank, and moves to lower elevations under the force of gravity. The Planning Area's modified and natural channels, V-ditches, and other conveyance channels are considered streams, whereas canals, aqueducts or other water transfer systems are not considered streams. A perennial stream has flowing water year-round during a typical year. The water table is located above the streambed for most of the year. During the dry season, groundwater and urban runoff are the primary sources of water for stream flow. During the rainy season, runoff from rainfall is the primary source of water for stream flow[2]. Some streams in the Planning Area do not flow year-round, and may be categorized as intermittent or ephemeral. An intermittent stream has flowing water during certain times of the year, when groundwater, rainfall, or urban runoff provides water for stream flow. During dry periods, intermittent streams may not have flowing water. An ephemeral stream, on the other hand, has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral streambeds are located above the water table year-round. Groundwater is not a source of water for ephemeral streams; runoff from rainfall is the primary source of water for stream flow.

Wetlands are defined for regulatory purposes as areas "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR §328.3; 40 CFR §230.3).

2.2.1.1 Permitting Agencies and Related Regulations

The U.S. Environmental Protection Agency (EPA) has delegated responsibilities for administering CWA Section 404 to the USACE. Therefore, project proponents must obtain a permit from the USACE for all discharges of dredged or fill material into waters of the United States, including wetlands, before proceeding with a proposed activity.

[1] Ordinary high water mark (OHWM) is defined by USACE as that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas. The USACE is the final arbitrator in determining the OHWM.

[2] Source for stream type definitions is the January 15, 2002 Federal Register; CFR §02-539.

The extent of USACE jurisdiction for waters of the United States is the OHWM or, if adjacent wetlands are present, the outer limits of those wetlands. In determining its jurisdiction, USACE considers a number of factors, including existing conditions, historical alterations, normal circumstances, as well as guidance, policies and recent court decisions.

Two types of permits are issued under the CWA Section 404: general permits which cover certain classes of activities, and individual permits for activities that are not authorized under a general permit. General permits may be issued on a nationwide, state, or regional basis and exempt certain activities from individual permit requirements. Activities permitted with a general permit have minimal individual or cumulative adverse impacts on the environment.

National general permits are called nationwide permits (NWPs). As of March 18, 2012, 50 NWPs are available for permitting activities such as maintenance of previously authorized structures, bank stabilization, and maintenance of existing flood control facilities. Some NWPs require that a pre-construction notification be submitted to USACE in advance of the project. NWPs are reviewed, updated, and reissued by USACE every five years. Therefore, no activity may be permitted for over 5 years.

Regional general permits (RGPs) are similar to NWPs but may only be used in certain regions. RGPs are issued by the Division or District Engineer for activities that fall within specific parameters. Local agencies with specific, identified activities that have minimal individual or cumulative adverse impacts on the environment may work with their USACE District to develop a RGP for the agency's activities. RGPs, like NWPs, are subject to review and re-issuance every 5 years.

Individual permits may be issued for projects that do not fit within the definition of NWPs or a local RGP. They are similar to RGPs in that they may be developed to address a suite of activities specific to a particular agency and geographic region. The permit term for individual permits is identified as a permit condition and is not subject to a mandatory 5-year review cycle as are NWPs and RGPs.

Under Section 404(b)(1) of the CWA, individual permits may be issued only for the least environmentally damaging practicable alternative. That is, authorization of a proposed discharge is prohibited if there is a practicable alternative that would have less adverse impacts and lacks other significant adverse consequences.

Compensatory Mitigation

Individual and general permits may include requirements for mitigation to account for negative impacts to waters of the United States resulting from the activities for which the permits were issued. On March 31, 2008 the USACE and EPA issued a *Final Compensatory Mitigation Rule* (33 CFR §332, 40 CFR §230) revising regulations governing compensatory mitigation for activities authorized by permits issued by the USACE. The final rule establishes performance standards and criteria for the use of permittee-responsible compensatory mitigation, mitigation banks, and in-lieu programs to improve the quality and success of compensatory mitigation projects for activities authorized by Department of the Army permits.

This rule improves the planning, implementation and management of compensatory mitigation projects by emphasizing a *watershed approach*[3] in selecting compensatory mitigation project

[3] The term "watershed approach" is a planning term used to describe a comprehensive regional approach to resource planning that considers physical processes and biologic conditions as they relate to ecosystem function within an integrated drainage ("watershed") unit. The term is used here to imply an approach to mitigation that

locations, requiring measurable, enforceable ecological performance standards and regular monitoring for all types of compensation and specifying the components of a complete compensatory mitigation plan, including assurances of long-term protection of compensation sites, financial assurances, and identification of the parties responsible for specific project tasks.

2.2.1.2 SMP Permitting Approach

The San Francisco District of the USACE has jurisdictional authority over CWA Section 404 in the City of Livermore. SMP activities including, but not limited to, sediment management, bank stabilization, and other activities that result in a discharge of dredged or fill material require permit authorization under CWA Section 404 from the USACE.

Based on discussions with USACE, the City applied for an individual permit to cover SMP activities that have a jurisdictional nexus with USACE. The individual permit will provide programmatic coverage for SMP maintenance activities conducted within the Planning Area. The individual permit will have a 10-year coverage period. After review of the initial permitting period, the permit would be updated, including reinitiated consultations with USFWS as necessary, and updated RWQCB permits.

USACE staff provided direction to the City on the permitting approach and also the methods and data collection necessary to support the programmatic permit. Information supporting the permitting process includes a wetland delineation report, biological assessment, and cultural resources inventory.

2.2.2 Section 401—Water Quality Certification

Under CWA Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of dredged and fill materials into surface waters of the United States (including wetlands) must obtain a Water Quality Certification (or Section 401 Certification) to ensure that any such discharge will comply with the applicable provisions of the CWA, including Sections 301, 302, 303, 306, and 307, and state water quality standards. The Water Quality Certification is issued by the state in which the discharge would originate; or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects that have a federal component and may affect state water quality (including projects that require federal agency approval, such as issuance of a CWA Section 404 permit) must also comply with CWA Section 401. The goal of CWA Section 401 is to allow for evaluation of water quality when considering activities associated with dredging or placement of fill materials into waters of the United States.

2.2.2.1 Permitting Agency and Related Regulations

In California, Water Quality Certifications are issued by the State Water Resources Control Board (State Water Board) and its nine Regional Water Quality Control Boards (Regional Boards or RWQCBs). Each Regional Board is responsible for implementing Section 401 in compliance with the CWA and with each Regional Board's respective water quality control plan (also known as a basin

goes beyond the immediate project site to consider how resources can best be protected and/or restored through an integrated approach operating at the watershed scale.

plan). Section 2.9 below provides more detail on the Porter-Cologne Water Quality Control Act (Porter-Control Act), basin plans, and State Water Board regulatory requirements for projects occurring outside of waters of the U.S. It is the policy of the Regional Boards to provide public notice of pending Section 401 Certification actions in order to gather comments from concerned agencies and the public.

2.2.2.2 SMP Permitting Approach

The EPA and San Francisco Bay RWQCB (Region 2) have jurisdictional authority over CWA Section 401 in the City of Livermore for waters of the U.S. All maintenance activities conducted under the SMP within USACE jurisdiction (federal nexus) will require CWA Section 401 Certification from the San Francisco Bay RWQCB.

The City worked with representatives from the San Francisco Bay RWQCB to develop a compliance approach for CWA Section 401 and the Porter-Cologne Act. The certification will have a five year period of coverage. The certification and SMP will be reviewed after the initial five year period with the potential option of a five year renewal of the certification. The San Francisco Bay RWQCB provided guidance and direction during the development of the SMP including review and comment on SMP Manual drafts.

2.2.3 Section 402

CWA Section 402 regulates discharges to surface waters (other than dredge or fill material) through the NPDES, administered by the EPA. The NPDES program provides for both general permits (those that cover a number of similar or related activities) and individual permits for discharges to waters of the U.S.

2.2.3.1 Permitting Agency and Related Regulations

In California, the State Water Board and its nine RWQCBs are authorized by the EPA to oversee the NPDES program (see the related discussion in Section 2.8, *Porter-Cologne Water Quality Control Act*, below). General Permits are issued by the State Water Board and overseen by the RWQCBs. The State Water Board has issued general permits for discharges from construction, industrial, and municipal activities. Individual permits are issued by the RWQCBs.

Construction Permit

Construction-related stormwater discharges to waters of the United States are regulated under the State Water Board's *General Permit for Discharges of Storm Water Associated with Construction Activity* (Construction General Permit) (California State Water Resources Control Board 2001). Projects disturbing more than 1 acre of land during construction are required to file a Notice of Intent (NOI) with the RWQCB in which the activity would occur in order to be covered by the Construction General Permit before the onset of construction. Construction activities resulting in soil disturbances of less than one acre are also subject to the Construction General Permit if the construction activity is part of a larger common plan of development that encompasses one or more acres of soil disturbance, or if there is significant water quality impairment from the activity.

The Construction General Permit requires the preparation and implementation of a stormwater pollution prevention plan (SWPPP) that must be completed before construction begins. The SWPPP must include a site map and a description of proposed construction activities, along with a

demonstration of compliance with relevant local ordinances and regulations and an overview of BMPs that will be implemented to prevent soil erosion and discharge of other construction-related pollutants that could contaminate nearby water resources. Permittees are further required to conduct annual monitoring and reporting to ensure that BMPs are correctly implemented and effective in controlling the discharge of stormwater-related pollutants.

Municipal Permits

As part of the NPDES, municipalities are required to maintain NPDES permits for their stormwater discharges. The municipalities, in turn, require that individual projects within their jurisdiction comply with the requirements of these permits.

On October 14, 2009, the San Francisco Bay RWQCB adopted Order No. R2-2009-0074, NPDES No. CAS612008, prescribing WDRs under the *San Francisco Bay Municipal Regional Stormwater Permit* for the discharge of stormwater runoff from the municipal separate storm sewer systems (MS4s). Phase 1 of the NPDES stormwater program provides NPDES permit coverage for large or medium municipalities with populations of 100,000 or more. Smaller (<100,000 population) communities and public entities that own or operate an MS4 are covered under Phase 2 of the NPDES program. Phase 1 permits are individual NPDES permits, while Phase 2 permits are covered by a statewide general NPDES permit, discussed below; the requirements associated with Phase 1 are more stringent than those associated with Phase 2.

The *General Permit for the Discharge of Storm Water from Small Municipal Separate Storm Sewer Systems* WQO No. 2003-0005-DWQ (Small MS4 General Permit), issued by the State Water Board, requires that dischargers develop and implement a Stormwater Management Program (SWMP) that describes the BMPs, measurable goals, and schedules of implementation, as well as assigns responsibility of each task. The Small MS4 General Permit requires all permittees to develop and implement a SWMP designed to reduce the discharge of pollutants through their MS4s to the Maximum Extent Practicable (MEP). The SWMP must be available for public review and must be approved by the appropriate RWQCB prior to permit coverage commencing. The General Permit requires the SWMP to be fully implemented by the end of the permit term.

Alameda Countywide Clean Water Program

The Alameda Countywide Clean Water Program (ACCWP) was initiated with the goal of forging consistent, effective countywide strategies to control sources of stormwater pollution. In support of this program, the San Francisco Bay RWQCB has issued a joint municipal stormwater permit to the 17 agencies and cities participating in the ACCWP, recently reissued on February 19, 2003 (Alameda Countywide Clean Water Program 2003). The participating entities include Alameda County; the Alameda County Flood Control Department and its Zone 7; and the cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City. The ACCWP is responsible for helping participant entities ensure that they are fulfilling their obligations under the permit and for preparing detailed reports that describe what each entity is doing to prevent stormwater pollution. The program coordinates its activities with other pollution prevention programs, such as wastewater treatment, hazardous waste disposal, and waste recycling.

The ACCWP has developed a Stormwater Quality Management Plan (SWQMP) that describes the program's approach to reducing stormwater pollution. The SWQMP for 2001–2008 serves as the basis of the ACCWP's NPDES permit (Alameda Countywide Clean Water Program 2003). The

proposed Project is within the boundaries addressed by the SWQMP. The plan does not regulate discharge requirements. Rather, the ACCWP plan is an advisory tool intended to assist dischargers within the boundaries of the 17 participatory agencies to comply with San Francisco Bay RWQCB regulations. The plan provides details and guidelines for San Francisco Bay RWQCB compliance for entities that would generate discharges to water bodies.

2.2.3.2 SMP Compliance Approach

SMP maintenance activities are closely linked with the municipal NPDES permits covering the Planning Area. In many ways, implementation of the SWMPs and the Standard Urban Stormwater Mitigation Plan (SUSMP) directly control the quantity and quality of storm water received in the channels maintained by the City. In turn, the SMP Manual functions to ensure compliance with NPDES permits through enhancement of riparian and in-channel features that are beneficial for filtration of storm runoff to improve water quality. Additionally, SMP maintenance activities would continue to include trash and debris clearing, as identified in the SWMP. Overall compliance with CWA Section 402 for the SMP, to the extent that it is necessary, will be achieved in combination with compliance with the Porter-Cologne Act, described below.

2.2.4 Regulations for the Use of Pesticides and Herbicides

2.2.4.1 NPDES General Permit

The *Statewide General National Pollutant Discharge Elimination System Permit for the Discharge of Aquatic Pesticides for Aquatic Weed Control in Waters of the United States* (General Permit No. CAG 990005) (General Permit) was issued by the State Water Board in 2004 (modified June 7, 2006). This NPDES General Permit covers application of the following substances for the specific purpose of controlling aquatic weed growth in surface waters: 2,4-D, acrolein, copper-based pesticides, diquat, endothall, fluridone, glyphosate, imazapyr, sodium carbonate peroxyhydrate, and triclopyr-based compounds. Coverage under this general permit is required for use of these pesticides directly in waters of the U.S.

Key requirements of the General Permit include the following:

- Compliance with the requirements of California Toxics Rule (40 CFR §131) and the state's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Water Resources Control Board 2005).
- Compliance with other applicable receiving water limitations and with effluent limitations.
- The permittee must be licensed by the California Department of Pesticide Regulation (DPR) or work under the supervision of someone who is licensed if the aquatic pesticide is considered a restricted material.
- Preparation of, and adherence to, an Aquatic Pesticide Application Plan.
- Compliance with specific monitoring and reporting requirements of the permit.
- Adherence to all label instructions and terms of any applicable use permits.
- Maintenance of a Pesticide Application Log.
- Compliance with Public Notice Requirements.

To obtain coverage under this General Permit, a discharger must submit a completed NOI, a vicinity map, and the first annual fee to the appropriate RWQCB. These items constitute a complete application package, the submittal of which authorizes the discharge of pollutants associated with the application of aquatic pesticides in compliance with the General Permit.

2.2.4.2 Stipulated Injunction Regarding Pesticides and the California Red-Legged Frog

On October 20, 2006, the Federal District Court for the Northern District of California issued a Stipulated Injunction regarding a lawsuit brought against EPA by the Center for Biological Diversity. The Court agreed that the EPA failed to comply with Section 7(a)(2) of the ESA by not ensuring that its registration of 66 named pesticide active ingredients will not affect the California red-legged frog.

Terms of the Stipulated Injunction require the EPA to make determinations on the potential effects of 66 named pesticides on California red-legged frog. The injunction also establishes buffer areas around certain habitats of the California red-legged frog, and disallows use of certain pesticides within those habitats and buffer zones. The injunction addresses pesticide use only in and within 400 feet of certain geographic areas designated by the USFWS as critical habitat, and specified non-critical habitat 'sections'. Sections are defined one-square mile areas of land, based on the Meridian-Township-Range-Section geographic system. The USFWS habitat areas identified in the City of Livermore include all of the creek and channel areas where maintenance is proposed under the SMP.

The Injunction allows a reduced buffer for localized spot treatments using handheld devices on rights-of-way, roadsides, pastures, lawns, or in forests and individual tree removal using cut stump application. The Injunction prohibits use of listed pesticides within 60 feet of aquatic breeding or non-breeding aquatic critical habitat or within 60 feet of aquatic features within the non-critical habitat sections subject to the Injunction.

The Injunction does not apply to proposed pesticide use if all of the following conditions are met:

- the pesticide is applied for the purpose of controlling state-designated invasive species and noxious weeds under a program administered by a public entity; and
- the pesticide is not applied within 15 feet of aquatic breeding critical habitat or non-breeding aquatic critical habitat, or within 15 feet of aquatic features within noncritical habitat sections subject to the injunction; and
- application is limited to localized spot treatment using hand-held devices; and
- precipitation is not occurring or forecast to occur within 24 hours; and
- the pesticide is applied by a certified applicator or working under the direct supervision of a certified applicator; and
- if using 2,4-D or triclopyr, only the amine formulations are used.

2.2.4.3 SMP Actions and Compliance Approach

SMP maintenance activities would involve the use of pesticides/herbicides for weed control on access roads and on cut tree stumps. The City complies with all application regulations, including the Federal Insecticide and Fungicide Act, and all City pesticide applicators are certified by the state. The City may apply AquaMaster®, which contains glyphosate as the active ingredient, to access roads along City-maintained channels. As part of tree removal activities within maintenance channels,

AquaMaster® is applied primarily on cut willow stumps by hand. The SMP does not include application of pesticides directly to water bodies.

Coverage under the NPDES General Permit is not required because pesticides would not be applied directly to water under the SMP.

As described above, court-ordered buffers have been established to protect California red legged frog habitat. In the SMP Planning Area, these buffers would apply in the application of AquaMaster® to maintenance roads and cut tree stumps.

2.2.5 Section 303[d]—Impaired Water Bodies and Total Maximum Daily Loads

Under CWA Section 303[d], states are required to identify "impaired water bodies," (that do not meet established water quality standards), identify the pollutants causing the impairment, establish priority rankings for waters on the list, and develop a schedule for development of control plans to improve water quality. Following listing the EPA then approves the state's recommended list of impaired waters. The EPA can also remove or add water bodies to the list. The Section 303[d] List must be updated every two years by each Regional Board. Water bodies on the list have no further assimilative capacity for the identified pollutant, and the Section 303[d] List identifies priorities for development of pollution control plans for each listed water body and pollutant.

The pollution control plans triggered by the CWA Section 303[d] List are called Total Maximum Daily Loads (TMDLs). The TMDL is a "pollution budget" designed to restore the health of a polluted body of water. The TMDL process provides a quantitative assessment of water quality problems, pollutant sources, and pollutant load reductions or control actions needed to restore and protect the beneficial uses of the impaired water body. More specifically, a TMDL is defined as the sum of the individual waste load allocations for point sources, load allocations for non-point sources, and natural background sources such that the capacity of the water body to assimilate pollutant loading (the loading capacity) is not exceeded (40 CFR §130.2). In other words, a TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards, thus ensuring the protection of beneficial uses. This calculation also includes a margin of safety and consideration of seasonal variations. The TMDL also contains the target reductions needed to meet water quality standards and allocates those reductions among the pollutant sources in the watershed.

2.2.5.1 Permitting Agency and Related Regulations

CWA Section 303 is overseen by the EPA and administered by the State Water Board and its nine RWQCBs. Once a TMDL is developed and approved by the RWQCB, State Water Board, and EPA, the implementation plan (if included in the TMDL) can be enacted. The TMDL implementation plan includes pollution prevention, control, and restoration actions; responsible parties; and schedules necessary to attain water quality standards. The implementation plan also identifies enforceable measures (e.g., prohibition) and triggers for Regional Board action (e.g., performance standards). One method of TMDL enforcement utilized by the State and Regional Boards is to require responsible parties to comply with pollution control actions a part of permits issued under the NPDES Program (see the CWA Section 402 discussion). If a NPDES permit signatory, or third party covered under a signatory, is found to be out of compliance with the permit requirements, including TMDL compliance requirements, penalties may be assessed by the signatory (in the case of third

party lapses) or by the state in a case where a signatory is out of compliance (as determined by EPA). At the state level, once a TMDL is incorporated into the RWQCB's Basin Plan as an amendment, the Porter-Cologne Act authorizes the agency to issue WDRs to responsible parties named in the TMDL. WDRs, whether issued under CWA or Porter-Cologne Act authority, may include implementation of BMPs to meet performance standards.

2.2.5.2 SMP Compliance Approach

The current (i.e., enforceable) Section 303[d] List was approved by the EPA in 2011 and is referred to as the 2010 Section 303[d] List. Impaired water bodies in the SMP area included in the 2010 list are shown in Table 2-1. TMDLs that have been adopted and are under development are listed in Table 2-2. A water quality attainment strategy and TMDL to address the Arroyo Las Positas diazinon impairment was completed in March 2004 by the San Francisco Bay RWQCB.

The SMP Manual is being developed to protect the beneficial uses identified in the basin plan and especially those which are currently listed as impaired on the 303[d] list. The SMP includes many BMPs to prevent release of pollutants, including those sequestered in channel sediments during and after maintenance activities. These BMPs will ensure that maintenance activities do not contribute to existing impairments within the Planning Area. The practices and approaches developed for the SMP considered existing and forthcoming TMDLs. The SMP is anticipated to be consistent with any TMDL updates made during the permit term of the SMP.

2.3 Federal Endangered Species Act

The ESA was enacted in 1973 to protect plant and wildlife species determined by USFWS or the National Marine Fisheries Service (NMFS) to be at risk of extinction. Species are protected through listing under the ESA as either *threatened* or *endangered*. An *endangered* species is at risk of extinction throughout all or a significant portion of its range (ESA Section 3[6]). A *threatened* species is likely to become endangered within the foreseeable future (ESA Section 3[19]). Species protected under the ESA are often referred to as "federally listed." Table 2-3 lists special status plants and wildlife that are recognized by federal and state agencies as threatened, endangered, or species of concern and are known to occur or may occur within creeks and channels in the Planning Area. The species in Table 2-3 were also addressed in EACCS and the term "focal species" was applied. To maintain consistency of approach, the special status plants and wildlife addressed in this SMP are also identified as focal species. EACCS is discussed below in Section 2.14.1.

ESA Section 9 prohibits the take of any fish or wildlife species listed under the ESA as endangered. Take of threatened species is also prohibited under ESA Section 9 unless otherwise authorized by federal regulations.[4] *Take*, as defined by the ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." *Harm* is defined as "any act that kills or injures the species, including significant habitat modification." In addition, ESA Section 9 prohibits the "removal or reduction to possession" of any listed plant species "under federal jurisdiction" (i.e., on federal land, where federal funding is provided, or where federal authorization is required).

[4] In some cases, exceptions may be made for threatened species under ESA Section 4[d]; in such cases, the USFWS or NMFS issues a "4[d] rule" describing protections for the threatened species and specifying the circumstances under which take is allowed.

The ESA includes three mechanisms that provide exceptions to the ESA Section 9 take prohibitions: ESA Section 7 consultation, ESA Section 10, and issuing ESA Section 4(d) rules. ESA Section 7 consultation allows for take coverage of federal actions. This will be the mechanism by which incidental take coverage is obtained for implementation of SMP activities and is discussed in greater detail below. For activities conducted outside of federal jurisdiction, ESA Section 10(a)(1)(A) provides scientific (research and monitoring) and enhancement of survival permits, and Safe Harbor Agreements, and ESA Section 10(a)(1)(B) provides incidental take permits. ESA Section 10(a)(2)(A) requires that before the regulating agency can grant an ESA 10(a)(1)(B) permit for incidental take, the applicant must submit a conservation plan.

Because the Agency anticipates obtaining incidental take authorization through Section 7 of the ESA, it does not anticipate the need to develop a habitat conservation plan for the SMP. Therefore, ESA Section 10 is not discussed in additional detail in this SMP Manual. ESA Section 4(d) allows the Secretary (Commerce and/or the Interior) to define rules that place limits on the take prohibitions identified in Section 9 (a)(1)(B) and 9(a)(1)(C) of the ESA for species federally listed as "threatened."

2.3.1 Section 7—ESA Authorization for Federal Actions

ESA Section 7 provides a means for authorizing take of threatened and endangered species by federal agencies under certain circumstances. It applies to actions that are conducted, permitted, or funded by a federal agency. Under ESA Section 7, the federal agency conducting, funding, or permitting an action (the lead agency) must consult with USFWS or NMFS, as appropriate, to ensure that the proposed action will not jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat[5]. If a proposed project "may affect" a listed species or designated critical habitat, the lead agency is required to prepare a biological assessment (BA) evaluating the nature and severity of the expected effect. In response, USFWS or NMFS issues a Biological Opinion (BO) with a determination that the proposed action either:

- may jeopardize the continued existence of one or more listed species (*jeopardy finding*) or result in the destruction or adverse modification of critical habitat (*adverse modification finding*), or
- will not jeopardize the continued existence of any listed species (*no jeopardy finding*) or result in adverse modification of critical habitat (*no adverse modification finding*).

2.3.1.1 Permitting Agency and Related Regulations

The ESA is administered by the USFWS and NMFS. In general, NMFS is responsible for protection of ESA-listed marine species and anadromous fishes while other listed species are protected under USFWS jurisdiction. As described above, USFWS and/or NMFS are engaged in the consultation process by the lead federal agency, often the USACE, and release of a final biological opinion (BO) represents the conclusion of the consultation.

In the City of Livermore, Region 8 (California, Nevada, and Klamath Basin) of the USFWS and the NMFS Southwest Regional Office are responsible for take authorizations under the ESA. These

[5] *Critical habitat* is defined as specific geographic areas, whether occupied by listed species or not, that are determined to be essential for the conservation and management of listed species, and that have been formally described in the Federal Register.

agencies evaluate proposed actions, review BAs, and issue BOs in support of federal permitting activities.

In the SMP Planning Area, USFWS has participated in the development of the EACCS (ICF International 2010) to provide protection and management of certain listed species in this area. On May 31, 2012, USFWS issued a *Programmatic Biological Opinion for U.S. Army Corps of Engineers Permitted Projects Utilizing the East Alameda County Conservation Strategy that May Affect Federally Listed Species in East Alameda County, CA* (USACE File No. 2011-00230S). These documents were considered in development of the SMP Manual and the program's Section 7 compliance approach. EACCS is described below in Section 2.14.1.

2.3.1.2 SMP Permitting Approach

In accordance with issuance of a CWA Section 404 permit by the USACE for SMP activities, ESA Section 7 consultation with the USFWS is required. Thus, a biological assessment (BA) will be prepared to address the entire SMP Area and all listed species and designated critical habitat under jurisdiction of the USFWS (Table 2-3). This BA will incorporate the guidance and approaches recommended in the EACCS that are relevant for SMP activities. Pending review, the USFWS will then issue a separate programmatic BO for the SMP. During annual work plan development, the City will submit a focused BA to the USACE with a request to append the SMP programmatic BO. The USACE will send the request to the USFWS. Following their review, and if appropriate, the USFWS will append annual projects to the programmatic BO and issue a "mini" BO for the year's projects.

Consultation with NMFS under ESA Section 7 is not needed at this time for the SMP because none of the City-maintained creeks and channels currently support salmonids due to downstream passage barriers. In the future, NMFS will be consulted should downstream fish barriers in any of the creeks and channels be removed. The City anticipates that this SMP manual would be updated at that time to comply with the terms and conditions of a NMFS issued BO.

2.4 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 U.S. Code [USC] §703–-712), administered by the USFWS, implements four treaties between the United States and Canada, Mexico, Japan and Russia, respectively, to manage and conserve migratory birds that cross national borders. The MBTA makes it unlawful in any manner, unless expressly authorized by permit pursuant to federal regulations, to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export at any time, or in any manner, any migratory bird, or any part, nest, or egg of any such bird. The definition of "take" is defined as any act to "pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture or collect." This includes most actions, direct and indirect, that could result in "take" or possession, whether it is temporary or permanent, of any protected species. Although harassment and habitat modification do not constitute a take in themselves under the MBTA or the California Fish and Game Code, such actions that result in direct loss of birds, nests or eggs including nest abandonment or failure are considered take under such regulations. A list of migratory birds protected under the MBTA, available in of 50 CFR §10.13, excludes nonnative species that have not been introduced into the U.S. or its territories, and species

that belong to the families not listed in any of the four treaties underlying the MBTA, such as wrentit (*Chamaea fasciata*), European starling (*Sturnus vulgaris*), California quail (*Callipepla californica*), Ring-necked Pheasant (*Phasianus colchicus*) and Chukar (*Alectoris chukar*), among other species less common in California.

On December 8, 2004 the U.S. Congress passed the Migratory Bird Treaty Reform Act (Division E, Title I, Section 143 of the Consolidated Appropriations Act, 2005, PL 108–447; MBTRA), which excludes all migratory birds that are nonnative or have been human introduced to the U.S. or its territories. It defines a native migratory bird as a species present within the U.S. and its territories as a result of natural biological or ecological processes. The USFWS published a list of the bird species excluded from the MBTA on March 15, 2005 (70 Federal Register [FR] 12710), which included two species commonly observed in the U.S., the rock pigeon (*Columba livia*) and domestic goose (*Anser anser* '*domesticus*').

2.4.1 Permitting Agency and Related Regulations

The MBTA is administered by the USFWS. USFWS sets seasons and bag limits for hunted species and protects migratory birds, their occupied nests, and their eggs (16 USC §703; 50 CFR §21; 50 CFR §10). Most actions that result in taking or in permanent or temporary possession of a protected species constitute violations of the MBTA.

2.4.2 SMP Compliance Approach

SMP activities, such as vegetation management, may require the removal of trees or snags where migratory birds are nesting. Compliance with this regulation will be met through the implementation of bird habitat avoidance measures and BMPs during program activities so that take of migratory birds is avoided. These measures are discussed in Chapter 7.

2.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, requires federal agencies (or agencies to which they provide funding or issue permits) to take into account the effects of their actions on cultural resources, including historic properties and historic and prehistoric archaeological sites. In addition, NHPA Section 106 requires lead agencies to:

- provide review and comment opportunities on actions that may affect cultural resources to the Advisory Council on Historic Preservation (an independent federal agency responsible for advising the president and Congress on historic preservation), and to
- coordinate with the State Historic Preservation Officer (SHPO) in the state where the proposed action will take place.

Federal review of projects is normally referred to as the Section 106 process. The Section 106 review process normally involves the following four-step procedure described in detail in the implementing regulations (36 CFR §800):

- identify and evaluate historic properties in consultation with the SHPO and interested parties;
- assess the effects of the undertaking on properties that are eligible for inclusion in the NRHP;

- consult with the SHPO, other agencies, and interested parties to develop an agreement that addresses the treatment of historic properties and notify the Advisory Council on Historic Preservation; and
- proceed with the project according to the conditions of the agreement.

2.5.1 Permitting Agency and Related Regulations

The SHPO has jurisdictional authority over NHPA Section 106 in California. Any federal action, such as issuance of project permits, must gain approval by the SHPO for compliance with NHPA Section 106. Compliance with NHPA Section 106 may be met through the development of a Programmatic Agreement, a Memorandum of Agreement, or a project-by project evaluation. Compliance under each pathway generally involves completion of a cultural resources inventory, evaluation of resources, and implementation of avoidance and mitigation measures for projects that may have an impact on cultural resources.

2.5.2 SMP Compliance Approach

All earth-moving activities, such as bank stabilization and sediment removal projects, conducted under the SMP within USACE jurisdiction (federal nexus) will require compliance with NHPA Section 106. As such, the City will submit a report documenting cultural resources, including historic properties and historic and prehistoric archaeological sites, in the SMP area to the USACE for use in consulting with the SHPO.

Compliance with the NHPA Section 106 will be met through the implementation of avoidance measures and BMPs during implementation of SMP activities so that harm to cultural resources is avoided. It is anticipated that Section 106 compliance for the SMP will be obtained annually on a project-level basis as the SMP is implemented.

2.6 National Environmental Policy Act

NEPA requires federal agencies to include in their decision-making process appropriate and careful consideration of all environmental effects of a proposed action and of possible alternatives. Documentation of the environmental impact analysis and efforts to avoid or minimize the adverse effects of proposed actions must be made available for public notice and review. This analysis is documented in either an environmental assessment (EA) or an environmental impact statement (EIS). Project proponents must disclose in these documents whether their proposed action will adversely affect the human or natural environment. NEPA's requirements are primarily procedural rather than substantive in that NEPA requires disclosure of environmental effects and mitigation possibilities but includes no requirement to mitigate.

2.6.1 Lead Agency

The issuance by the USACE of a CWA Section 404 individual permit constitutes a federal action. Therefore, the USACE must comply with NEPA. The USACE would be the lead agency undertaking NEPA compliance. The USACE may conduct NEPA compliance under its own purview, or it may utilize an environmental assessment or environmental impact statement provided in draft form by the entity requesting the permit.

2.6.2 SMP Compliance Approach

Because an individual permit will be developed as part of the programmatic permitting of the SMP, NEPA compliance will be required as part of the federal action of the USACE. NEPA compliance led by the USACE will meet environmental compliance requirements for permitting actions conducted by all federal agencies granting permits for the SMP, provided that the project description is the same for all issued permits (i.e., separate NEPA documents are not required to address USACE or USFWS permits). The SMP Manual will provide the basis for developing the project description for NEPA compliance.

2.7 Federal Regulation of Floodplains

Congress passed the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 to manage costs and improve precautions for emergency flooding and disaster relief. The intent of these acts was to reduce the need for large, publicly funded flood control structures and disaster relief by restricting development on floodplains.

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP) to provide subsidized flood insurance to communities that comply with FEMA regulations limiting development in floodplains. A key requirement is the adoption of a local floodplain management ordinance restricting development within the mapped floodplain. FEMA issues flood insurance rate maps (FIRMs) for communities participating in the NFIP. The City of Livermore entered the NFIP in 1978. The effective FIRMs for the City of Livermore are dated August 9, 2009. These maps delineate flood hazard zones in the community. The locations of known flooding areas in Livermore, including areas identified by FEMA, are illustrated in Figure 3-6.

Executive Order 11988 (Floodplain Management) addresses floodplain issues related to public safety, conservation, and economics. It generally requires federal agencies constructing, funding, or permitting projects in a floodplain to:

- avoid incompatible floodplain development,
- be consistent with the standards and criteria of the NFIP, and
- restore and preserve natural and beneficial floodplain values.

The City Floodplain Manager represents FEMA as local administrator of the NFIP within the City Planning Area; including review of development proposals, building permits, and Letters of Map Change.

2.7.1 SMP Relevance

The primary objective of the maintenance activities of the SMP is to reduce the potential for flooding associated with the creeks and channels within the City's Planning Area. The cumulative result of the sediment removal, bank stabilization, vegetation management, and other activities described in this manual is to lessen the flood hazard.

2.8 Porter-Cologne Water Quality Control Act

The Porter-Cologne Act was passed in 1969 and together with the CWA, provides regulatory guidance to protect water quality and water resources. The Porter-Cologne Act established the State Water Board and divided California into nine regions, each overseen by an RWQCB. The Porter-Cologne Act established regulatory authority over "waters of the state," which are defined as "any surface water or groundwater, including saline waters, within the boundaries of the state" (California Water Code, Division 7, § 13050). More specifically, the State Water Board and its nine RWQCBs have jurisdiction over the bed and banks of a stream channel, its riparian corridor, and its beneficial uses.

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

The Porter-Cologne Act requires the development and periodic review of water quality control plans (Basin Plans) for the protection of water quality in each of the state's nine regions. A Basin Plan is unique to each region and must identify beneficial uses, establish water quality objectives for the reasonable protection of the beneficial uses, and establish a program of implementation for achieving the water quality objectives. To ensure currency, Basin Plans must be updated every 3 years. The Basin Plans must also comply with Section 303 of the federal CWA, which requires states to establish their own water quality standards. Basin Plans provide the technical basis for the RWQCBs to determine waste discharge requirements, take enforcement actions, and evaluate grant proposals.

As described above in the discussion of CWA Section 401, regulatory compliance for projects occurring within waters of the U.S. is met through a Water Quality Certification granted by the RWQCBs. For projects occurring within Porter-Cologne Act jurisdiction (i.e., State jurisdiction) but outside of waters of the U.S. (in streams this is the area above the OHWM, or "isolated" waters such as wetlands), a WDR or Waiver of WDR is required. WDRs are issued by the RWQCB that has jurisdiction over the region in which the project occurs.

2.8.1 Permitting Agency and Related Regulations

The State Water Board is the primary state agency responsible for protecting the quality of the state's surface and groundwater supplies, but much of its daily implementation authority is delegated to the nine RWQCBs. In general, the State Water Board manages water rights and regulates statewide water quality, while the RWQCBs focus on water quality within their respective regions. For projects that cross more than one region, the State Water Board is responsible for overseeing water quality protection.

As discussed above, each Regional Board is required to develop a Basin Plan to guide management and protection of resources. However, each region may also develop and implement its own policies beyond what is required by the state. Additionally, in compliance with CWA Section 303, the RWQCBs identify water bodies whose beneficial uses are impaired by pollutants and develop TMDLs to restore those beneficial uses. This process is described above under CWA Section 303.

2.8.1.1 San Francisco Bay Regional Water Quality Control Board

The San Francisco Bay RWQCB is charged with maintaining the beneficial uses of waters of the state in the San Francisco Bay Region, as presented in the San Francisco Bay Basin Water Quality Control Plan (Basin Plan), which is the San Francisco Bay RWQCB's master water quality control planning document (available online).

Water Quality Objectives for Use in Designing and Implementing Projects with Impacts to Creeks or Wetlands

To assist project proponents in designing projects in a manner that avoids and/or minimizes impacts to waters of the State, the San Francisco Bay RWQCB has developed a technical reference circular (Circular) that provides guidance for applicants on how to design projects that protect and restore stream and wetland system functions. Project proponents are encouraged to consult this Circular (available online) when developing projects with potential impacts to creeks or wetlands. The San Francisco Bay RWQCB intends to periodically revise and update this Circular to take advantage of emerging science and management practices.

Projects that impact creeks or wetlands should strive to achieve three water quality objectives—Watershed Hydrology, Stream Dynamic Equilibrium, and Stream and Wetland System Habitat Integrity.

Watershed Hydrology

The hydrologic connectivity between headwaters and estuary, surface water and ground water, and landscape, floodplain, and stream channel should be protected to produce the pattern and range of flows necessary to support beneficial uses identified in the Basin Plan and a functional ecosystem.

Stream Dynamic Equilibrium

Stream attributes, including hydrologic and sediment regimes, vegetation communities, channel forms, slopes, and floodplain areas, should be protected in a manner so as not to arrest natural hydrogeomorphic processes nor accelerate an imbalance resulting in excessive erosion or deposition of sediment, cause nuisance, or otherwise adversely affect beneficial uses. Watershed processes contribute to a dynamic balance over time between sediment loads and surface water flows which produce complex, fluctuating, and resilient systems.

Stream and Wetland System Habitat Integrity

Stream and wetland system habitats should be maintained by protecting the type, amount, and complexity of wetland and riparian vegetation, the extent of riparian areas, and the substrate characteristics necessary to support aquatic life.

Achievement of these water quality objectives protects and restores the physical integrity and associated functionality of stream and wetland systems, which include perennial, intermittent, and ephemeral streams and wetlands and their associated riparian areas. The following four principles should be used in developing projects, in order to achieve the water quality objectives:

1. *Water Quality Functions and Land Use:* Functioning stream and wetland systems provide a wide range of water quality benefits that support the beneficial uses identified in the Basin Plan. Many land use activities have the potential to substantially degrade water quality functions of

stream and wetland systems. Therefore, project proponents should recognize the intrinsic connections between land use activities and the structures, processes, and functions of stream and wetland systems.

2. *No Net Loss:* Stream and wetland system areas, functions, and beneficial uses in the Region have been substantially degraded from historic levels as a result of human activities. Therefore, the remaining resources are especially valuable. Projects and associated mitigation measures should be consistent with the California Wetlands Conservation Policy (No Net Loss Policy, Executive Order W-59-93) to ensure no net loss and achieve a long-term net gain in the quantity, quality, and permanence of stream and wetland system areas, functions, and beneficial uses.
3. *Climate Change Adaptation:* Stream and wetland system protection and restoration are a critical element of a strategy for reducing adverse impacts of greenhouse gas emissions and adapting the region's water resource management to account for the adverse effects of climate change and sea level rise. Protecting and restoring stream and wetland system functions, including floodwater storage, groundwater recharge, carbon sequestration (e.g., in riparian vegetation and wetland soils that are rich in organic matter), and maintaining aquatic life and wildlife habitat connectivity are important to mitigate for the adverse effects of climate change.
4. *Watershed Approach:* Many water quality and ecosystem problems are best identified, prioritized, addressed, and solved using a watershed approach. A watershed approach helps to address cumulative impacts on water quality, and encourages the development of watershed plans and partnerships that coordinate the planning, use, and protection of stream and wetland system resources. Project proponents should consider their project's affects when multiple individual effects are added or interact with other effects in a watershed to create cumulative adverse impacts to water quality. Project proponents should include all appropriate and practicable measures to avoid and minimize potential direct, secondary, and cumulative temporary and permanent impacts to water quality and beneficial uses.

2.8.2 SMP Compliance Approach

The San Francisco Bay RWQCB has jurisdictional authority to implement the Porter-Cologne Act in the City of Livermore. All projects conducted under the SMP which occur in waters of the State will require a WDR under the Porter-Cologne Act. In practice, WDRs are combined with NPDES permitting requirements and the CWA Section 401 Water Quality Certification. WDRs issued will require compliance with all current Basin Plan policies.

The SMP is a multi-objective approach to protection of the San Francisco Bay RWQCB's new and existing beneficial uses through compliance with water quality objectives. These objectives were reviewed and integrated into the impact avoidance planning approaches described in Chapters 4 and 7 of this manual.

2.9 California Endangered Species Act

CESA was established in the California Fish and Game Code (CFGC), Sections 2050–2116. CESA was originally enacted in 1970 to designate wildlife, fish and plants as "endangered" or "rare". In 1984, CESA was amended and species were reclassified as "endangered" or "threatened". As of January 1985, all "rare" wildlife species were reclassified as "threatened" and the term rare was dropped from the code. For plants however, the classification of "rare" was maintained for plants listed under

the California Native Plant Protection Act (Sections 1900–1913), but those plants are only subject to the protections of that act and not CESA.

The CESA states that all native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, threatened with extinction and those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation will be protected or preserved. The CESA sets forth procedures by which individuals, organizations, or CDFW can submit petitions to the Fish and Game Commission requesting that a species, subspecies, or variety of plant or animal be added to, deleted from, or changed in status on the State lists of threatened or endangered species.

CDFW maintains two key species lists for CESA listed species; (1) State and Federally Listed Endangered, Threatened and Rare Plants of California[6], and (2) State and Federally Listed Endangered and Threatened Animals of California[7]. These lists are updated two times per year. CDFW also maintains other lists of species with a range of protections through the CFGC. These include California Species of Special Concern lists (CSC or SSC) for fish, reptiles, amphibians, birds and mammals. A species of special concern is a species, subspecies, or distinct population of an animal native to California that currently satisfies one or more of the following (not necessarily mutually exclusive) criteria:

- is extirpated from the State or, in the case of birds, in its primary seasonal or breeding role;
- is listed as Federally-, but not State-, threatened or endangered; meets the State definition of threatened or endangered but has not formally been listed;
- is experiencing, or formerly experienced, serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status; and
- has naturally small populations exhibiting high susceptibility to risk from any factor(s) that if realized, could lead to declines that would qualify it for State threatened or endangered status.

In addition to these CSC species, the CFGC provides protections for other species such as California Fully Protected Species and Special Plant Species. It is important to note that only species classified by the state as “threatened” or “endangered” fall under the protections of CESA. Such other special status species are generally protected through either CFGC Sections 1602 (Streambed or Lakebed Alteration Agreement Program), California Fully Protected Species regulations or through CEQA discussed elsewhere in this chapter.

Like ESA, CESA also allows for incidental take of listed species. Take is defined under the California Fish and Game Code as any action or attempt to “hunt, pursue, catch, capture, or kill.” The incidental take permit process is outlined in CESA (CFGC Sections 2081 and 2080.1).

CESA (CFGC Section 2081[b]) provides a means by which agencies or individuals may obtain authorization for incidental take of state-listed species. Take must be incidental to, and not the purpose of, an otherwise lawful activity. Requirements for a CFGC Section 2081[b] permit include: an analysis of the impacts on listed species and whether the issuance of the incidental take permit would jeopardize the continued existence of the species; development of mitigation measures that

[6] <http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEPlants.pdf>.

[7] <http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEAnimals.pdf>.

minimize and fully mitigate impacts; development of a monitoring plan; and assurance of funding to implement mitigation and monitoring.

For state-listed species that are also federally listed under the ESA, CESA (CFGC Section 2080.1) allows for incidental take issued through ESA Section 7 or Section 10 to potentially provide incidental take coverage under CESA, assuming CDFW determines the protection and mitigation prescribed under the ESA consultation are consistent with CESA. This is known as a "consistency determination." Under CFGC Section 2080.1, CDFW issues a consistency determination with the federal take authorization.

2.9.1 SMP Compliance Approach

Implementation of SMP activities may require compliance with CESA due to the possibility that state-listed species may be negatively impacted. The California tiger salamander is a state-listed threatened species that occurs within the City's geography and in aquatic habitats potentially affected by SMP activities.

In addition to the CESA species, two CSC have the potential to be impacted by SMP activities. These CSC species include California red-legged frog and western pond turtle. Other state species with various levels of protections could be impacted by SMP activities, and protections for these species will be addressed through either CFGC Section 1602 or CEQA.

It is anticipated that a separate CESA incidental take permit will be required for potential impacts to these species.

2.10 California Fish and Game Code Sections 3503 and 3503.5—Bird Nests and Birds of Prey

Section 3503 of the CFGC makes it unlawful to take, possess or needlessly destroy the nests or eggs of any bird. CFGC Section 3503.5 makes it unlawful to take, possess or needlessly destroy birds of prey or the nests or eggs of a bird of prey; Section 3503.5 prohibits the take, possession, or needless destruction of any nests, eggs or birds in the orders Falconiformes (new world vultures, hawks, eagles, ospreys and falcons, among others)or Strigiformes (owls); Section 3511 prohibits the take or possession of fully protected birds; and Section 3513 prohibits the take or possession of any migratory nongame bird or part thereof as designated in the MBTA.

2.10.1 Permitting Agency and Related Regulations

CFGC Section 3503 and Section 3503.5 are administered by the CDFW and the Fish and Game Commission. These regulations are enforced under CDFW and through the CEQA environmental process.

2.10.2 SMP Compliance Approach

SMP activities, such as vegetation management, may require the removal of trees or snags where birds are nesting. Compliance with this regulation will be met through the implementation of

avoidance measures and BMPs so that take of birds is avoided. The SMP contains conservation measures to avoid such take in order to comply with CFGC Sections 3503 and 3503.5.

2.11 California Fish and Game Code Section 1602—Lake and Streambed Alteration Agreement Program

Under the CFGC Section 1602, CDFW projects that affect the flow, channel, or banks of rivers, streams, and lakes are required to notify CDFW. CFGC Section 1602 requires public agencies and private individuals to notify and enter into a Lake or Streambed Alteration Agreement with CDFW prior to construction of a project that will:

- substantially divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake;
- substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake; or
- result in the disposal or deposition of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into any river, stream, or lake.

CFGC Section 1602 may apply to any work undertaken within the 100-year floodplain of any body of water or its tributaries, including perennial, intermittent, and ephemeral rivers, streams, or lakes in the state. In general, however, it is construed as applying to work within the active floodplain and/or associated riparian habitat of a wash, stream, or lake that provides benefit to fish and wildlife. CFGC Section 1602 typically does not apply to drainages that lack a defined bed and banks, such as swales, or to wetlands such as vernal pools.

2.11.1 Permitting Agency and Related Regulations

CDFW has regulatory jurisdiction over the bed, bank, or channel of a stream, lake, or pond, as stated in CFGC Sections 1600–1616. Under CFGC Section 1602, CDFW administers the Lake and Streambed Alteration Program and may issue a Streambed Alteration Agreement (SAA) for proposed projects within their jurisdiction. SAAs are typically issued through an application process (submittal of a notification package) and include restrictions on construction periods and locations and avoidance, minimization, and mitigation measures for potential impacts on habitat associated with waters of the state. Because CDFW has discretionary approval authority, it is a responsible agency under CEQA (see further discussion of CEQA below). As such, proposed projects must fully comply with CEQA before CDFW can finalize a SAA. A Routine Maintenance Agreement (RMA) is a type of SAA can also be used between CDFW and an applicant to provide more broad or program wide coverage for similar and routine maintenance activities across a common program area.

2.11.2 SMP Compliance Approach

The CDFW Bay-Delta Region has jurisdiction over streambed alteration activities occurring in the City of Livermore. Bank stabilization and sediment removal activities, as well as some vegetation management activities, implemented through the SMP will require a streambed alteration agreement from CDFW.

With the development of the SMP Manual and its other associated permitting efforts, the RMA will be drafted in collaboration with CDFW to provide CFGC Section 1602 compliance for all SMP activities. The RMA will include SMP activities and will have a 10-year permit term and will be available for review and renewal following the initial 10-year period.

2.12 California Environmental Quality Act

CEQA (PRC 21000 et seq.) is the cornerstone of environmental law and policy in California. CEQA requires public agencies to assess and publicly disclose the environmental implications of proposed actions through the preparation of appropriate documents. The primary objectives of CEQA include:

- ensuring that the potential environmental impacts of proposed projects are disclosed to decision makers and the public;
- ensuring that environmental damage is avoided, reduced, or compensated for by the implementation of carefully designed mitigation measures;
- making the public aware of the reasons for an agency's approval of a project with significant, unavoidable, and unmitigable environmental impacts;
- fostering cooperation between agencies in the review of projects; and
- enhancing public involvement in the planning and review of projects that may impact local communities and their natural environment.

CEQA applies to discretionary activities proposed, implemented, or approved by California public agencies, including state, regional, county, and local agencies. The public agency which has the principal responsibility for carrying out or approving a project which may have a significant effect upon the environment is the lead agency for CEQA compliance and is responsible for preparing the environmental documentation for the proposed project.

Several types of documents may be used to comply with CEQA. Some types of actions are categorically exempt from the assessment and disclosure of impacts required by CEQA, and for such actions, a categorical exemption is filed. For most projects, the first step in CEQA compliance is preparation of an initial study (IS) to determine whether a proposed project is likely to result in a significant adverse impact on the environment. If the IS shows that no significant impact is likely, the lead agency files a negative declaration (ND); if project impacts can be reduced below the level of significance by the implementation of one or more mitigation measures, the lead agency may file a mitigated negative declaration (MND). However, if the IS shows that the proposed project is likely to result in one or more significant adverse impacts that cannot be adequately reduced by mitigation, the lead agency must complete an environmental impact report (EIR). The EIR must evaluate the likely environmental impacts of the proposed project and a reasonable range of feasible alternatives that would accomplish the same goals, and is required to identify the environmentally superior alternative.

2.12.1 Lead Agency

The City of Livermore would be the lead agency responsible for complying with CEQA.

2.12.2 SMP Compliance Approach

CDFW and the San Francisco Bay RWQCB must comply with CEQA prior to the issuance of permits. CEQA is also triggered by the discretionary action of the City in adopting the SMP Manual and approving the SMP program, the implementation of which may result in a significant adverse impact on the environment. As the agency with principal responsibility for carrying out the SMP, the City is the CEQA lead agency.

Compliance with CEQA will be met through the development of an IS/MND for the SMP Manual. The IS/MND will evaluate the environmental impacts of the creek and channel maintenance activities proposed in the SMP Manual. The IS/MND will be crafted to address the needs of each regulatory agencies to grant permits, as well as provide the necessary CEQA compliance to allow the City to approve the SMP.

2.13 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (Eagle Act) prohibits the taking or possession of and commerce in bald and golden eagles with limited exceptions. Under the Eagle Act, it is a violation to "take, possess, sell, purchase, barter, offer to sell, transport, export or import, at any time or in any manner, any bald eagle commonly known as the American eagle, or golden eagle, alive or dead, or any part, nest, or egg, thereof." *Take* is defined to include pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, and disturb. *Disturb* is further defined in 50 CFR §22.3 as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

Recent revisions to the Eagle Act authorizes take of bald eagles and golden eagles under the following conditions: (1) where the take is compatible with the preservation of the bald eagle and golden eagle; (2) take is necessary to protect an interest in a particular locality; (3) take is associated with but not the purpose of an otherwise lawful activity; and (4) for individual instances of take, the take cannot be avoided; or (5) for programmatic take, the take is unavoidable even though advanced conservation practices are being implemented (50 CFR §22.26). Permits issued under this regulation usually authorize disturbance only; however, in limited cases a permit may authorize lethal take that results from but is not the purpose of an otherwise lawful activity.

2.14 Local Stream and Watershed Plans

Applicable local plans, such as general plans, are discussed in detail in the IS/MND which accompanies the SMP Manual. The EACCS and the Zone 7 Stream Maintenance Master Plan are relevant stream and watershed management plans in the SMP Planning Area. These plans are summarized below.

2.14.1 East Alameda County Conservation Strategy

The primary purpose of EACCS is to provide a regional approach to species conservation and streamline environmental permitting. EACCS includes a baseline inventory of biological resources and conservation priorities that will be utilized by local agencies and resource agencies during project-level planning and environmental permitting. To this end, EACCS describes how to avoid, minimize, and mitigate impacts on selected focal species and sensitive habitats. By implementing EACCS, local agencies can more easily address the legal requirements relevant to these species and set priorities for mitigation and conservation to contribute to the protection of focal species and sensitive habitats in eastern Alameda County.

EACCS is designed to serve as a coordinated approach to conservation in the eastern portion of Alameda County. The specific goals of EACCS are:

- Improve corridors and linkages between other conservation planning efforts (habitat conservation plans [HCPs]/natural community conservation plans [NCCPs]) inside and adjacent to the EACCS Study Area.
- Set goals to document, protect, and enhance native biological and ecological diversity in the study area.
- Establish a set of standards to preserve, enhance, restore, manage, and monitor native species and the habitats and ecosystems upon which they depend.
- Streamline and simplify the issuance of permits for future project proponents in the study area by indicating clear standards for lawful incidental take of species listed as threatened or endangered pursuant to ESA and CESA and by setting clear mitigation ratios for focal species and sensitive habitats.
- Standardize avoidance, minimization, mitigation, and compensation requirements of the ESA, CESA, CEQA, NEPA, and other applicable laws and regulations relating to biological and natural resources within the study area, so that public and private actions will be governed equally and consistently, thus reducing delays, expenses, and regulatory duplication.
- Provide a less costly, more efficient project review process that will result in more productive conservation than the current project-by-project, species-by-species compliance process for focal species and sensitive habitat.
- Restore natural communities that have been degraded or lost over time where possible.
- Introduce creative solutions to making land management activities which benefit focal species more feasible through incentives for and the education of the private lands community.

2.14.2 Zone 7 Stream Maintenance Master Plan

The Stream Maintenance Master Plan (SMMP) was developed by Zone 7 in cooperation with stakeholders and other agencies. The SMMP EIR includes the following goals (ESA Associates 2006).

- Protect people, property, and stream corridors from damaging drainage and floods.
- Reduce or manage erosion and sedimentation in a manner that is compatible with other stream resources.
- Provide adequate conveyance of water for recharge and storage needs.

- Protect and enhance the water quality of streams and groundwater.
- Protect and enhance aquatic and riparian habitat associated with streams and wetlands.
- Promote recreation, alternative transportation, and public education opportunities along streams and the Chain of Lakes.

The SMMP EIR recommends a regional approach to flood protection to maximize benefits and minimize costs. Regional flood protection would occur via creek modifications to meet capacity requirements for the 100-year flood event and prevent sediment accumulation without expanding existing trapezoidal channels.

The SMMP identifies projects to detain floodwaters, store and remove sediment and divert and store floodwaters until they can be passed safely downstream.

Table 2-1. 2010 Clean Water Act Section 303(d) List of Water Quality Limited Segments in the City of Livermore

RWQCB	Waterbody	Pollutant	Potential Sources
San Francisco Bay (Region 2)	Arroyo Del Valle	Diazinon	Urban Runoff/Storm Sewers
	Arroyo Las Positas	Nutrient/Eutrophication Biological Indicators	Urban Runoff/Storm Sewers, Surface Runoff
	Arroyo Mocho	Diazinon, Temperature	Urban Runoff/Storm Sewers, Habitat Modification, Removal of Riparian Vegetation, Channelization

Source: State Water Resources Control Board 2011.
RWQCB = Regional Water Quality Control Board.

Table 2-2. Status of Total Maximum Daily Loads (TMDLs) in the SMP Area

RWQCB	Waterbody	Impairment	TMDL Status
San Francisco Bay (Region 2)	Arroyo Del Valle	Diazinon	This listing was made by EPA for the 1998 Section 303(d) list. For 2006, diazinon was moved by EPA from the 303(d) list to this being addressed list because of a completed EPA approved TMDL.
San Francisco Bay (Region 2)	Arroyo Las Positas	Nutrient/eutrophication biological indicators	For 2006, diazinon was moved by EPA from the Section 303(d) list to this being addressed list because of a completed EPA approved TMDL.
San Francisco Bay (Region 2)	Arroyo Mocho	Diazinon, temperature	For 2006, diazinon was moved by EPA from the Section 303(d) list to this being addressed list because of a completed EPA approved TMDL.

Source: State Water Resources Control Board 2011.
EPA = U.S. Environmental Protection Agency.
RWQCB = Regional Water Quality Control Board.
TMDL = total maximum daily load.

Table 2-3. Focal Species with the Potential to Occur in the SMP Area

Species	Scientific Name	Status[a]		
		Federal	State	CNPS
Invertebrates				
Longhorn fairy shrimp	*Branchinecta longiantenna*	FE	–	–
Vernal pool fairy shrimp	*Branchinecta lynchi*	FT	–	–
Callippe silverspot butterfly	*Speyeria callippe callippe*	FE	–	–
Amphibians				
California tiger salamander	*Ambystoma californiense*	FT	ST	–
California red-legged frog	*Rana draytonii*	FT	CSC	–
Birds				
Golden eagle	*Aquila chrysaetos*	BGPA, MBTA	CSC, FP	–
Tricolored blackbird	*Agelaius tricolor*	MBTA	CSC	–
Western burrowing owl	*Athene cunicularia hypugea*	MBTA	CSC	–
Mammals				
American badger	*Taxidea taxus*	–	CSC	–
San Joaquin kit fox	*Vulpes macrotis mutica*	FE	ST	–
Plants				
San Joaquin spearscale	*Atriplex joaquiniana*	–	–	1B.2
Congdon's tarplant	*Centromadia parryi* ssp. *congdonii*	–	–	1B.2
Palmate-bracted bird's-beak	*Cordylanthus palmatus*	FE	SE	1B.1
Livermore tarplant	*Deinandra bacigalupii*	–	–	1B.1

Notes

[a] Status

State Status

FP = Fully protected.
SE = State listed as endangered.
ST = State listed as threatened.

CSC = California special concern species.

Federal Status

BGPA = Bald Eagle and Golden Eagle Protection Act.
MBTA = Migratory Bird Treaty Act.
FE = Federally endangered.
FT = Federally threatened.

California Native Plant Society Ranking

1B = Rare or endangered in California and elsewhere.

Native Plant Threat Rankings

.1 = Seriously threatened in California (high degree/immediacy of threat).
.2 = Fairly threatened in California (moderate degree/immediacy of threat).

Chapter 3
Environmental Setting

3.1 Introduction

This chapter presents the environmental setting focusing on the physical and biological conditions of the SMP Planning Area. This information provides the foundation for framing the maintenance approach of Chapter 4, and drafting the description of program activities and implementation in Chapters 5 through 9.

The resource setting also provides an important basis for environmental compliance. Physical and biological resources have been considered and described to address the regulatory requirements of the ESA, CESA, CWA Sections 401 and 404, the Porter-Cologne Act, and CFGC Section 1600 et seq.

This chapter is organized as follows:

- Section 3.2, *Topography and Landforms*
- Section 3.3, *Watersheds, Creeks, and Land Use*
- Section 3.4, *Geology and Soils*
- Section 3.5, *Climate*
- Section 3.6, *Regional Flooding*
- Section 3.7, *Groundwater and Water Supply*
- Section 3.8, *Water Quality*
- Section 3.9, *Vegetation Communities and Creek/Channel Land Cover*
- Section 3.10, *Focal Plants and Wildlife*

3.2 Topography and Landforms

Livermore is located in eastern Alameda County approximately 35 miles southeast of San Francisco (Figure 3-1). It is surrounded by the hills of the Diablo Range which create Livermore Valley. Cities that surround Livermore include Dublin and Pleasanton to the west and Tracy to the east. Livermore Valley gradually slopes from the east to west, with the City of Livermore in the center.

3.3 Watersheds, Creeks, and Land Use

3.3.1 Alameda Creek Watershed

The Alameda Creek watershed is by far the largest watershed in the county, covering more than 635 square miles (including 77% of the county), and stretching from Mount Diablo (Contra Costa County) in the north, to Mount Hamilton in the south (Santa Clara County), to Altamont Pass in the

east. The general drainage pattern is east to west through three major arroyos: Arroyo Las Positas, Arroyo Mocho, and Arroyo del Valle. These arroyos join Arroyo de la Laguna in Pleasanton, which drains the Livermore Valley in a southerly direction approximately 18 miles to San Francisco Bay via Niles Canyon and Alameda Creek outside of the Planning Area (Zone 7 Water Agency 2006).

Runoff from the northern region flows to tributaries of Alameda Creek. Runoff from much of the southern part of the watershed is either collected and stored in Calaveras and San Antonio Reservoirs, which are part of San Francisco's water system (San Francisco Public Utilities Commission [SFPUC] owns 36,000 acres of the watershed), or is collected in Lake Del Valle. Most of the watershed is undeveloped, and is either in private rangelands or public lands. Only about 7% of the total acreage of the watershed is developed.

For about 39 miles, Alameda Creek flows from its headwaters on the northwestern slopes of the Diablo Range in Santa Clara County to South San Francisco Bay. Headwater elevations are close to 4,000-feet, with stream gradients downstream through the upper reaches varying from between 1 and 5%. Alameda Creek is an intermittently perennial stream in the upper watershed, but in the Sunol Valley, where principal stream channels are broad and the substrate is characterized by deep, coarse alluvium, a high rate of infiltration results in dry reaches during the summer months. Many of the tributaries that supply flows to Alameda Creek are historically intermittent and can be isolated from the mainstem beginning in early to midsummer (Welch et al. 1966). This is especially true of streams, both natural and channelized, that drain the Livermore Valley. For example, the natural hydrology of the Alameda Creek watershed has been altered by water supply activities as well as by development and flood control.

3.3.1.1 Livermore Valley Subwatershed

The Livermore Valley subwatershed extends south of Livermore along the Arroyo Mocho and the Arroyo Del Valle (Figure 3-2). The total area of the subwatershed is roughly 310 square miles (198,400 acres), and the total area of the SMP is approximately 26.5 square miles (17,000 acres) (Schaaf & Wheeler 2004).

There are five major drainage areas within the City of Livermore, all of which drain either by gravity or pumping into channels and creeks flowing west (Figure 3-3) (Schaaf & Wheeler 2004).

Creeks

A network of small natural channels collects the storm water from the northern portion of the City. These channels include the Arroyo Seco, Arroyo Las Positas Relocation, Altamont Creek, Cayetano Creek, Collier Creek and Cottonwood Creek; all of which flow into the Arroyo Las Positas. The arroyo Las Positas merges with the Arroyo Mocho to the west of Livermore, which eventually joins the Arroyo De La Laguna (Figure 3-4) (Schaaf & Wheeler 2004).

The Arroyo Mocho runs along the southern edge of the downtown portion of the City and conveys storm water from the downtown and southwest areas. It is a natural channel that has been excavated and improved in various reaches to provide enhanced flood flow conveyance. The Arroyo Del Valle runs along the southwestern edge of the City and picks up some storm water from the City. Both the Arroyo Mocho and the Arroyo Del Valle flow to the Arroyo De La Laguna to the west, the Arroyo De La Laguna drains to Alameda Creek, which reaches the San Francisco Bay approximately 4 miles downstream (Schaaf & Wheeler 2004).

Arroyo Mocho is a tributary of Arroyo de la Laguna, and its headwaters are located southeast of Livermore (Alameda Creek Alliance 2009). Arroyo Mocho has intermittent perennial flow due to fault zone seepage (Smith 1998) and the Zone 7 Artificial Recharge program that releases water from the South Bay Aqueduct into Arroyo Mocho and recharges groundwater resources (RMC 2006). This in turn has disrupted the natural hydrologic regime in Arroyo Mocho and permanently altered the ecology of the stream downstream of Livermore. The Upper watershed is unaffected by Zone 7's artificial releases; and the "hydrologic regime" remains mostly "natural".

Arroyo Las Positas is the major drainage feature through the Livermore Valley, draining approximately 7,000 acres. The creek originates in the Altamont Hills and continues in a westerly direction, following Interstate 580 (I-580) to the confluence with Arroyo Mocho, also a tributary to Alameda Creek. Arroyo Seco drains into Arroyo Las Positas from the north (Oakland Museum of California 2009). Arroyo Los Positas is a gaining stream in its upper reaches providing for perennial flows along its entire length.

3.3.2 Land Use

The city of Livermore is entirely within an Urban Growth Boundary (UGB). The UGB was established in order to protect agricultural and natural resources and to prevent future urban development outside Livermore (City of Livermore 2004). The UGB was finalized after two initiatives were passed. The first, passed by local voters in March of 2000, is the *South Livermore Urban Growth Boundary Initiative*, which defines the UGB around the southern portion of the city (City of Livermore 2004). The second, passed by the Livermore City Council in December of 2002, is the *North Livermore Urban Growth Boundary Initiative*, and defines the UGB around the northern portion of Livermore (City of Livermore 2004).

A fairly wide mix of land uses characterizes Livermore. There are areas of protected watersheds and open space, creeks flow through lower-density hillside residential areas and through increasingly dense residential areas mixed with commercial and industrial uses. Most residential areas retain some open space in the form of lawns and gardens, and public parks are scattered throughout the City (Schaaf & Wheeler 2004.).

Although open space is scattered throughout the City, particularly near the creeks, the vast majority of Livermore has been urbanized. The City is experiencing new development around its edges, primarily in the northeast and northwest. While expansion has nearly met the current urban growth boundaries, there are still several parcels within the City that are currently undeveloped (Schaaf & Wheeler 2004.).

3.4 Geology and Soils

3.4.1 Regional Geologic Context

The City of Livermore is located within the central portion of the Coast Ranges Geomorphic Province. In the San Francisco Bay Area (Bay Area), the Coast Ranges Province is characterized by a series of northwest-trending en-echelon ridges and valleys bounded by active faults of the San Andreas system, which forms the boundary between the Pacific and North American tectonic plates (Norris and Webb 1990). From west to east, these faults include the San Gregorio, the San Andreas,

the Hayward-Rodgers Creek, Calaveras, Concord-Green Valley, Greenville, and Ortigalita, together with a number of smaller structures.

3.4.2 Geology of the Livermore Valley

The Livermore Valley, containing the cities of Livermore and Pleasanton, lies south and west of the Diablo Range and east of the East Bay Hills. This valley, an east-west trending valley, unique to this area, is a deep alluviated depression (Ollenburger 1986) containing sediments deposited as part of the Livermore Gravels Formation. The Greenville fault forms the eastern border of this valley, separating it from the western foothills of the Diablo Range. It is postulated that the Greenville Fault is connected to the Concord Fault at depth by a buried "blind" thrust fault system (Wetlands Research Associates 2004). It is this interaction of the Greenville and Concord Faults that has created the Mount Diablo uplift, a presently active (Crane 1995), Late Quaternary tectonic feature located in the north-central portion of the Planning Area. The bedrock structure of the Mount Diablo uplift is composed of rocks of the Miocene Green Valley/Tassajara Formation and is postulated to contain deposits of the Livermore Gravels Formation (Graymer et al. 1996). The core of the Mount Diablo uplift, located just north of the plan area, contains older Franciscan rocks, flanked by east- and westward-younging sedimentary strata of Eocene through Pliocene age.

3.4.3 Soils

The Livermore Valley floodplain supports very gravelly soils assigned to the Yolo-Pleasanton association, interspersed with loams and clays of the Rincon-San Ysidro association.

The Natural Resources Conservation Service (NRCS) has classified all soils into four hydrologic soil groups (A, B, C, and D) according to their infiltration rate, which correlates to its ability to absorb and transmit water; this aids in the determination of total runoff. Much of Livermore was built on soils with hydrologic group B, which allows moderate infiltration rates. However, areas in the northeast and southwest are classified group D, which have very slow infiltration rates and will increase the amount of runoff. The soil along the northern edge of Livermore is in group C which also has a slow infiltration rate. The varied geologic settings affect the magnitude of flood risk experienced throughout the City (Schaaf & Wheeler 2004.).

Soil groups within the City of Livermore are illustrated in Figure 3-5.

3.5 Climate

Climatically, the Livermore Valley is intermediate between the moderate, marine Mediterranean conditions of the Bay Area and the more marked seasonality of the interior Central Valley. The Livermore Valley is characterized as a standard Mediterranean climate in that it has extended periods of precipitation during the winter months and virtually no precipitation from spring through autumn.

The City of Livermore's climate is semiarid with an average summertime high temperature of 89°F, dropping to an average winter nighttime low temperature of 36°F. Mean average precipitation is roughly 15 inches, with about 80% of that precipitation falling from November through March. Precipitation occurs entirely as rainfall. Snowmelt is not a hydrologic process that significantly affects runoff in the City (Schaaf & Wheeler 2004).

3.6 Regional Flooding

Heavy rainfall in the winter months produces flood situations in the Livermore Valley. Historical flooding information can be valuable in highlighting areas of recurring problems, and prioritizing future improvements. Areas with known flooding problems include areas surrounding the Springtown and Rhododendron intersection, the intersection of Jack London and Kitty Hawk, Murrieta and Jack London, Murrieta and Stanley Blvd, the intersection of Stanley Blvd and El Caminito, areas adjacent to Springtown golf course, the Arroyo Las Positas at Las Positas Golf Course, and areas surrounding the Granada Channel (Figure 3-6) (Schaaf & Wheeler 2004).

Flooding resulted from creek and channel restrictions and undersized channels. Significant damage has occurred from flooding in Livermore in the past, with the largest flood in history being in January of 1952 where railroads, bridges, roads, utilities, and private properties were damaged (Schaaf & Wheeler 2004).

The City of Livermore became a member of the National Flood Insurance Program (NFIP) in 1978 and is responsible for Floodplain Management within the city limits. All new development and improvements built since 1978 must meet the NFIP requirements. According to the Federal Emergency Response Agency (FEMA) Flood Insurance Rate Maps (FIRMs) for Livermore, over half of the developable land in the City is in the 100-year floodplain. According to FEMA (1997), the 100-year flood elevations across the Planning Area range from an elevation of 357 feet to 374 feet, which corresponds to a flood depth of one to two feet, on average.

3.6.1 Flood Protection Facilities

Flood protection is provided to developed portions of Livermore by a series of storm drains, channels, and creeks that convey storm-generated runoff westerly toward the San Francisco Bay through Niles Canyon.

3.6.1.1 Interior Flood Protection Facilities

Precipitation that falls on land within the Livermore Valley generates storm water runoff. This runoff is conveyed in a number of natural and manmade flood protection systems. These systems interact with one another, and potential improvements to one system may impact the performance of other systems, either positively or negatively. Storm runoff is delivered to the major flood protection facilities through a system of street gutters, pipes, ditches and pump stations. Pumping systems provide flood protection at railroad underpasses near the downtown area of Livermore. Pump stations along the railroad underpasses are located at the intersection of East Stanley Boulevard and Isabel Avenue, north of Stanley Boulevard on Murrieta Boulevard, and north of Railroad Avenue at “P” Street and North Livermore Avenue (Schaaf & Wheeler 2004).

3.6.1.2 Recent Flood Protection Measures Taken

The City of Livermore has recognized inadequacies in the existing storm drain system. In an effort to alleviate this problem they have completed channel and pipeline improvements. Recent City activity has focused on (Schaaf & Wheeler 2004):

1. A small channel between Arroyo Road and Tahoe Drive was constructed in the southwest to alleviate undersized pipes.

2. Phase I of the downtown storm drain improvement projects has been constructed along Holmes Street from "S" Street to Arroyo Mocho.
3. Channel improvements near Springtown.
4. Concannon Boulevard extension with removal of Wente Street corrugated metal pipe (CMP) culvert crossing with installation of a free spanning bridge.
5. Pump station improvements at Murrieta crossing to add provision for backup emergency mobile pump.

3.7 Groundwater and Water Supply

The Planning Area is within the Livermore Valley groundwater basin. The basin covers approximately 69,700 acres, which extend west to east from the Pleasanton Ridge and the Calaveras fault to the Altamont Hills and the Greenville fault, and extend north to south from the Tassajara Upland to the Livermore Upland and Verona fault. The faults in the area prevent lateral movement of groundwater. The valley floor, formed by a faulted asymmetric syncline, overlies deposits from alluvial fans, outwash plains, streambeds and lakes composed of valley-fill materials, the Livermore Formation, and the Tassajara Formation. The alluvium consists of unconsolidated gravel, sand, silt, and clay. The maximum depth of the alluvial deposits is less than 100 feet in east Livermore Valley and increases to 400 feet east of Pleasanton. The Livermore and Tassajara Formations are deeper, up to 4,000 feet thick, and consist of materials typical in seafloor deposits containing gravel, sand, chert, shale, and clays. The general groundwater gradient flows to the west and then south toward the Arroyo de la Laguna. The total storage capacity of the basin is approximately 500,000 acre-feet, while the amount of groundwater in storage was estimated at 219,000 acre-feet in 1999.

The basin is divided into a primary Main Basin and secondary Fringe Basins. The Main Basin is composed of Amador, Bernal, Castle, and Mocho II subbasins. Groundwater levels in the Main Basin can range from 10 to 20 feet below the surface in unconfined aquifers. The subbasin is bounded to the west by the Pleasanton fault, to the east by the Livermore fault, to the north by a permeability barrier of interfingering alluvial deposits with non-water-bearing formations. This subbasin has high production wells.

Zone 7 has actively used the Livermore Valley groundwater basin as a supply of drinking water since 1974. Zone 7 currently operates 210 wells annually. Zone 7 prepares a Well Master Plan in 2004, which identifies the construction of additional water wells in the Chain of Lakes area. While most of the new wells are proposed south of the project area, there may be a need to place some within the project area. The California Water Service Company also operates wells within Livermore city limits; however, all of them are outside the Planning Area. According to Zone 7 monitoring reports, the groundwater budget is essentially in balance with a slight net deficit (790 acre-feet). Approximately 10,000 acre-feet are extracted for domestic water supply; 190 acre-feet, for agricultural uses; and 12,600 acre-feet, for gravel mining operations. Natural and artificial recharge from rainfall, releases from the South Bay Aqueduct or Lake Del Valle (which is approximately 8 miles southeast of the project area), and gravel mining recharge to the Arroyo Mocho and the Arroyo Del Valle (which drains from Lake Del Valle, travels in a northwesterly fashion, eventually joining with the Arroyo Mocho upstream of Bernal) account for approximately 22,000 acre-feet per year. The Amador subbasin well production ranges from 42 to 2,820 gallons per minute (gpm) and specific capacities of 1.1 to 217 gpm per foot of drawdown (ESA Associates 2006).

3.8 Water Quality

Descriptions of key water quality parameters in relation to surface water and groundwater quality are provided in the following sections. Depending on the available information, local groundwater quality and surface water quality are described in more detail below.

3.8.1 Surface Water Quality

The U.S. Geological Survey (USGS) and San Francisco Bay RWQCB have monitored water quality within the Planning Area. The USGS monitored four sites along the Arroyo Las Positas for water quality during the early 1980s (U.S. Geological Survey 2004). Four sites within the Planning Area were monitored in 2001 and 2002 by the San Francisco Bay RWQCB (2004). Using additional sources and locations, Zone 7 has created a water flow record back to 1912 and water quality data back to 1948. These data suggest that the water quality of the Arroyo Las Positas has remained relatively unchanged throughout the past 20 years. Water quality objectives are being met for most constituents. Total dissolved solids (TDS) thresholds, however, are exceeded regularly, and the water is high in chlorides. Alkaline soils in natural sections of the creek are a contributing factor of the elevated TDS levels. Existing erosion of bed and banks is also contributing sediment to the creek.

Extensive water quality data were not available for the Arroyo Mocho or Cottonwood Creek. However, the water quality is expected to reflect the land uses in the watershed. Land uses surrounding the creeks include open space, urban/industrial, and agricultural uses. Open space is not anticipated to contribute pollutants to water bodies above background levels, except when it includes grazing, which would typically contribute sediment, nutrients, and bacteria. Urban and agricultural land uses typically contribute sediment, hydrocarbons and metals, pesticides, nutrients, bacteria, and trash. The proposed land uses would be expected to contribute similar contaminants.

Both the Arroyo Las Positas and the Arroyo Mocho are listed as highly impaired water bodies under Section 303(d) of the CWA for diazinon from urban runoff and storm drains. Moving downstream, the Arroyo de la Laguna and Alameda Creek are both highly impaired for diazinon from urban runoff and storm drains. The southern San Francisco Bay, the receiving waters for Alameda Creek, is impaired by a number of constituents.

3.8.2 Groundwater Quality

Groundwater quality is highly variable throughout the Livermore Valley groundwater basin. Zone 7 actively monitors the groundwater quality of the basin. There has been a net increase in TDS, and the associated salt content, over time. Based on the 1974 baseline of storage volume and salt concentration, as well as annual fluxes in recharge and salts, estimates of the 2005 theoretical TDS basin-wide is 710 milligrams per liter (mg/L) (Jones & Stokes 2006). At two key wells monitored by Zone 7 over the past ten years, actual TDS levels have fluctuated between 410 to 790 mg/L with most of the records between 470 to 620 mg/L (Jones & Stokes 2006). Zone 7 has identified recharge of local streamflow, recharge of imported water, subsurface inflow, and irrigation return flows as major sources of salt to the main basin. Elevated nitrate plumes occur in the central and eastern valley from livestock manure and the historic usage of septic tanks. For the Amador subbasin, waters are of good to excellent quality, characterized by sodium bicarbonate, magnesium bicarbonate, and calcium bicarbonate with a few instances of elevated levels of boron (likely from natural sources in soils) and nitrate (likely from agricultural contributions).

3.9 Vegetation Communities and Creek/Channel Land Cover

Vegetation communities and land cover types identified in this SMP are based on the recent vegetation community mapping completed for the EACCS (ICF International 2010). The SMP Area encompasses 12 vegetation communities covering approximately 789 acres including:

- alkali meadow and scalds;
- California annual grassland;
- mixed evergreen forest/oak woodland
- mixed riparian forest and woodland;
- mixed willow riparian scrub;
- valley sink scrub;
- alkali wetland;
- perennial freshwater marsh;
- seasonal wetland;
- pond; and
- riverine.

In addition, six non-natural land cover types are present in the SMP project area including:

- vineyard;
- cropland;
- ruderal;
- golf course/urban park;
- urban-suburban; and
- rural residential.

Each of these fifteen land cover types is discussed below. SMP land cover mapping is summarized in Table 3-1. See Figures 3-7 through 3-145 for land cover mapping within individual creek and channel reaches.

3.9.1 Alkali Meadow and Scalds

Alkali meadow and scald is relatively rare in the SMP Area. It is found on approximately 10 acres, predominantly in the northeast corner of the SMP Area. The most notable areas where this land cover occurs include the Springtown Alkali Sink.

Dominant species in alkali meadows include saltgrass, wild barley, and alkali ryegrass. The associated herb cover consists of halophytes, including saltbush, alkali heath, alkali weed, alkali mallow, and common spikeweed. Alkali meadow (alkali grassland) community type is considered a significant natural community by the California Natural Diversity Database (CNDDB) because of its

rarity and the pressing threats to the remnant communities from land use conversion, invasive species, and changes in hydrologic regime within the watershed. Focal plant species that may be found in this land cover type include San Joaquin spearscale, recurved larkspur, Congdon's tarplant, palmate-bracted bird's-beak, and Livermore Valley tarplant.

3.9.2 California Annual Grassland

California annual grassland occupies an estimated 180 acres of the SMP Area. This land cover type is found throughout the SMP Area.

California annual grassland is an herbaceous plant community dominated by nonnative annual grasses (Holland 1986; Sawyer and Keeler-Wolf 1995). In the project area, annual grassland was mapped where grasses and forbs dominate the land cover and where trees and shrubs comprise less than 10% canopy cover. The dominant species are mostly nonnative grasses from the Mediterranean basin, such as soft chess, red brome, wild oats, ripgut brome, and rat-tail fescue). In the spring, many of the annual grasslands are interspersed with a variety of native wildflowers typical of the inner Coast Ranges. Commonly found species of wildflowers in these grasslands include lupine, fiddleneck, popcornflower, California poppy, owl's clover, and clarkia (Jones & Stokes 2003). In some areas, nonnative weedy vegetation, such as thistles, mustards, and a variety of other weedy forbs, are also common.

Focal plant species that may be found in this land cover type include big tarplant and Congdon's tarplant. Focal wildlife species that could occur in California annual grasslands include San Joaquin kit fox, western burrowing owl, California red-legged frog, California tiger salamander, golden eagle, tricolored blackbird, and American badger. Alameda whipsnake may use grasslands adjacent to chaparral or scrub for movement. California red-legged frog and California tiger salamander breed in aquatic habitats (e.g., ponds) within grasslands, and use grasslands as movement and underground refugia habitat. Grassland provides potential habitat in the project area for all life stages of the federally endangered Callippe silverspot butterfly. Several species of birds also use annual grasslands as important foraging habitat.

3.9.3 Mixed Evergreen Forest/Oak Woodland

Mixed evergreen forest/oak woodland occupies an estimated 11 acres of the total SMP Area. It is present in discontinuous areas in the southern half of the SMP Area. The largest contiguous stands are near Lake Del Valle, in the south-central part of the SMP Area.

Mixed evergreen forest/oak woodland is characterized by a diverse overstory often dominated by coast live oak. This land cover type contains a mix of co-dominant oaks such as coast live oak, blue oak, and valley oak. The canopy of this land cover type is generally more open and includes some deciduous species. In addition to the array of dominant oaks in this land cover type, a number of both broad-leafed evergreen and deciduous trees are present, including California bay, madrone, California buckeye, and black oak (Holland 1986; Sawyer and Keeler-Wolf 1995). Where shrubby, the understory consists of patches of toyon, poison-oak, and scrub oak. Where more open, the understory typically consists of annual grasses and shade-tolerant perennials, such as yerba santa and common snowberry.

There are no focal species specifically associated with mixed evergreen forest/oak woodland, but focal species typically associated with other habitat types that occur adjacent to the mixed evergreen forest/oak woodland could be found within mixed evergreen forest/oak woodland.

3.9.4 Mixed Willow Riparian Scrub

Mixed willow riparian scrub occupies an estimated 33 acres of the total SMP Area. Mixed willow riparian scrub occurs in and along the margins of the active channel on intermittent and perennial streams. In the SMP Area, the most contiguous reach of willow riparian forest and scrub occurs along Arroyo Mocho and along Arroyo del Valle as it passes through Livermore.

In the east Bay Area, streamside habitat dominated by shrubby willows is classified as Central Coast Riparian Scrub (Holland 1986). Although red willow and arroyo willow remain the most common dominant canopy species in this habitat, the name of the land cover has been changed to mixed riparian forest and scrub to better reflect the conditions within the SMP Area. Understory development in willow scrub or forest land cover types is dictated by canopy density. Where the canopy is more open and dominated by trees or scattered willow scrub, an understory of shrubs and herbs is present.

A range of conditions exists among the mixed willow riparian scrub community. Yellow willow, red willow, arroyo willow, and narrowleaf willow are the dominant canopy species in this habitat. Scrub communities typically consist of scattered willows and mule fat occurring in and along the margins of open sandy washes. Understory development in this land cover type is controlled by canopy density.

California red-legged frog and foothill-yellow legged frog utilize this land cover year-round for breeding and movement, though some of the stream course that pass through urban areas are less suitable. Alameda whipsnake uses riparian forest and scrub habitats for movement during dispersal. No covered plants are strictly associated with riparian forest and scrub land cover types. Riparian corridors in general are important as movement habitat for nearly all terrestrial species. These communities serve to connect the landscape as they move through other land cover types.

3.9.5 Mixed Riparian Forest and Woodland

Mixed riparian forest and woodland occupies approximately 171 acres of the total SMP Area. Mixed riparian forest and woodland is found in association with streams throughout the SMP Area. Stands of this land cover include sections of Arroyo Los Positas and Arroyo Mocho as they pass through Livermore.

Mixed riparian forest and woodland land cover types are similar to willow riparian forests and woodlands in species occurrences. They are found in and along the margins of the active channel on intermittent and perennial streams. Generally, no single species dominates the canopy, and composition varies with elevation, aspect, hydrology, and creek or channel type. The major canopy species throughout the SMP Area are California sycamore, valley oak, coast live oak, red willow, and California bay. Associated trees and shrubs include California black walnut, other species of willow, California buckeye, Fremont cottonwood, and bigleaf maple.

Focal species associated with this land cover type are the same as mixed willow riparian scrub.

3.9.6 Sycamore Alluvial Woodland

Sycamore alluvial woodland is a sensitive natural community and was mapped on 68 acres of the SMP Area. In the SMP Area, this land cover type occurs entirely within the Arroyo del Valle stream reach.

Sycamore alluvial woodland was readily identified by the large, well-spaced sycamore crowns. In early winter aerial imagery, the large pale branches and halo of fallen golden-yellow leaves were visible. The landscape position, on broad alluvial valley floors, was also indicative of this land cover type.

The sycamore alluvial woodland land cover type is generally present on broad floodplains and terraces along low gradient streams with deep alluvium. Areas mapped as sycamore alluvial woodland are generally open canopy woodlands dominated by California sycamore, often with white alder and willows (*Salix* spp.). Other associated species include bigleaf maple, valley oak, coast live oak, and California bay.

The understory is disturbed by winter flows, and herbaceous vegetation is typically sparse or patchy. Typically, plants such as willows, coyote brush, mule fat, California buckeye, blackberry, Italian thistle, poison-oak, common chickweed and bedstraw populate the streambanks.

Although it occurs along streams, sycamore alluvial woodland undergoes extreme variation in water availability. During the rainy season, the stream channel and adjacent terraces are subject to flooding. During the summer drought, the streams are generally dry, and little moisture is available in the stony substrate. The alluvial substrate contains little soil and is nutrient poor. Flooding also subjects sycamore alluvial forest to frequent disturbance. However, this disturbance appears to benefit regeneration of western sycamores. Regeneration from seed appears to occur in pulses correlated with large flood events (Shanfield 1984). Trees that are damaged by flooding can also resprout from the roots and trunk (Shanfield 1984). Anthracnose, a fungal disease, can defoliate the trees in springtime (Holstein 1984). Heavy cattle grazing may inhibit recruitment of sycamore seedlings, although recruitment may occur under light grazing in favorable (wet) years (Smith 1998).

Focal species that may occur in sycamore alluvial woodland include California red-legged frog, western pond turtle, and American badger. California red-legged frog and western pond turtle breed and typically forage in aquatic habitats (e.g., streams) within sycamore alluvial woodland, and use sycamore alluvial woodland as movement and underground refugia habitat. Sycamore alluvial woodland provides potential movement habitat and, where gopher or ground squirrel colonies exist, foraging habitat in the SMP Area for American badger. Several species of birds also use sycamore alluvial woodlands as important foraging and nesting habitat.

3.9.7 Valley Sink Scrub

Valley sink scrub, also known as alkali sink scrub, was mapped on 20 acres of the SMP Area. It generally occurs in the northern half of the SMP Area, most notably in the Springtown Alkali Sink and adjacent to Frick Lake just northeast of Livermore. Valley sink scrub could also occur in any of the locations mapped as alkali meadow and scald, and the land cover should be mapped at the parcel scale during project review.

This community develops where clay-rich alkaline soils are seasonally saturated because of a shallow water table, low surface runoff, and slow infiltration (Bittman 1985). Valley sink scrub is rare compared with its historical extent, and most of the remaining occurrences are highly degraded (U.S. Fish and Wildlife Service 1998). This habitat is considered sensitive by CDFW (California Natural Diversity Database 2009).

Valley sink scrub is dominated by a discontinuous shrub layer of iodine bush and alkali seepweed. The herbaceous layer consists of a patchwork of barren, salt-encrusted scalds and alkali grassland vegetation. Focal plant species that may occur in valley sink scrub include San Joaquin spearscale, palmate-bracted bird's beak, and Livermore Valley tarplant. Focal wildlife species that may occur or are known to occur in valley sink scrub include San Joaquin kit fox and western burrowing owl. California red-legged frogs and California tiger salamanders may use valley sink scrub for upland habitat or as habitat or for movement corridors.

3.9.8 Alkali Wetland

Within the SMP Area, alkali wetlands occupy an estimated 14 acres of the total SMP Area. These wetlands occur primarily in the northern half of the SMP Area, particularly along creeks and channels where alkali soils occur. A larger alkali wetland complex occurs in the Springtown Alkali Sink, north of Livermore. Alkali wetlands support ponded or saturated soil conditions and occur as perennial or seasonally wet features on alkali soils. Alkali wetlands were mapped where wetlands occurred in association with alkali soils.

The vegetation of alkali wetlands is composed of halophytic plant species adapted to both wetland conditions and high salinity levels. Typical species include those common to both seasonal and alkali wetlands, such as salt grass, alkali heath, and common spikeweed.

Alkali wetlands provide function and value for wildlife similar to those provided by seasonal wetlands. The array of wildlife species found in seasonal wetlands is also found in alkali wetlands. See the section below on the Springtown Alkali Sink for more details.

3.9.8.1 Springtown Alkali Sink

The Springtown Alkali Sink is a biologically unique area that supports several state- and federally listed plant and wildlife species (Kohlmann et al. 2008). It encompasses approximately 1,150 acres at the northern edge of the city of Livermore and adjacent Alameda County. The sink is a topographic depression in which salts have concentrated; these salts, and the unique and complex surface and groundwater hydrology of the region, support an unusually high diversity and density of sensitive biotic communities and focal species.

Boundary of the Sink

Historically, Springtown Alkali Sink occupied an irregularly shaped area of more than 3,000 acres. The historical boundaries of the sink can be determined through historical aerial photos and the extent of the saline-alkaline soils (Soil Conservation Service 1966; Coats et al. 1988). The sink formerly extended west to the intersection of Hartford Avenue and North Livermore Avenue, east to Frick Lake, south almost to I-580, and north almost to the "May School Road" line (a line formed by extending May School Road to the east).

The extent of the sink has been greatly reduced by residential development in the south and agricultural operations in the north. High-quality habitats are currently found in two disjunct areas on either side of Vasco Road. This boundary is based largely on the extent of saline-alkaline soils of the Pescadero and Solano soil series, which indicates the historical extent of the sink. The larger of the two areas of the sink stretches from Ames Road in the east to North Livermore Avenue in the west. This area also includes a small watershed upstream of the intersection of Raymond Road and Ames Street that contains saline-alkaline soils and focal species, and supports the hydrology of the sink. East of Vasco Road, the sink includes a high density of wetlands and focal species, and the saline-alkaline soils along Brushy Peal Tributary. The most prominent feature in this area is Frick Lake, the only large saline vernal pool known to exist in the county.

Hydrology of the Sink

The sink is influenced by both surface and groundwater flows into the basin from fresh and saline sources. Surface flows to the sink come from seven south- and southwest-draining subbasins (Jones & Stokes 2003). The largest subbasins are those containing Brushy Peak Tributary and Altamont Creek; these contribute saline-alkaline flows from the east and northeast. The remaining six subbasins are considerably smaller than the Brushy Peak–Altamont Creek subbasin. In the past, the Brushy Peak–Altamont Creek subbasin contributed by far the largest proportion of surface water and groundwater entering the sink's wetland and saline-alkaline habitats (Coats et al. 1988; Phillip Williams & Associates 1988; Questa Engineering Corporation 1998). Because of significant modifications to Altamont Creek and grading related to residential development, a greater proportion of the surface water and groundwater entering the sink's lowland habitats now comes from subbasins to the north and northwest, particularly the subbasin that contains North Livermore Avenue (Questa Engineering Corporation 1998).

At present, the most prominent hydrologic feature in the sink is Frick Lake, located in the area's northeastern corner. Frick Lake is a seasonally ponded basin that covers about 24 acres at high water. The lake is primarily fed by incidental precipitation and by runoff from rangelands to the east. Minor amounts of runoff also enter the lake from the north and south. Vegetation surrounding the lake suggests that its water is saline. Neither the chemistry nor the origin of the lake has been studied to date. Frick Lake may have formed as uplift along the Greenville Fault blocked westward-flowing drainages at the rangefront, pooling water behind a local topographic high; although Laughlin Road follows the west margin of the lake, it was likely built on an existing elevated surface and does not appear to confine the lake.

The sink also contains a high density of seasonal wetlands and vernal pools. These pools fill with water in the winter and slowly dry during spring. The pools are formed in depressions within a mosaic of "hogwallow" or "mima mound" topography. The pools are fed by surface runoff in the complex microtopography and small channels that wind through the sink. These pools support a high diversity of aquatic and semi aquatic organisms, as described below.

The sink also receives significant influx of salts and flows just below the surface in a shallow groundwater layer. This shallow layer occurs from the surface to between 6 and 10 feet deep, above a semi-confining claypan/hardpan (Phillip Williams & Associates 1988; Questa Engineering Corporation 1998). Near the surface, groundwater flows into the sink through buried channels that may have been historical creeks. These subsurface channels enter the sink from the northwest, north, and northeast. Although not well studied, they appear to extend as far west as North Livermore Avenue, as far north as Manning Road, and as far east as Laughlin Road (Questa

Engineering Corporation 1998). These subsurface channels appear to play a major role in water budget and salt balance of the sink (Lamphier & Associates and SWA Group 2000), and point to the importance of preserving the groundwater hydrology within the larger watersheds of the sink.

Biotic Communities of the Sink

Biotic communities within the sink consist of valley sink scrub, alkali grassland, and California annual grassland. All three of those land cover types are described above.

Focal Species of the Sink

The sink is unique, in part, because of its concentration of focal species. Probably the most unique of these species is palmate-bracted bird's beak, listed as endangered under the ESA and CESA. Other special-status plant species that occur in the sink include brittlescale, San Joaquin spearscale, hispid bird's-beak, and Livermore Valley tarplant. Special-status wildlife species known to occur in the sink include California red-legged frog, California tiger salamander, vernal pool fairy shrimp, and western burrowing owl. San Joaquin kit fox may occasionally use the eastern portion of the sink.

3.9.9 Perennial Freshwater Marsh

Within the SMP Area, perennial freshwater marsh occupies an estimated 11 acres of the total SMP Area. Perennial freshwater marsh is likely to have been underestimated in the EACCS land cover mapping due to the small size of these features and the difficulty of distinguishing marsh from the surrounding grassland on the spring aerial photos. Some perennial freshwater marsh is also difficult to distinguish from seasonal wetland during winter.

Perennial freshwater marsh is dominated by emergent herbaceous plants (reeds, sedges, grasses) with either intermittent flooded or perennially saturated soils. Freshwater marshes are found throughout the coastal drainages of California wherever water slows down and accumulates, even on a temporary or seasonal basis. A freshwater marsh usually features shallow water that is often clogged with dense masses of vegetation, resulting in deep peaty soils. Plant species common to coastal and valley freshwater marsh predominantly consist of cattails, bulrushes, sedges, and rushes. Dominant species in perennial freshwater wetland in the SMP Area include rabbitsfoot grass, nutsedge, willow weed, and watercress. Dominant species in non-tidal freshwater marsh are narrow-leaved cattail, rice cutgrass, bur-reed, alkali bulrush, and perennial peppergrass.

Focal species that may be found breeding in the perennial freshwater marsh land cover type include tricolored blackbird and California red-legged frog.

3.9.10 Seasonal Wetland

Within the SMP Area, seasonal wetlands occupy an estimated 22 acres of the total SMP Area. Seasonal wetlands occur in association with riparian land cover along Arroyo Las Positas. This land cover type often occurs adjacent to alkali wetland. These two land cover types were differentiated based on the underlying soils in the EACCS land cover mapping. Seasonal wetlands are likely underrepresented in the land cover map because of their typically small size and isolated locations, and difficulty in interpreting the photographic signature of individual features. However, large seasonal wetland complexes (i.e., groups of many small pools or wetlands) were easily visible on aerial photos.

Seasonal wetlands are freshwater wetlands that support ponded or saturated soil conditions during winter and spring and are dry through the summer and fall until the first substantial rainfall. The vegetation is composed of wetland generalists, such as hyssop loosestrife, cocklebur, and Italian ryegrass that typically occur in frequently disturbed sites, such as along streams. Common species in seasonal wetlands within the SMP Area include watercress, water speedwell, and smartweeds (Jones & Stokes 2001).

3.9.11 Pond

Ponds occupy approximately 2 acres of the SMP Area. Ponds are important habitat networks that facilitate species movement and increase breeding diversity.

Ponds are small perennial or seasonal water bodies with little or no vegetation. If vegetation is present, it is typically submerged or floating. Ponds may occur naturally or may be created or expanded for livestock use (stock ponds).

The majority of the ponds in the SMP Area are most often stock ponds that provide water to grazing livestock. Lands historically used for grazing, but currently protected as open space, also contain historical stock ponds in disrepair that may be a result of not using grazing as a management tool. Plants often associated with ponds include floating plants such as duckweed (*Lemna* spp.) or rooted plants such as cattails, bulrushes, sedges, rushes, watercress, and water primrose. Stock ponds are often surrounded by pasture with grazing livestock. Immediately adjacent to the stock pond, soil may be exposed due to the continued presence of livestock. Stock ponds without grazing may be overgrown and surrounded by wetland vegetation including willows, cattails, reeds, bulrushes, sedges, and tules, thus reducing habitat value for wildlife.

Focal species that use ponds during all or part of the year include California tiger salamander, California red-legged frog, and tricolored blackbird. These species rely on ponds and browsing animals for breeding sites. No focal plants are associated with ponds.

3.9.12 Riverine Stream

There are approximately 43 linear miles and 41 acres of streams within the SMP Area. Major streams in the SMP Area include Arroyo del Valle, Arroyo Mocho and Arroyo Las Positas, and Altamont Creek. Streams can be unvegetated along their banks or support various types of riparian vegetation. Streams that support riparian vegetation were categorized into one of the three riparian land cover types. For a complete picture of the extent of streams in the SMP Area the stream and riparian land covers should be considered together.

The stream land cover type includes perennial, intermittent, and ephemeral watercourses characterized by a defined bed and bank. Perennial streams support flowing water year-round in normal rainfall years. These streams are often marked on USGS quadrangle maps with a blue line, and are known as blue-line streams. In the semiarid Mediterranean climate of the SMP Area with its wet and dry seasons, perennial streamflows are enhanced in the dry season through groundwater aquifer contributions, flows from shallower springs/seeps, and reservoir releases. Intermittent (seasonal) streams carry water though most of the wet season (November–April) and are dry through most or all of the dry season (May–October) in a normal rainfall year. More specifically, in the wet season, intermittent streamflow occurs when the water table is raised, or rejuvenated, following early season rains that fill shallow subsurface aquifers. Intermittent flows can also be

considered as the baseflows between storm events that continue on through much of the winter season. Ephemeral streams carry water only during or immediately following a rainfall event. All streams are jurisdictional if they have a defined bed and bank (refer to regulatory descriptions in Chapter 2).

The creek or channel land cover type is most closely associated with riparian plants (see the "Riparian Forest and Scrub" section above for discussion of riparian land cover types). The riparian plant composition and width of the riparian corridor vary depending on channel slope, magnitude and frequency of channel and overbank flows, and the frequency/duration of flooding flows that inundate the broader floodplain. Willows may become established in-channel in areas of sediment deposition, unless suppressed by intensive grazing. Woody debris, such as fallen trees that are submerged in streams, provides good habitat and shelter for fish and aquatic invertebrates.

Stream systems provide habitat for aquatic macroinvertebrates, which are an important food source for local and downstream populations of fish, birds, and other animals. Further downstream outside of the SMP Area, below the flood control drop structure (Bay Area Rapid Transit weir) adjacent to the Quarry Lakes Regional Recreation Area, central California coast steelhead and Central Valley fall-run Chinook salmon have been observed. Central California coast steelhead use streams with suitable depths, velocities, and temperatures for juvenile rearing and feeding. Juvenile Central Valley fall-run Chinook salmon use the margins of rivers and streams after emerging from gravels to feed. They also use overhanging vegetation and substrate for cover. Focal species that rely on stream land cover include California red-legged frog, foothill yellow-legged frog, and tricolored blackbird. Alameda whipsnake and San Joaquin kit fox could use the riparian corridors adjacent to stream habitats for movement corridors.

3.9.13 Vineyard

Vineyards occupy 1 acre of the SMP Area. Vineyards are mostly located south of Livermore, though some vineyard development is also starting north of Livermore. Vineyard development in natural habitats substantially degrades wildlife habitat. Some focal species are sometimes observed in vineyards (e.g., foraging and movement). In some areas, nonnative weedy vegetation, such as thistles, mustards, and a variety of other weedy forbs, may be found.

3.9.14 Cropland

Cropland is the most common of the farmland land cover types in the low-lying areas of the SMP Area, occupying 12 acres. Croplands are abundant throughout the Livermore Valley north and south of the city of Livermore.

Row-crops are those areas tilled and cultivated for agricultural crops such as corn, grain, strawberries, peppers, and pumpkins. These row-crops can also be converted to other agricultural uses. *Fallow fields* include fields that were not in production at the time of aerial photos, but may be utilized for grain, row-crops, and hay and pasture in subsequent years.

Hay and *pasture* include both dryland settings and irrigated areas. The key difference between hay production and pasture is that crops are harvested onsite and consumed offsite (hay is also cut, bailed, and trucked offsite), whereas pasture is consumed by livestock onsite. Common vegetation includes fast-growing forage grasses, such as wild oats and Italian ryegrass, as well as irrigated

legumes such as alfalfa, sweet clover, and true clover. In some areas, nonnative weedy vegetation, such as thistles, mustards, and a variety of other weedy forbs, are also common.

Focal species expected to be found in this land cover type are tricolored blackbird, western burrowing owl, Callippe silverspot butterfly, and golden eagle, all of which forage in grain crops and pastures. Western burrowing owls may also breed in agricultural settings if ground squirrel burrows are present. San Joaquin kit fox may move through this land cover type if it occurs near suitable grassland areas. California tiger salamander and California red-legged frog disperse through croplands to reach suitable breeding and upland habitat.

3.9.15 Ruderal

This land cover type occupies 19 acres in the SMP Area and generally occurs on the edges of or within developed areas. Areas mapped as ruderal are disturbed areas characterized by sparse nonnative, typically weedy vegetation. Most ruderal areas are vacant parcels surrounded by developed areas. Some areas mapped as ruderal may actually be cropland that has been left fallow for a year or more. Ruderal areas that have not experienced substantial disturbance (e.g., disking) for a number of years may develop into annual grasslands.

Where vegetation is present, ruderal land cover is dominated by a mixture of nonnative annual grasses and weedy species, such as black mustard, thistles, and wild radish, that tend to colonize quickly after disturbance. Wildlife common to ruderal habitats can include species closely associated with urban development, such as house sparrow, European starling, rock dove, western scrub-jay, black-tailed jackrabbit, raccoon, opossum, striped skunk, and house mouse. Focal species such as the western burrowing owl often use ruderal habitats in the Bay Area for both nesting and overwintering habitat. However, ruderal habitats frequently become overgrown with vegetation, which becomes fire-prone, dense, matted, and uninhabitable for wildlife species.

3.9.16 Golf Course/Urban Park

Urban parks and golf courses comprise23 acres of the SMP Area. Urban parks and golf courses are located throughout the urbanized areas of the SMP Area.

Golf courses and urban parks are composed predominantly of nonnative vegetation and provide limited habitat for native wildlife. Urban parks are unlikely to support any focal species. Golf courses on the fringe of urban areas may support California tiger salamander, California red-legged frog, western burrowing owl, or tricolored blackbird, particularly if ponds are present on or near the golf course; however, habitat quality in and around golf courses is typically of lower quality because golf course apply fertilizers and other chemical treatments that may run off into waterways and onto adjacent lands during rain events.

3.9.17 Urban-Suburban

Urban-suburban areas comprise 145 acres of the SMP Area. The urban-suburban land cover comprises areas where the native vegetation has been cleared for residential, commercial, industrial, transportation, or recreational structures, and is defined as one or more structures per 2.5 acres. These include areas that have structures, paved and impermeable surfaces, horticultural plantings, and lawns smaller than 10 acres (irrigated lawns larger than 10 acres were mapped as urban parks).

Vegetation found in the urban-suburban land cover type is usually in the form of landscaped residences, planted street trees (i.e., elm, ash, liquidambar, pine, palm), and parklands. Most of the vegetation is composed of nonnative or cultivated plant species.

It is less likely that focal species would be found in urban-suburban areas. The exception would be western burrowing owl, which sometimes thrives in suburban areas that have been cleared for development (prior to development occurring). In addition, the alkali wetlands that occur in north Livermore (adjacent to urban development) support may alkali wetland species, including the palmate-bracted bird's beak.

3.9.18 Rural Residential

Rural residential areas comprise 6 acres of the SMP Area. Rural residential areas are mainly located in the foothills that surround the City.

The rural residential land cover type is similar to the urban-suburban type except that it is typically much less dense (defined as less than one structure per 2.5 acres) and usually contains extensive landscaping and/or irrigated lands (including small areas of pasture).

Several covered species may be found in rural residential areas. Mobile species such as golden eagle, western burrowing owl, tricolored blackbird, San Joaquin kit fox, or American badger may move through rural residential land cover if it occurs adjacent to or near natural habitat. Similarly, California tiger salamander may utilize areas that have open grasslands and are near suitable breeding sites. Callippe silverspot butterfly will move through rural residential areas to disperse between patches of grassland.

3.10 Focal Plants and Wildlife

To address potential impacts to special-status plants and wildlife, the SMP utilizes much of the work completed for EACCS, including that plan's focal species list which identifies listed and sensitive species that occur in east Alameda County. Many of these species may be affected by stream maintenance activities in the SMP Area. The potential for occurrence of focal species within or adjacent to SMP Area creeks and channels as described in this SMP manual was based on the results of research, observations, and habitat distribution modeling completed for EACCS, as well as incorporating new species occurrence records from the California Natural Diversity Database (CNDDB) maintained by CDFW.

The following species accounts summarize listing status, distribution in the study area, ecological information, and threats in the study area and the region. The accounts represent the best available scientific data for each species. The species accounts are not intended to summarize all biological information known about a species. Rather, each account summarizes scientific information that is relevant to the species in the study area.

The EACCS habitat distribution models were developed for select focal species to predict where in the study area species are more likely to occur based on known habitat requirements. Habitat distribution models were developed on a regional scale using regional data. The models were intended for use in regional planning and do not necessarily provide accurate site-specific species information. Site-specific conditions will be field-verified as part of the SMP annual work plan prior to completion of maintenance activities.

The list of EACCS focal species includes 13 fish and wildlife and six plant species. Of the focal species addressed by EACCS, three fish and wildlife and two plant species were initially considered for inclusion in the SMP, but were later omitted as the SMP was refined due to either a) a lack of suitable habitat within identified maintenance areas; or b) the ability of the maintenance activities to be planned and implemented in a manner that avoids potential effects to focal species. Species omitted included the following:

- Foothill yellow-legged frog (*Rana boylii*)
- Alameda whipsnake (*Masticophis lateralis euryxanthus*)
- Central California coastal steelhead (*Oncorhynchus mykiss*)
- Big tarplant (*Blepharizonia plumose*)
- Recurved larkspur (*Delphinium recurvatum*)

3.10.1 Focal Plants

3.10.1.1 San Joaquin Spearscale (*Atriplex joaquiniana*)

San Joaquin spearscale is a California Native Plant Society (CNPS) List 1B.2 species, considered fairly endangered in California.

Distribution

San Joaquin spearscale occurs along the western side of the Great Valley from Glenn County to Merced County and in the small valleys of the inner Coast Ranges, including the Livermore Valley. It occurs in the broad flood basins of the valley floor and on alluvial fans associated with the major streams draining from the inner Coast Ranges foothills. It is generally found at low elevations, but has been collected up to 1,055 feet above sea level (ICF International 2010).

Ecology

San Joaquin spearscale typically occurs in alkali grassland and alkali meadow, or on the margins of alkali scrub. It blooms from April through October and occurs on clay soils, often in areas of high alkalinity.

Threats

The principal threat to San Joaquin spearscale has been the historic conversion of much of the alkali grassland to agriculture. Present threats include habitat conversion to urban use, overgrazing, invasive annual species, and impacts associated with road and utility line construction and maintenance (ICF International 2010).

Occurrence in the Planning Area

There are 16 documented occurrences of San Joaquin spearscale in eastern Alameda County (California Natural Diversity Database 2015). All are presumed extant and occur north of I-580. These documented populations range in size from several hundred individual plants to several thousand. Potentially suitable habitat for this species in the Planning Area includes portions of

Arroyo Las Positas and Altamont Creek in the northeast end of the City, and near the confluence of Arroyo Las Positas and Cayetano Creek.

Stream Maintenance Considerations

Based on habitat quality and the SMP's proximity to extant occurrences, potential for occurrence of San Joaquin spearscale is possible but considered low. Given the limited extent of potentially suitable habitat within the SMP area, it is not likely that program-related activities will impact habitat for this species. Surveys for this species will occur in appropriate habitats as part of the site reconnaissance during annual work plan development to determine presence or absence.

3.10.1.2 Congdon's Tarplant (*Centromadia parryi* ssp. *congdonii*)

Congdon's tarplant is a CNPS List 1B.2 species that is considered fairly endangered in California.

Distribution

Congdon's tarplant is known from East San Francisco Bay Area, Salinas Valley, and Los Osos Valley.

Ecology

Congdon's tarplant blooms from May through October and occurs in annual grassland on lower slopes, flats, and swales below 800 feet. This species can be associated with alkaline or saline soils. Hybridization with the subspecies *Centromadia parryi* ssp. *rudis* was reported on 1998 survey forms for the North Livermore Road population (ICF International 2010).

Threats

The species is severely threatened by development in most areas, including road widening that accompany development. In other more natural settings mowing or heavy grazing can impact this species, though it has been documented in areas where both mowing and grazing occur. The biggest threat is the loss of natural disturbance in areas where natural processes are restricted. This allows annual invasive species to outcompete this species (ICF International 2010).

Occurrence in the Planning Area

This species has been documented in grassland communities north of Highway 580 within east Alameda County and there are 15 CNDDB occurrences within the SMP Area (California Natural Diversity Database 2015). Within the Planning Area, potentially suitable habitat for this species occurs in the vicinity of the Cottonwood Creek and Collier Canyon Creek.

Stream Maintenance Considerations

Based on habitat quality and the SMP's proximity to extant occurrences, potential for occurrence of Congdon's tarplant is possible but considered low. Given the limited extent of potentially suitable habitat within the SMP area, it is not likely that program-related activities will impact habitat for this species. Surveys for this species will occur in appropriate habitats as part of the site reconnaissance during annual work plan development to determine presence or absence.

3.10.1.3 Palmate-bracted bird's-beak (*Cordylanthus palmatus*)

The Palmate-bracted bird's-beak is state and federally endangered.

Distribution

Palmate-bracted bird's-beak is known from scattered locations in the Central Valley from Colusa County to Fresno County. There is a lone population in the Springtown Preserve north of Livermore (ICF International 2010).

Ecology

Palmate-bracted bird's-beak is associated with alkaline sites in grassland and chenopod scrub from 10–500 feet elevation. This species blooms from May through October. Seeds are dispersed by water, making the local hydrology very important to the extent of a population (ICF International 2010).

Threats

Palmate-bracted bird's-beak is listed as endangered both at the federal and state level. It is a CNPS List 1B.1 species and is seriously endangered in California. This species is threatened by agriculture, grazing, urbanization and development, unauthorized off-road vehicle use, and altered hydrology. Non-native annual grasses are becoming a threat to this species. Targeted grazing programs or other forms of non-native grass control may be beneficial at abating this threat (ICF International 2010).

Occurrence in the Planning Area

One occurrence of Palmate-bracted bird's-beak has been reported, located northeast of Livermore in the Springtown Preserve. This population has been surveyed repeatedly over the last 20 years. The population has varied in size from 9,000 plants in 1990 to nearly 53,000 in 1997 (California Natural Diversity Database 2015). Potentially suitable habitat for this species occurs along Altamont Creek at its confluence with Arroyo Las Positas.

Stream Maintenance Considerations

Based on habitat quality and the SMP's proximity to extant occurrences, potential for occurrence of Palmate-bracted bird's-beak is possible but considered low. Given the limited extent of potentially suitable habitat within the SMP area, it is not likely that program-related activities will impact habitat for this species. Surveys for this species will occur in appropriate habitats as part of the site reconnaissance during annual work plan development to determine presence or absence.

3.10.1.4 Livermore tarplant (*Deinandra bacigalupii*)

This species is a CNPS List 1B.2 species and is considered fairly endangered in California.

Distribution

Livermore tarplant is endemic to California and know from three occurrences, all near Livermore, Alameda County.

Ecology

Livermore tarplant blooms from June through October and occurs in seeps and meadows, often associated with alkali meadows at 500–600 feet in elevation (ICF International 2010).

Threats

This species is threatened by development including road widening that could occur as the result of development pressure (ICF International 2010).

Occurrence in the Planning Area

This species has not been identified within the Planning Area; however, three occurrences are located northeast of Livermore in the foothills of the Diablo Range. Two of those populations are located just south of I-580 between the junction of Greenville Road and Las Positas Road and Hawthorne Road. These two populations are just east of Greenville Road. The third population is located near the intersection of Ames Street and Raymond Road north of Livermore (California Natural Diversity Database 2015).

Stream Maintenance Considerations

Based on habitat quality and the SMP's proximity to extant occurrences, potential for occurrence of Livermore tarplant is possible but considered low. Given the limited extent of potentially suitable habitat within the SMP area, it is not likely that program-related activities will impact habitat for this species. Surveys for this species will occur in appropriate habitats as part of the site reconnaissance during annual work plan development to determine presence or absence.

3.10.2 Focal Wildlife

3.10.2.1 Longhorn Fairy Shrimp (*Branchinecta longiantenna*)

The fairy shrimp is a federally listed as endangered and is extremely rare.

Distribution

The longhorn is known to occur in alkali sink and scrub plant communities. The four known populations of longhorn fairy shrimp include areas within the Carrizo Plain National Monument, San Luis Obispo County; areas within San Luis National Wildlife Refuge Complex; areas within the Brushy Peak Regional Preserve, Alameda County, and areas within the Vasco Caves Preserve, near the town of Byron in Contra Costa County. Three of the four populations are found within public lands that are protected and managed for vernal pool species. The Livermore Vernal Pool Region is listed as a core recovery area (ICF International 2010).

Ecology

Longhorn fairy shrimp occurrences are rare and highly disjunct with specific pool characteristics largely unknown. Typical habitat for listed fairy shrimp in California include vernal pools, seasonally ponded areas within vernal swales, ephemeral freshwater habitats and artificial habitats (railroad toe-drains, roadside ditches, abandoned agricultural drains, ruts left by heavy construction vehicles, and depressions in firebreaks) (ICF International 2010).

Habitat for longhorn fairy shrimp in Alameda County is primarily in water pooled in sandstone depressions. Vernal pools in other parts of California that support these fairy shrimp are either loam or sandy loam or shallow, alkaline pools. The seasonal pool habitat is subject to seasonal variations, and it is thought that longhorn fairy shrimp are dependent on the ecological characteristics of those variations. These characteristics include duration of inundation and presence or absence of water at specific times of the year. The longhorn fairy shrimp is capable of living in vernal pools of relatively short duration (pond 6 to 7 weeks in winter and 3 weeks in spring) (ICF International 2010).

Longhorn fairy shrimp are omnivorous filter-feeders. They are a component of the planktonic crustacea within seasonal temporary pools and can occur in densities as high as 200 per liter of water (ICF International 2010).

Predator consumption of fairy shrimp cysts (resting eggs) aids in distributing populations. Predators expel viable cysts in their excrement, often at locations other than where they were consumed. If conditions are suitable, these transported cysts may hatch at the new location and potentially establish a new population. Cysts can also be transported in mud carried on the feet of animals, including livestock that may wade through their habitat. Beyond inundation of the habitat, the specific cues for hatching are largely unknown although temperature is believed to play a role. Longhorn fairy shrimp have been reported to co-occur with the vernal pool fairy shrimp (*Branchinecta lynchi*), throughout its range (ICF International 2010).

Threats

Longhorn fairy shrimp are threatened by the same activities as other vernal pool invertebrates. These threats include the conversion of vernal pool habitat to agricultural lands and urban development, and extinction due to the small and isolated nature of remaining populations. The limited and disjunct distribution of vernal pools, coupled with the even more limited distribution of the longhorn fairy shrimp, means that any reduction in vernal pool habitat could adversely affect this species (ICF International 2010).

Recolonization opportunities are diminished when physical barriers, such as development or lack of vernal pool habitat, isolate populations from one another or inhibit transport of cysts. Isolated populations could be more susceptible to inbreeding depression, which can result in local extinction or reduced fitness. However, this has never been demonstrated for branchiopod crustaceans (ICF International 2010).

Activities that alter the suitability of vernal pool habitat could impact the special-status crustaceans that depend on them. These activities include damaging the impermeable clay and /or hardpan layers of the habitat bottom, filling in the habitat, altering (e.g., through contaminants) or destroying the watershed that conveys overland flow into the habitat. Additionally, introduction of non-native plants, destruction or degradation of the surrounding upland habitat, introduction of fish (such as *Gambusia* spp.) into special-status shrimp habitats, and activities that would discourage or prevent waterfowl and waders from feeding at occupied habitats and thereby restrict gene-flow between populations would also significantly affect longhorn fairy shrimp populations (ICF International 2010).

Occurrence in the Planning Area

The species is known to occur at the Brushy Peak Regional Preserve (ICF International 2010). Brushy Peak Regional Preserve is owned by the Livermore Area Recreation and Park District and

managed by East Bay Regional Park District (EBRPD). All of three of the known localities of this species in the study area are within this preserve, which is currently protected (California Natural Diversity Database 2015)). Within the Planning Area, potentially suitable habitat occurs north of Highway 580 along Arroyo Las Positas and Altamont Creek.

Stream Maintenance Considerations

Based on the limited known distribution of longhorn fairy shrimp in proximity to the SMP area, the potential for newly discovered occurrences is possible but considered low. Therefore, it is not likely that program-related activities will impact habitat for this species.

3.10.2.2 Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)

The vernal pool fairy shrimp is federally listed as threatened.

Distribution

The vernal pool fairy shrimp is found from southern Oregon to southern California, throughout the Central Valley, and west to the central Coast Ranges. Disjunct populations occur in San Luis Obispo County, Santa Barbara County, and Riverside County. This species has been observed in the eastern portions of Alameda County. In 1996, the U.S. Fish and Wildlife Service reported that there were 32 known populations of the vernal pool fairy shrimp (ICF International 2010).

The Livermore Vernal Pool Region straddles Alameda, Contra Costa, and Santa Clara Counties, extending into southwestern San Joaquin County. There are 12 occurrences of vernal pool fairy shrimp in the Livermore Vernal Pool Region: eight in the Altamont Hills core area, four of which are in areas planned for development. The core recovery area includes portions of Brushy Peak Regional Preserve, which is inside of the EACCS study area (ICF International 2010).

Ecology

This species is usually associated with vernal pools, but can also be found in association with other ephemeral habitats including alkali pools, seasonal drainages, stock ponds, vernal swales, rock outcrops and artificially created ephemeral habitats (railroad toe-drains, roadside ditches, abandoned agricultural drains, ruts left by heavy construction vehicles, and depressions in firebreaks) (ICF International 2010).

Vernal pools are subject to seasonal variations, and vernal pool fairy shrimp are dependent on the ecological characteristics of those variations. These characteristics include duration of inundation and presence or absence of water at specific times of the year. The vernal pool fairy shrimp is capable of living in Central Valley vernal pools of relatively short duration (pond 6 to 7 weeks in winter and 3 weeks in spring). Other factors contributing to the suitability of pools for vernal pool fairy shrimp include alkalinity 22 to 274 ppm (parts per million), total dissolved solids (TDS) (48 to 481 ppm), and pH (6.3 to 8.5). Water in pools occupied by vernal pool fairy shrimp typically has low conductivity and chloride. Vernal pool fairy shrimp have been found in pools ranging from 0.05 acre to 0.1 acre but occur more frequently in small, deep pools. Vernal pool fairy shrimp are omnivorous filter-feeders. Fairy shrimp indiscriminately filter particles from the surrounding water, including bacteria, unicellular algae, and micrometazoa (ICF International 2010).

Like the longhorn fairy shrimp, vernal pool fairy shrimp are a component of the planktonic crustacea within seasonal temporary pools and can occur in densities as high as 200 per liter of water. Predator consumption of fairy shrimp cysts (resting eggs) aids in distributing populations of fairy shrimp. Predators expel viable cysts in their excrement, often at locations other than where they were consumed. If conditions are suitable, these transported cysts may hatch at the new location and potentially establish a new population. Cysts can also be transported in mud carried on the feet of animals, including livestock that may wade through the habitat (ICF International 2010).

Beyond inundation of the habitat, the specific cues for hatching are unknown, although temperature is believed to play a large role. Typically, midvalley fairy shrimp mature in about 16 days when water temperatures reach at least 20 degrees Celsius (ICF International 2010).

Vernal pool fairy shrimp commonly co-occur with the California linderiella (*Linderiella occidentalis*) and has also been reported co-occurring with the midvalley pool fairy shrimp (*Branchinecta mesovallensis*). In most cases, the vernal pool fairy shrimp does not co-occur with other fairy shrimp species and is not numerically dominant when other fairy shrimp species are present (ICF International 2010).

Threats

Vernal pool fairy shrimp are threatened by the same activities as other vernal pool invertebrates. These threats include the conversion of vernal pool habitat to agricultural lands and urban development, and stochastic extinction because of the small and isolated nature of remaining populations. The limited and disjunct distribution of vernal pools, coupled with the even more limited distribution of the vernal pool fairy shrimp, means that any reduction in vernal pool habitat quantity could adversely affect this species (ICF International 2010).

Recolonization opportunities are diminished when physical barriers, such as development or lack of vernal pool habitat, isolate populations from one another or inhibit transport of cysts. Isolated populations could be more susceptible to inbreeding depression, which can result in local extinction or reduced fitness. However, this has never been demonstrated for branchiopod crustaceans (ICF International 2010).

Activities that alter the suitability of vernal pool habitat may impact the special-status crustaceans dependent on those habitats. These activities include damaging the impermeable clay and /or hardpan layers of the habitat bottom, filling in the habitat, and altering (e.g., through contaminants) or destroying the watershed that conveys overland flow into the habitat. Additionally, introduction of non-native plants, destruction or degradation of the surrounding upland habitat, introduction of fish (such as *Gambusia* spp.) into special-status shrimp habitats, and activities that would discourage or prevent waterfowl and waders from feeding at occupied habitats and thereby restrict gene flow between populations would also significantly affect mid-valley fairy shrimp populations (ICF International 2010).

Occurrence in the Planning Area

There are four CNDDB occurrence records for this species in the EACCS study area: at the Springtown Natural Communities Reserve near Livermore, in an alkali sink containing vernal pools; in a seasonal wetland with an annual grassland upland, north of Highway 580 near Livermore; south of Frick Lake, in a heavily grazed pasture; and north of the Brushy Peak Preserve in southeastern Contra Costa County (California Natural Diversity Database 2015) . Vernal pool fairy shrimp may

also be found elsewhere in vernal pool habitats. Within the Planning Area, potentially suitable habitat occurs north of Highway 580 along Arroyo Las Positas and Altamont Creek. Critical habitat has been designated along the northeast boundary of the City of Livermore.

Stream Maintenance Considerations

Based on the restriction of vernal pool fairy shrimp to vernal pools and other ephemeral habitats, the potential for newly discovered occurrences is possible but considered low. Therefore, it is not likely that program-related activities will impact habitat for this species.

3.10.2.3 Callippe Silverspot Butterfly (*Speyeria callippe callippe*)

The Callippe silverspot is federally listed as endangered.

Distribution

The Callippe silverspot is endemic to the San Francisco Bay area and is best known from San Bruno Mountain in San Mateo County. Historically, populations occurred on the west side of San Francisco Bay from Twin Peaks in San Francisco to the vicinity of La Honda in San Mateo County. In the East Bay, populations were known from northwestern Contra Costa County southward to the Castro Valley area of Alameda County. Additional populations of the species *S. callippe* occur in the Sky Valley-Lake Herman area of southern Solano County and in the north central and northeastern portions of Alameda County. Since 1988, callippe silverspot butterflies have been recorded at San Bruno Mountain and Sign Hill near South San Francisco (San Mateo County), in the hills near Pleasanton (Alameda County), at Sears Point (Sonoma County), and in the hills between Vallejo and Cordelia. Currently the only population known on the San Francisco Peninsula is at San Bruno Mountain, while populations in the East Bay are limited to southern Solano County and the Pleasanton-Sunol areas. A closely related subspecies, *S. callippe comstocki*, is difficult to distinguish from *S. callippe callippe* and is known to occur in the San Francisco Bay area. Critical habitat for the Callippe silverspot, designated July, 1978, does not occur in the Planning Area (78 CFR §28938–28945) (ICF International 2010).

Ecology

The Callippe silverspot butterfly occurs in grasslands where its sole larval food plant, johnny jump-up (*Viola pedunculata*), grows. It has been observed in both grazed and ungrazed grasslands. The Callippe silverspot butterfly occurs in hilly terrain with a mixture of topographic relief. Adults will visit the margins of oak woodlands and riparian areas in search of nectar, as well as disturbed areas if favored nectar plants grow there (ICF International 2010). The three primary habitat requirements of the callippe silverspot butterfly are:

- grasslands supporting its larval food plants;
- hilltops near suitable habitat for mate location; and
- nectar plants, which can occur in grasslands or nearby oak woodlands, riparian areas, or disturbed areas.

Because the butterfly has been observed flying distances of approximately 1 mile, these three habitat features do not necessarily have to be adjacent to each other (ICF International 2010).

The adult flight season is about 6 to 8 weeks in length, starting in mid-May and terminating in mid-July. When available, the adult silverspot feed on nectar plants including mints, especially *Monardella*, and thistles, such as *Silybum*, *Carduus*, and *Cirsium*, and buckeyes (*Aesculus*). Adults tend to congregate on hilltops, a behavior known as hilltopping, where they search for potential mates (ICF International 2010).

Because the leaves of *Viola pedunculata* are typically dry by the start of the adult flight season, females frequently lay their eggs in or near areas where *Viola* grows. For this reason, newly hatched larvae do not feed before they find a suitable diapause location. When *Viola* sprouts during the following winter, the larvae have to search for the food plant. Also, developing larvae usually feed at night, but crawl off of the food plant and hide nearby during the daytime. Thus, short distance dispersal, probably on the order of tens of feet, occurs routinely during the larval stage (ICF International 2010).

Threats

Loss and alteration of habitat, primarily through urbanization and habitat degradation by non-native plants, are some of the factors contributing to the decline of the callippe silverspot butterfly in the study area. Overgrazing can be detrimental, but properly managed grazing can enhance grassland habitat by preventing other species from outcompeting host plants. Increased frequency of fire may also be detrimental, but this impact would require further study. Other threats include trampling by hikers, bikers and equestrians. Dust from quarrying operations has been reported as a threat to the species, because abundant dust could clog the spiracles of larvae and adults, interfering with their respiration. Callippe silverspot butterflies are also very sensitive to pesticide use (ICF International 2010).

Occurrence in the Planning Area

There are no CNDDB occurrences in the Planning Area (California Natural Diversity Database 2015), but potentially suitable habitat occurs north of Highway 580, along Arroyo Las Positas, and along portions of Arroyo Seco.

Stream Maintenance Considerations

Program maintenance activities within creeks and channels is not expected to result in effects to Callippe silverspot butterflies because this is not their preferred habitat. Staging areas that occur in upland grasslands could potentially impact this species; however, the potential for occurrence is low due to a lack of recorded observations in east Alameda County. Potential occurrence is possible but considered low. Therefore, it is not likely that program-related activities will impact habitat for this species. Where appropriate, surveys for this species will occur as part of the site reconnaissance during annual work plan development to determine presence or absence.

3.10.2.4 California Tiger Salamander (*Ambystoma californiense*)

The California tiger salamander is divided into three distinct population segments (DPS) and each has a separate designation under the ESA. The Sonoma DPS and Santa Barbara DPS are listed as federally endangered. The Central California DPS (which overlaps with the study area) is federally threatened. The California tiger salamander is also state listed as threatened (ICF International 2010).

Distribution

The California tiger salamander is endemic to California. Historically, the California tiger salamander probably occurred in grassland habitats throughout much of the state. Although this species still occurs within much of its historic range, it has been extirpated from many areas it once occupied. The loss of California tiger salamander populations has been primarily due to habitat loss within their historic range (ICF International 2010).

Based on genetic analysis, there are six populations of California tiger salamanders, distributed as follows: (1) Santa Rosa area of Sonoma County, (2) Bay Area (central and southern Alameda, Santa Clara, western Stanislaus, western Merced, and the majority of San Benito counties), (3) Central Valley (Yolo, Sacramento, Solano, eastern Contra Costa, northeast Alameda, San Joaquin, Stanislaus, Merced, and northwestern Madera counties), (4) southern San Joaquin Valley (portions of Madera, central Fresno, and northern Tulare and Kings counties), (5) Central Coast range (southern Santa Cruz, Monterey, northern San Luis Obispo, and portions of western San Benito, Fresno, and Kern counties), and (6) Santa Barbara County (ICF International 2010).

Most populations occur at elevations below 1,500 feet, but California tiger salamanders have been recorded at elevations up to 3,660 feet. Although populations have declined, the species continues to breed at a large number of locations within its current range (59 FR § 18353–18354, April 18, 1994). At most historic breeding sites below 200 feet elevation, ponds remain present but are typically occupied by non-native species and no longer support California tiger salamanders (ICF International 2010).

Ecology

California tiger salamanders require two major habitat components: aquatic breeding sites and terrestrial upland sites. California tiger salamanders inhabit valley and foothill grasslands and the grassy understory of open woodlands, usually within one mile of water. Following metamorphosis California tiger salamanders are terrestrial animals that spend most of their time underground in subterranean refuge sites. Underground retreats are usually California ground squirrel (*Spermophilus beechyii*) or pocket gopher (*Thomomys bottae*) burrows and, occasionally, human-made structures. Adults emerge from underground to breed, but only for brief periods during the year. California tiger salamanders breed and lay their eggs primarily in vernal pools and other ephemeral ponds that fill in winter and often dry out by summer; they sometimes use permanent human-made ponds (e.g., stock ponds), reservoirs, and small lakes that do not support predatory fish or bullfrogs. Streams are rarely used for reproduction (ICF International 2010).

Adult salamanders migrate from upland habitats to aquatic breeding sites during the first major rainfall events of early winter and return to upland habitats after breeding. This species requires small-mammal burrows for cover during the non-breeding season and during migration to and from aquatic breeding sites. California tiger salamanders also use logs, piles of lumber, and shrink-swell cracks in the ground for cover. California tiger salamanders have been documented up to 1.3 miles from their breeding sites (ICF International 2010).

The California tiger salamander is particularly sensitive to the duration of ponding in aquatic breeding sites. Because at least 10 weeks are required to complete metamorphosis, aquatic sites that are considered suitable for breeding should retain water for a minimum of 10 weeks; these tend to be larger pools. Large vernal pool complexes, rather than isolated pools, probably offer the best

quality habitat; these areas can support a mixture of aquatic breeding sites and nearby upland refuge sites (ICF International 2010).

Aquatic larvae feed on algae, small crustaceans, and small mosquito larvae for about six weeks after hatching. Larger larvae feed on zooplankton, amphipods, mollusks, and smaller tadpoles of Pacific treefrogs (*Pseudacris regilla*), California red-legged frogs (*Rana draytoni*), western toads (*Bufo boreas*) and spadefoot toads (*Spea* spp.). Adults eat earthworms, snails, insects, fish, and small mammals (ICF International 2010).

Dispersal of juveniles from natal ponds to underground refuge sites could occur throughout the year. While juveniles will move short distances from breeding ponds once they start to dry up in the late spring and summer, longer distances from breeding ponds are attained during rainy periods (ICF International 2010).

California tiger salamander larvae and embryos are susceptible to predation by fish, herons and egrets, bullfrogs, and possibly garter snakes. Because of their secretive behavior and limited periods above ground, adult California tiger salamanders have few predators (ICF International 2010).

Threats

California tiger salamander populations have declined as a result of two primary factors: widespread habitat loss and habitat fragmentation. Residential development and land use changes in the California tiger salamander's range have removed or fragmented vernal pool complexes, eliminated refuge sites adjacent to breeding areas, and reduced habitat suitability for the species over much of the Central Valley. Grading activities have probably also eliminated large numbers of salamanders directly (ICF International 2010).

Non-native species (bullfrogs, Louisiana red swamp crayfish, and non-native fishes [mosquitofish, bass, and sunfish]) prey on tiger salamander larvae and may eliminate larval populations from breeding sites. Rodent control through destruction of burrows and release of toxic chemicals into burrows can cause direct mortality to individual salamanders and may result in a decrease of available habitat (ICF International 2010).

Vehicular-related mortality is an important threat to California tiger salamander populations. California tiger salamanders readily attempt to cross roads during migration, and roads that sustain heavy vehicle traffic or barriers that impede seasonal migrations may have impacted tiger salamander populations in some areas. Hybridization between California tiger salamander and an introduced congener, *A. tigrinum*, has been documented and may be extensive (ICF International 2010).

Occurrence in the Planning Area

There are 143 CNDDB occurrences of California tiger salamander within the SMP Area (California Natural Diversity Database 2015). Suitable upland habitat includes most undeveloped sites surrounding the urbanized City core. CNDDB occurrences have been documented along Arroyo Mocho, Arroyo Seco, Altamont Creek, Arroyo Las Positas, Cottonwood Creek, and Collier Canyon Creek (ICF International 2010); therefore, potentially suitable breeding habitat may occur in each of these creeks and channels. Critical habitat (Unit 18 – Doolan Canyon) occurs in the planning area near Collier Canyon Road.

Stream Maintenance Considerations

Since California tiger salamanders do not typically occur in stream channels, in-channel maintenance activities will have little direct effect on this species; however, road mortality of migrating California tiger salamanders can be a concern during winter rains. City maintenance activities are unlikely to affect salamanders because migration occurs mainly at night during rainfall and City crews typically work during daylight hours due to safety concerns.

During the dry season (summer months) California tiger salamanders are typically underground and may be affected by maintenance activities that result in ground disturbance (i.e., excavation, grading). If ground disturbance along the shoulders of access roads or creek/channel banks occurs, there is the potential for individuals to be crushed in burrows or excavated out of burrows. During any time of year excavation of ground squirrel or pocket gopher burrows could impact upland habitat for this species. As such, specific avoidance and minimization practices will be conducted during maintenance activities that could directly impact suitable subsurface habitat.

Scheduling ground disturbing maintenance activities outside of the rainy season, when possible, will reduce the chance of encountering above-ground California tiger salamanders. Additionally, avoidance of adjacent wetlands or temporary pools along roadways or along creeks and channels will reduce impacts on breeding California tiger salamanders.

3.10.2.5 California Red-legged Frog (*Rana draytonii*)

The California red-legged frog is federally listed as threatened and is a California species of special concern.

Distribution

The taxon is known from isolated locations in the Sierra Nevada, North Coast, and northern Transverse Ranges. It is relatively common in the San Francisco Bay area and along the central coast. The California red-legged frog is believed to be extirpated from the floor of the Central Valley. California red-legged frogs occupy many areas of suitable habitat throughout Alameda County (ICF International 2010).

Ecology

California red-legged frogs use a variety of habitat types; these include various aquatic systems as well as riparian and upland habitats. However, they may complete their entire life cycle in a pond or other aquatic site that is suitable for all life stages (66 FR 14626). California red-legged frogs inhabit marshes; streams; lakes; ponds; and other, usually permanent, sources of water that have dense riparian vegetation. The highest densities of frogs are found in habitats with deepwater pools (at least 2.5 feet deep) with dense stands of overhanging willows (*Salix* sp.) and a fringe of tules (*Scirpus* sp.) or cattails (*Typha* sp.). Juvenile frogs seem to favor open, shallow aquatic habitats with dense submergent vegetation. Although red-legged frogs can inhabit either ephemeral or permanent streams or ponds, populations probably cannot be maintained in ephemeral streams in which all surface water disappears (ICF International 2010).

As adults, California red-legged frogs are highly aquatic when active but depend less on permanent water bodies than do other frog species. Adults may take refuge during dry periods in rodent holes or leaf litter in riparian habitats. Adult California red-legged frogs have been observed using large

cracks in the bottom of dried ponds as refugia. Although red-legged frogs typically remain near streams or ponds, marked and radio-tagged frogs have been observed to move more than two miles through upland habitat. These movements are typically made during wet weather and at night (ICF International 2010).

California red-legged frogs typically lay their eggs in clusters around aquatic vegetation from December to early April. Larvae undergo metamorphosis 3.5–7 months after hatching. However, larvae have been observed to take more than a year to complete metamorphosis in four counties in the central coast of California (ICF International 2010).

Threats

The decline of the California red-legged frog is attributable to a variety of factors. Large-scale commercial harvesting of red-legged frogs led to severe depletions of populations at the turn of the century. Subsequently, exotic aquatic predators such as bullfrogs, crayfish, and various species of predatory fish became established and contributed to the continued decline of the species. Habitat alterations such as conversion of land to agricultural and commercial uses, reservoir construction which effects downstream riparian environments, and in some places unauthorized off-highway vehicle use threaten remaining populations (ICF International 2010).

Occurrence in the Planning Area

There are 125 CNDDB occurrences of California red-legged frog within the SMP Area(California Natural Diversity Database 2015). Creeks and channels within the Planning Area that potentially support this species include Arroyo Las Positas, Arroyo Seco, Realigned Arroyo Las Positas, Altamont Creek, and Collier Canyon Creek. The Planning Area is within the East San Francisco Bay core area of Recovery Unit 4 in the 2002 California red-legged frog Recovery Plan (ICF International 2010). North of Highway 580, critical habitat has been designated for this species.

Stream Maintenance Considerations

Natural creeks potentially provide the highest quality habitat for California red-legged frogs in the Planning Area. These channels typically have in-channel vegetation and slow moving, backwater areas that provide microhabitat features essential for this species. This does not preclude California red-legged frogs from occurring in other engineered or modified channels. For example, occurrences of California red-legged frog have been recorded in Arroyo Las Positas, which is a straightened and channelized urban creek. Nonetheless, the overall habitat quality is lower in those channels since they often do not contain the complexity necessary to support the frog's life history.

Stream maintenance activities will incorporate measures to reduce potential impacts to aquatic environments and special-status species that use such environments, including California red-legged frogs. To the extent feasible given flood control requirements, vegetation removal activities will avoid complete removal of in-stream vegetation and woody debris. Removal of in-stream vegetation could indirectly impact this species by reducing the amount of available habitat for securing egg masses and providing refugia for tadpoles and adults. Bank stabilization through revegetation will be encouraged (to reduce erosion) but will be implemented with native species only. This also includes avoiding using mulch, which often contains non-native seeds. Reduction in sediment loading to creeks would improve habitat conditions for the California red-legged frog. Well-vegetated riparian corridors may act as a filter by trapping and reducing sediment. However, this may have a cumulative negative effect on this species since in-stream vegetation typically

establishes on built-up sediment in engineered and modified channels. Without sediment deposition in these channels, in-stream vegetation will be reduced.

3.10.2.6 Golden Eagle (*Aquila chrysaetos*)

The golden eagle is considered a special-status species in California. It is protected by the MBTA and the Eagle. This species is also protected by CFGC and is a Fully Protected Species by the State of California. It is considered a species of special concern by the CDFW.

Distribution

The golden eagle is predominately a western North American species ranging from northern Alaska through the western states and Great Plains to Mexico with some breeding and wintering locations in eastern North America. Within California, the golden eagle is a year-round resident generally inhabiting mountainous and hilly terrain throughout the open areas of the state (ICF International 2010).

Ecology

Golden eagles use nearly all terrestrial habitats of the western states except densely forested areas. In the interior central Coast Ranges of California, golden eagles favor open grasslands and oak savanna, with lesser numbers in oak woodland and open shrublands. Secluded cliffs with overhanging ledges and large trees are used for nesting and cover. Preferred territory sites include those that have a favorable nest site, a dependable food supply (medium to large mammals and birds), and broad expanses of open country for foraging. Hilly or mountainous country where takeoff and soaring are supported by updrafts is generally preferred to flat habitats. Deeply cut canyons rising to open mountain slopes and crags are ideal habitat (ICF International 2010).

Breeding densities are directly related to territorial spacing and foraging requirements for the species. Territory size has been estimated to average 124 square kilometers (sq km) in northern California but can vary largely with habitat conditions. Mating occurs from late January through August, with peak activity in March through July. Eggs are laid from early February to mid-May. Clutch size varies from one to four eggs, but two is the most common size. Incubation lasts 43–45 days, and the fledging period is about 72–84 days. The young usually remain dependent on their parents for as long as eleven weeks afterward. Golden eagles are the top avian predator in the grassland/savanna ecosystem of the central Coast Range in California. They may directly compete with ferruginous hawks (*Buteo regalis*) and other smaller hawks for small mammals, and with California condors (*Gymnogyps californianus*) for carrion (ICF International 2010).

The species is relatively common in some areas of its range. Local threats or declines do not pose a major conservation problem from a population perspective, though local populations could be effected by high mortality rates. This species was once a common resident throughout the open areas of California; numbers are now reduced near human population centers, but in general, populations seem stable. Within West Central California, including Alameda County, the golden eagle population is apparently stable (ICF International 2010).

Threats

The primary existing threats to golden eagle survival throughout its range include loss or alteration of both foraging and nesting habitat. In California, this is due to reclamation of grasslands for

agriculture, urbanization, and the elimination of annual grassland habitat. Human disturbance of nesting birds and fatalities caused by contact with infrastructure (e.g., power facilities, buildings, fences, wind turbines) also pose threats to this species. An analysis of the causes of fatalities in 61 golden eagles radio-tagged and recovered in the Diablo Range from January 1994 to December 1997 found that 37% were killed by wind turbine strikes, 16% by electrocution, and 5% by lead poisoning. The remaining birds were lost due to shootings (2%), car strikes (5%), botulism (2%), territorial fights with other eagles (5%), collision with fences (3%), fledging mishaps (10%), and other unknown factors (15%) (ICF International 2010).

Occurrence in the Planning Area

There are sixe CNDDB occurrences of golden eagle within the SMP Area (California Natural Diversity Database 2015). Potentially suitable forage habitat occurs within the Planning Area, particularly north of Highway 580, as well in other undeveloped portions of the City.

Stream Maintenance Considerations

Most stream maintenance activities, if conducted during the breeding season, have the potential to impact nesting golden eagles, as well as other raptors and migratory birds. This is due to the widespread nature of bird breeding habitat. Any activities that require ground excavation or vegetation removal have the potential to remove or disturb bird nests during the breeding season. Other activities, particularly those that require mobilizing large equipment, have the potential to disturb nesting birds due to excessive noise.

Whenever feasible, Program-related activities will be scheduled outside of the nesting season (typically March to July). Preconstruction surveys will be conducted for active nests during the nesting season, and procedures to avoid impacts to active nests will be established.

3.10.2.7 Tricolored Blackbird (*Agelaius tricolor*)

The tricolored blackbird is considered a special-status species in California. It is protected by the MBTA and by CFGC. It is considered a species of special concern by the CDFW.

Distribution

Tricolored blackbirds are endemic to the west coast of North America and primarily to California. The species' historical breeding range in California included the Sacramento and San Joaquin Valleys, lowlands of the Sierra Nevada south to Kern County, the coast region from Sonoma County to the Mexican border, and sporadically on the Modoc Plateau (Neff 1937; Grinnell and Miller 1944). Though individuals move and utilize different habitats within the region, depending on time of year, long distance migration has not been verified in this species.

Tricolored blackbirds are largely endemic to California, and more than 99% of the global population occurs in the state. In any given year, more than 75% of the breeding population can be found in the Central Valley. Small breeding populations also exist at scattered sites in Oregon, Washington, Nevada, and the western coast of Baja California (ICF International 2010).

Tricolored blackbirds are considered "itinerant breeders" (i.e., nomadic breeders) where individuals or colonies can breed in different regions within the same year. Breeding colonies of tricolored

blackbirds often go unreported because of their similar appearance to the common red-winged blackbird (*Agelaius phoeniceus*) (ICF International 2010).

Ecology

Tricolored blackbirds have three basic requirements for selecting their breeding colony sites: open, accessible water; a protected nesting substrate, including either flooded, thorny, or spiny vegetation; and a suitable foraging space providing adequate insect prey within a few miles of the nesting colony. Almost 93% of the 252 breeding colonies reported by Neff (1937) were in freshwater marshes dominated by cattails and bulrushes (*Schoenoplectus* spp.). The remaining colonies in Neff's study were in willows (*Salix* spp.), blackberries (*Rubus* spp.), thistles (*Cirsium* and *Centaurea* spp.), or nettles (*Urtica* spp.) (ICF International 2010).

An increasing percentage of tricolored blackbird colonies in the 1980s and 1990s were reported in Himalayan blackberries (*Rubus discolor*), and some of the largest recent colonies have been in silage and grain fields. Other substrates where tricolored blackbirds have been observed nesting include giant reed (*Arundo donax*), safflower (*Carthamus tinctorius*), tamarisk trees (*Tamarix* spp.), elderberry/poison oak (*Toxicodendron diversilobum*), and riparian scrublands and forests (e.g., *Salix*, *Populus*, *Fraxinus*). Ideal foraging conditions for tricolored blackbirds are created when shallow flood-irrigation, mowing, or grazing keeps the vegetation at an optimal height (<15 centimeters). Preferred foraging habitats include agricultural crops such as rice, alfalfa, irrigated pastures, and ripening or cut grain fields (e.g., oats wheat, silage, and rice), as well as annual grasslands, cattle feedlots, and dairies. Tricolors also forage in remnant native habitats, including wet and dry vernal pools and other seasonal wetlands, riparian scrub habitats, and open marsh borders (ICF International 2010).

As many as 20,000 or 30,000 tricolored blackbird nests have been recorded in cattail marshes of 4 hectares (9 acres) or less, and individual nests may be built less than 0.5 meter (1.5 feet) apart. Tricolored blackbird's colonial breeding system may have adapted to exploit a rapidly changing environment where the locations of secure nesting habitat and rich insect food supplies were ephemeral and likely to change each year. During the breeding season, tricolored blackbirds exhibit itinerant breeding, commonly moving to different breeding sites each season. In the northern Central Valley and northeastern California, individuals move after their first nesting attempts, whether successful or unsuccessful. Banding studies indicate that significant movement into the Sacramento Valley occurs during the post-breeding period (ICF International 2010).

Wintering populations shift extensively within their breeding range in California. Concentrations of more than 15,000 wintering tricolored blackbirds may gather at one location and disperse up to 32 km (20 miles) to forage. Local, regional, and statewide tricolored blackbird populations have experienced major declines since 1994 (ICF International 2010).

Threats

The greatest threats to this species are the direct loss and alteration of habitat; however, other human activities, as well as predation, also threaten tricolored blackbird populations in the Central Valley. Most native habitats that once supported nesting and foraging tricolored blackbirds have been altered by urbanization and unsuitable agricultural uses, including vineyards, orchards, and row crops. Many former agricultural areas within the historical range of tricolored blackbirds are now being urbanized. Nests and nest contents in cereal crops and silage are often destroyed by agricultural operations. Harvesting of silage and plowing of weedy fields are currently the most

common reasons that tricolored blackbird nesting colonies are destroyed in agricultural areas. Typically tricolored blackbirds have not completed their nesting cycle when fields are plowed, creating a situations where birds are attracted to an area to breeding, because there is ample foraging opportunities, but then nests are destroyed as a result of the agricultural operations. California Audubon Society has worked with local land owners to delay plowing until tricolored blackbirds have completed their nesting cycle and moved out of the area. Financial incentives have been offered to land owners to offset the cost of a delayed harvest. Other factors that may affect the nesting success of colonies in agricultural areas include herbicide and pesticide applications, and spraying ponds for mosquito abatement. A primary reason for limited nesting success in agricultural areas (particularly in rice fields) is predation of fledgling by black-crowned night herons (*Nycticorax nycticorax*) (ICF International 2010).

Occurrence in the Planning Area

Eight tri-colored blackbird occurrences are listed in the CNDDB, at the following locations: Sunol Valley (approximately 1200 in 1971, 150 in 1994); along Altamont Pass Road, east of Dyer Road 45 adults observed nesting in 1992); east of Pleasanton (16 pair in 1980; Kaiser gravel pit); east of San Ramon (20 in 1990, 60 in 1995, possibly extirpated in 2002-2007); Arroyo del Valle, south west of Livermore (1974; possibly extirpated); Isabel gravel pits (1994); a colony adjacent to California aqueduct, south end of Bethany Reservoir in 2003; and east of San Ramon, near Windemere Ranch Middle School (75 in 1990) (California Natural Diversity Database 2015).

Results of a 2008 census reported only one active colony in Alameda county, at Ames and Dolan roads near the City of Livermore (April 27 2008, 27 nesting pairs). There were no nesting tricolored blackbirds at the following historic colony sites: Altamont Creek, Broadmoor Pond, Dagnino Road, Dyer Road, Laughlin Road, North Flynn Road, Vallecitos Lane (ICF International 2010).

Potentially suitable forage habitat occurs within the Planning Area, particularly north of Highway 580, as well in other undeveloped portions of the City. Potentially suitable breeding habitat for this species occurs in Arroyo del Valle.

Stream Maintenance Considerations

Most stream maintenance activities, if conducted during the breeding season, have the potential to impact tricolored blackbirds. Any activities that require ground excavation or vegetation removal have the potential to remove or disturb bird nests during the breeding season. Other activities, particularly those that require mobilizing large equipment, have the potential to disturb nesting birds due to excessive noise.

Whenever feasible, Program-related activities will be scheduled outside of the nesting season (typically March to July). Preconstruction surveys will be conducted for active nests during the nesting season, and procedures to avoid impacts to active nests will be established.

3.10.2.8 Western Burrowing Owl (*Athene cunicularia hypugea*)

The burrowing owl is considered a special-status species in California. It is protected by the MBTA and the CFGC. It is considered a species of special concern by the CDFW.

Distribution

The burrowing owl is found throughout western North America, west of the Mississippi River and south into Mexico. In California, the range of burrowing owl extends through the lowlands south and west from north central California to Mexico, with small, scattered populations occurring in the Great Basin and the desert regions of the northeastern and southwestern part of the state, respectively. They are absent from the coast north of Sonoma County and from high mountain areas such as the Sierra Nevada and the Transverse Ranges extending east from Santa Barbara County to San Bernardino County. Burrowing owls once occurred in suitable lowland habitats throughout the Bay Area. This species utilized what was once vast open valley floors and low sloping foothills year round. Burrowing owl populations have been greatly reduced or extirpated from most of the San Francisco Bay Area and along the California coast to Los Angeles (ICF International 2010).

Ecology

Throughout their range, burrowing owls require habitats with three basic attributes: open, well-drained terrain; short, sparse vegetation; and underground burrows or burrow facsimiles. During the breeding season, they may also need enough permanent cover and taller vegetation within their foraging range to provide them with sufficient prey, which includes large insects and small mammals. Burrowing owls occupy grasslands, deserts, sagebrush scrub, agricultural areas (including pastures and untilled margins of cropland), earthen levees and berms, coastal uplands, and urban vacant lots, as well as the margins of airports, golf courses, and roads (ICF International 2010).

Burrowing owls typically select sites that support short vegetation, even bare soil, presumably because they can easily see over it. However, they will tolerate tall vegetation if it is sparse. Owls will perch on raised burrow mounds or other topographic relief such as rocks, tall plants, fence posts, and debris piles to attain good visibility (ICF International 2010).

This opportunistic feeder will consume arthropods, small mammals, birds, amphibians, and reptiles. Insects are often taken during the day, while small mammals are taken at night. In California, crickets and meadow voles were found to be the most common food items. Nocturnal foraging can occur up to several kilometers away from the burrow. In urban areas, burrowing owls are often attracted to streetlights, where insect prey congregates. Western burrowing owls most commonly live in burrows created by California ground squirrels (*Spermophilis beecheyi*). Burrowing owls may compete incidentally with other predators such as coyotes, other owls and hawks, skunks, weasels, and badgers for rodents and a variety of insects (ICF International 2010).

Little information exists on the migration routes, timing of migration, and wintering areas, especially for the California population (ICF International 2010).

Threats

The most immediate threats to the burrowing owl are the conversion of grassland habitat to urban and some agricultural uses (vineyards, orchards, and some row crops) and the loss of more suitable agricultural lands to development. Equally important is the loss of fossorial rodents, such as ground squirrels across much of the owl's historical habitat. Eradication programs have decimated populations of these rodents over time and have in turn disrupted the ecological relationships on which owls depend; because western burrowing owls typically need other animals to dig their

burrows, the loss of fossorial rodents limits the extent of year-round owl habitat throughout their range (ICF International 2010).

Occurrence in the Planning Area

There are 40 documented occurrences of burrowing owls throughout eastern Alameda County, many of which are records of nesting pairs (California Natural Diversity Database 2015). Potentially suitable habitat for this species occurs adjacent to creeks and channels north of Highway 580, as well as along portions of Arroyo Las Positas, Altamont Creek, Arroyo Seco, Arroyo del Valle, and Arroyo Mocho.

Stream Maintenance Considerations

Bank stabilization and revegetation activities (including any upland construction staging), if conducted during the breeding season, have the potential to impact western burrowing owls. Other activities, particularly those that require mobilizing large equipment, have the potential to disturb nesting birds due to excessive noise. In-stream sediment removal and vegetation management activities would not directly impact burrowing owls as this is not their preferred habitat.

Whenever feasible, Program-related activities will be scheduled outside of the nesting season (typically March to July). Preconstruction surveys will be conducted for active nests during the nesting season, and procedures to avoid impacts to active nests will be established.

3.10.2.9 American Badger (*Taxidea taxus*)

The American badger is considered a special-status species in California. It is considered a species of special concern by CDFW.

Distribution

In North America, American badgers occur as far north as Alberta, Canada and as far south as central Mexico. Their distribution through the United States is expanding and presently extends from the Pacific Coast eastward to Texas, Oklahoma, Missouri, Illinois, Indiana, and Ohio. The American badger has a broad altitudinal range, from below sea level at Death Valley up to 12,000 feet (3,660 meters) at the Arctic-Alpine Life Zone. In California, American badgers occur throughout the state except in humid coastal forests of northwestern California in Del Norte and Humboldt Counties (ICF International 2010).

The American badger has been decreasing in numbers throughout California over the last century. A distribution study for American badgers in California conducted through the 1970's and 1980's determined that there was no change in the overall range of this species since early in the century (Larson 1987). However, changes in the abundance of badgers in California could not be accurately determined by this study (ICF International 2010).

Ecology

American badgers occur in a wide variety of open, arid habitats but are most commonly associated with grasslands, savannas, mountain meadows, and open areas of desert scrub. The principal habitat requirements for this species appear to be sufficient food (burrowing rodents), friable soils, and relatively open, uncultivated ground. American badgers are primarily found in areas of low to moderate slope. Burrows are used for denning, escape, and predation on burrowing rodents. A

recent study in the Bay Area documented the use suburban areas as movement corridors between larger patches of grassland (ICF International 2010).

Young are born in burrows dug in relatively dry, often sandy, soil, usually in areas with sparse overstory. American badgers mate in summer and early autumn and young are born in March and early April. Juveniles may leave their natal grounds at 3 to 4 months of age, disperse up to 110 km, and use disturbed habitats and agricultural areas (ICF International 2010).

Badgers are solitary animals, but they are not known to defend an exclusive territory. Typical population density is about five animals per sq km. Although home range size varies according to geographic area, distribution of food resources, and season, the general range of this species is 395 acres – 2,100 acres (137 –850 hectares). Males occupy larger home ranges than females (2.4 versus 1.6 sq km) (ICF International 2010).

American badgers are mostly nocturnal but also forage and disperse during the daytime. This species is active year round, except at high elevations and latitudes, where they become torpid during the winter. At lower elevations, the American badger in the winter exhibits reduced surface activity (ICF International 2010).

American badgers are carnivorous and are relatively opportunistic predators, feeding on a number of rodent species such as mice, chipmunks, ground squirrels, gophers, rabbits, and kangaroo rats. They will also eat reptiles, insects, birds and their eggs, and carrion. The American badger is a ferocious fighter and has very few predators. Predators include coyotes, golden eagles, mountain lions, bears and gray wolves throughout its range (ICF International 2010).

Threats

Common threats to the American badger include habitat conversion to urban and agricultural uses, shooting and trapping, poisoning, automobile fatalities, and reduction of prey base from rodent control activities. In the west, infill of formerly open woodlands and encroachment of forests into grassland as a result of effective fire suppression has eliminated or degraded much badger habitat. Some populations are estimated to be up to 80% yearlings or young of the year, suggesting high mortality rates. Badgers may be attracted to roads, both because ground squirrels often burrow alongside them, and because they are good travel routes (ICF International 2010).

Occurrence in the Planning Area

Badgers occurred on short grass and dry pasture and some scrub habitat near Del Valle Reservoir and on Lawrence Livermore National Laboratory and Department of Defense property (ICF International 2010). There are 8 CNDDB occurrences of the species in the SMP Area (California Natural Diversity Database 2015). Potentially suitable habitat for this species in the Planning Area occurs north of Highway 580 and along the upstream portion Arroyo Seco in the southeastern portion of the City.

Stream Maintenance Considerations

Program maintenance activities within creeks and channels are not expected to result in effects to American badger because this is not their preferred habitat. Staging areas that occur in upland grasslands could potentially impact this species; however, the potential for occurrence is low due to the limited distribution in the Planning Area. Therefore, it is not likely that program-related

activities will impact habitat for this species. Where appropriate, surveys for this species will occur as part of the site reconnaissance during annual work plan development to determine presence or absence.

3.10.2.10 San Joaquin Kit Fox (*Vulpes macrotis mutica*)

The San Joaquin kit fox is federally and state listed as endangered.

Distribution

San Joaquin foxes occur in some areas of suitable habitat on the floor of the San Joaquin Valley and in the surrounding foothills of the Coast Ranges, Sierra Nevada, and Tehachapi Mountains from Kern County north to Contra Costa, Alameda, and San Joaquin Counties. There are known occurrences in Alameda, Contra Costa, Fresno, Kern, Kings, Madera, Merced, Monterey, San Benito, San Joaquin, San Luis Obispo, Santa Barbara, Santa Clara, Stanislaus, and Tulare Counties. The largest extant populations of kit fox are in Kern County (Elk Hills and Buena Vista Valley) and San Luis Obispo County in the Carrizo Plain Natural Area (ICF International 2010).

Although the precise historical range of San Joaquin kit fox is unknown, it is believed to have extended from Contra Costa and San Joaquin Counties in the north to Kern County in the south. Surveys conducted between 1969 and 1975 extended the known range of the kit fox back into portions of its historical range in the northern San Joaquin Valley, including Contra Costa, Alameda, and San Joaquin Counties. At this time, kit foxes were also found in three counties outside the originally defined historical range: Monterey, Santa Clara, and Santa Barbara counties (ICF International 2010).

Ecology

San Joaquin kit foxes occur in a variety of habitats, including grasslands, scrublands, vernal pool areas, alkali meadows and playas, and an agricultural matrix of row crops, irrigated pastures, orchards, vineyards, and grazed annual grasslands. They prefer habitats with loose-textured soils that are suitable for digging, but they occur on virtually every soil type. Dens are generally located in open areas with grass or grass and scattered brush, and seldom occur in areas with thick brush. Preferred sites are relatively flat, well-drained terrain. They are seldom found in areas with shallow soils due to high water tables or impenetrable bedrock or hardpan layers. However, kit foxes may occupy soils with a high clay content where they can modify burrow dug by other animals, such as California ground squirrels (*Spermophilus beecheyi*) (ICF International 2010).

In the northern part of its range (including San Joaquin, Alameda, and Contra Costa Counties) where most habitat on the valley floor has been eliminated, kit foxes now occur primarily in foothill grasslands, valley oak savanna, and alkali grasslands. Retaining a linkage between San Joaquin kit fox populations in western Merced County north into San Joaquin, Alameda, and Contra Costa Counties is an important recovery goal for this species. Less frequently, foxes will den within small parcels of native habitat that are surrounded by intensively maintained agricultural lands and adjacent to dryland farms, and forage in tilled and fallow fields and irrigated row crops (ICF International 2010).

Kit foxes may range up to 20 miles at night during the breeding season and somewhat less (6 miles) during the pup-rearing season. The species can readily navigate a matrix of land use types. Home

ranges vary from less than one square mile up to approximately 12 square miles. The home ranges of pairs or family groups of kit foxes generally do not overlap (ICF International 2010).

San Joaquin kit foxes prey upon a variety of small mammals, ground-nesting birds, and insects. They are in turn subject to predation by such species as coyote, non-native red foxes, domestic dog, eagles, and large hawks (ICF International 2010).

Threats

Continued fragmentation of habitat is a serious threat to this species. Increasing isolation of populations through habitat degradation and barriers to movement, such as aqueducts and busy highways, can limit dispersal to and occupancy of existing and former lands. The threat of being struck by vehicles is high, particularly for dispersing individuals, crossing roadways with median barriers. Livestock grazing is not thought to be necessarily detrimental to the kit fox, but it may affect the number of prey species available, depending on the intensity of grazing. Moderate grazing is thought to benefit the species because it can potentially enhance the prey base and reduce vegetation to allow kit fox to more easily detect and avoid predators. The use of pesticides to control rodents and other pests also threatens kit fox in some areas, either directly through poisoning or indirectly through reduction of prey abundance (ICF International 2010).

Occurrence in the Planning Area

Six San Joaquin kit fox occurrences are documented from the eastern portion of the SMP Area, in open habitat including grassland, rangeland, pasture, annual grassland and alkali sink scrub (California Natural Diversity Database 2015). Occurrences of the species within the EACCS study area were primarily located at the Bethany Reservoir, on private lands, and SFPUC land (ICF International 2010). Within the Planning Area, potentially suitable habitat for this species occurs north of Highway 580 and along the upstream portion Arroyo Seco in the southeastern portion of the City.

Stream Maintenance Considerations

Program maintenance activities within creeks and channels are not expected to result in effects to San Joaquin kit fox because this is not their preferred habitat. Staging areas that occur in upland grasslands could potentially impact this species; however, the potential for occurrence is low due to the limited distribution in the Planning Area. Therefore, it is not likely that program-related activities will impact habitat for this species. Where appropriate, surveys for this species will occur as part of the site reconnaissance during annual work plan development to determine presence or absence.

Table 3-1: Land Cover Acreages by Reach

Creek or Channel Name	Reach Name	Land Cover Type (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest / Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course / Urban Park	Ruderal	Rural Residential	Urban - Suburban	Vineyard	Grand Total
Altamont Creek		***4.36***	***4.54***	***26.41***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.95***	***0.00***	***13.54***	***0.00***	***0.05***	***0.00***	***0.00***	***12.76***	***0.00***	***62.61***
	AC-1	1.66	0.94										0.06		0.05			0.00		2.71
	AC-2	0.13	0.02										13.48					1.69		15.32
	AC-3																	5.33		5.33
	AC-4										0.95							2.09		3.04
	AC-5	2.57	2.48	4.36														2.77		12.18
	AC-6		1.10	3.53														0.84		5.47
	AC-7			18.52														0.04		18.56
Altamont Creek Tributary		***3.17***	***1.72***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.07***	***0.00***	***4.60***	***0.00***	***0.00***	***0.00***	***0.00***	***4.62***	***0.00***	***14.18***
	ACT-1										0.07							3.80		3.87
	ACT-2	3.17	1.72										4.60					0.82		10.31
Arroyo Del Valle		***0.00***	***0.00***	***31.41***	***10.58***	***40.10***	***17.46***	***0.00***	***0.46***	***1.33***	***0.00***	***68.10***	***0.00***	***0.00***	***0.00***	***3.46***	***0.00***	***0.94***	***0.46***	***174.29***
	ADV-01						17.39			1.33						3.46		0.22		22.40
	ADV-02						0.06					9.76						0.24		10.06
	ADV-03											14.24								14.24
	ADV-04											11.85								11.85
	ADV-05											28.36								28.36
	ADV-06					1.57						3.90								5.47
	ADV-07			0.07	0.27	7.79												0.48		8.62
	ADV-08			2.10	5.29															7.40
	ADV-09			1.00	2.39	0.15														3.54
	ADV-10			9.86		2.82													0.46	13.14
	ADV-11			7.20		9.83			0.46											17.48
	ADV-12			3.76		7.85														11.61
	ADV-13			2.06		2.76														4.82
	ADV-14			1.08		7.33														8.41
	ADV-15			4.29	2.62															6.91
Arroyo Las Positas		***2.48***	***7.34***	***47.16***	***0.00***	***47.38***	***3.91***	***10.84***	***0.62***	***3.34***	***16.04***	***0.00***	***0.56***	***2.56***	***12.77***	***6.05***	***1.48***	***18.52***	***0.00***	***181.05***
	ALP-1			0.66		6.26	3.91			3.34					1.50	5.59				21.26
	ALP-2			0.27		12.75									4.31	0.46				17.79
	ALP-3					0.05					12.41			2.56				2.77		17.79
	ALP-4					8.37												0.18		8.55
	ALP-5	0.53		16.54		0.09												0.84		18.00
	ALP-6			6.87		7.42												1.56		15.85
	ALP-7			3.99		12.43												0.89		17.31
	ALP-8	0.27	4.60	18.83		0.01					0.20		0.51					0.62		25.04
	ALP-9	0.41	2.20										0.05							2.66
	ALP-10	0.27							0.61						4.00			1.94		6.82
	ALP-11	1.00	0.54					2.11							0.76			0.62		5.03
	ALP-12							4.07	0.01						2.20			0.79		7.07
	ALP-13							2.30										1.78		4.08
	ALP-14							1.54										1.75		3.29

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Creek or Channel Name	Reach Name	Land Cover Type (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest / Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course / Urban Park	Ruderal	Rural Residential	Urban - Suburban	Vineyard	Grand Total
	ALP-15							0.82										2.70		3.52
	ALP-16										3.43						1.48	2.08		6.99
Arroyo Las Positas Tributary		***0.00***	***0.00***	***17.28***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***7.20***	***0.00***	***0.00***	***0.00***	***0.04***	***0.00***	***24.52***
	ALPT-1			7.55																7.55
	ALPT-2			2.53																2.53
	ALPT-3			7.20										7.20				0.04		14.44
Arroyo Mocho		***0.00***	***0.00***	***0.51***	***0.00***	***45.75***	***11.97***	***0.00***	***0.00***	***17.74***	***0.00***	***0.00***	***0.00***	***2.31***	***4.49***	***0.81***	***0.00***	***13.93***	***0.87***	***98.38***
	AM-1					1.41	0.01			2.84						0.81		1.56		6.63
	AM-2					6.53												2.51		9.04
	AM-3									14.12								1.64		15.76
	AM-4					2.66				0.78								2.15		5.59
	AM-5					9.03									0.92			1.42		11.37
	AM-6					9.94									1.19			2.08		13.21
	AM-7					6.16									1.06			0.73		7.95
	AM-8			0.51		10.02									1.32			1.45		13.30
	AM-9						4.29							0.25				0.39	0.87	5.80
	AM-10						7.67							2.06						9.73
Arroyo Seco		***0.00***	***0.00***	***15.93***	***0.00***	***30.82***	***0.00***	***0.00***	***0.00***	***10.62***	***3.71***	***0.00***	***0.00***	***0.00***	***0.00***	***3.57***	***0.27***	***24.79***	***0.00***	***89.71***
	AS-1			9.99														0.16		10.15
	AS-2			0.16		4.57												2.69		7.42
	AS-3					0.02				1.37								1.19		2.58
	AS-4			0.96						5.67								1.98		8.61
	AS-5									3.57								3.44		7.01
	AS-6									0.01								1.54		1.55
	AS-7					0.90												7.49		8.39
	AS-8					5.13												2.28		7.41
	AS-9										2.38					1.48		0.55		4.41
	AS-10										1.33					0.24		1.62		3.19
	AS-11					5.16										1.13		0.89		7.18
	AS-12					1.86												0.43		2.29
	AS-13			0.65		3.50										0.17		0.53		4.85
	AS-14			3.38		6.87										0.55				10.80
	AS-15			0.79		2.81				0.00							0.27			3.87
Bear Creek Basins		***0.36***	***0.10***	***4.80***					***0.43***		***0.15***		***0.86***					***7.43***		***14.13***
Collier Canyon Creek		***0.00***	***0.00***	***19.70***	***0.00***	***3.65***	***0.00***	***0.00***	***0.00***	***0.00***	***0.19***	***0.00***	***0.00***	***0.22***	***3.60***	***0.00***	***0.00***	***13.75***	***0.00***	***41.11***
	CCC-1										0.19							1.30		1.49
	CCC-2																	3.74		3.74
	CCC-3					2.13								0.22	3.60			1.97		7.92
	CCC-4																	2.40		2.40
	CCC-5																	1.82		1.82
	CCC-6			10.73														2.02		12.75

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Creek or Channel Name	Reach Name	Land Cover Type (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest / Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course / Urban Park	Ruderal	Rural Residential	Urban - Suburban	Vineyard	Grand Total
	CCC-7			8.97		1.52												0.50		10.99
Cottonwood		***0.00***	***0.00***	***2.87***	***0.00***	***3.33***	***0.00***	***0.00***	***0.00***	***0.00***	***0.44***	***0.00***	***0.00***	***0.00***	***0.09***	***0.00***	***0.00***	***0.00***	***0.00***	***6.73***
Creek	CC-1			0.83		2.36									0.09					3.28
	CC-2			2.04		0.97					0.44									3.45
Granada		***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.23***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***16.42***	***0.00***	***16.65***
Channel	GC-1																	5.01		5.01
	GC-2									0.23								11.41		11.64
Ravenswood Drainage Swales																	***4.63***	***4.32***		***8.95***
Realigned		***0.00***	***0.00***	***14.25***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***7.76***	***0.00***	***0.00***	***0.00***	***0.00***	***1.95***	***5.28***	***0.00***	***27.33***	***0.00***	***56.57***
Arroyo Las	RALP-1			2.77						7.76					1.95			6.01		18.49
Positas	RALP-2			0.92														4.47		5.39
	RALP-3			5.87												5.28		16.53		27.68
	RALP-4			1.69														0.32		2.01
	RALP-5			2.08																2.08
	RALP-6			0.92																0.92
Grand Total		**10.37**	**13.70**	**180.32**	**10.58**	**171.03**	**33.34**	**10.84**	**1.51**	**41.02**	**21.55**	**68.10**	**19.56**	**12.29**	**22.95**	**19.17**	**6.38**	**144.85**	**1.33**	**788.89**

Chapter 4

Pre-Maintenance Planning Approach and Impact Avoidance

4.1 Introduction

This chapter describes the planning steps to be taken prior to conducting annual maintenance work to ensure that the work is effective and also avoids and minimizes potential environmental impacts. As such, this chapter describes the program's planning approach. In contrast, Chapter 5 describes the maintenance activities in more specific detail. Following the description of program activities in Chapter 5, Chapter 6 presents a summary of program impacts and Chapter 7 presents the program's additional impact-reducing measures and BMPs that occur beyond the planning measures described here in Chapter 4.

In this chapter, the maintenance planning and impact avoidance approach for the SMP is presented as a series of resource planning steps. These planning steps occur prior to the actual maintenance work to ensure that the work is targeted, effective, and avoids foreseeable environmental impacts.

The maintenance planning approach is a four-step process that begins with broad level activity planning and focuses down to the details informing maintenance at a specific project site. At the broadest scale, Maintenance Principles are used to provide overarching guidance for maintenance activities. Framing Considerations build on the Maintenance Principles and frame the extent of the SMP's three primary activities: Sediment Management, Vegetation Management, and Bank Stabilization. Framing Considerations guide the maintenance activities to effectively work in alignment with natural processes and thereby avoid or reduce potential impacts. Following the Framing Considerations, Maintenance Goals are used to set the desired outcomes of the program. The fourth and final planning scale describes Maintenance Triggers. These are events that initiate the need for maintenance activities to occur. In sum, the maintenance approach follows a sequence of four planning steps that operate at different scales as follows:

1. **Maintenance Principles:** provide overarching guidance for SMP activities including impact avoidance and minimization approaches;
2. **Framing Considerations:** provide more specific context for the primary SMP activities while considering stream functions;
3. **Goals:** describe desired outcomes for maintenance activities; and
4. **Triggers:** define the need and timing for maintenance activities.

4.2 Maintenance Principles

The following Maintenance Principles were chartered to guide the SMP:

1. No Unnecessary Intervention
2. Understand the System and its Processes

3. Consider Adjacent Land Uses
4. Apply System Understanding to Maintenance Activities
5. Manage for Incremental Ecologic Improvement (Lift)
6. Integrate Maintenance Activities Towards Sustainability (reduced frequency of maintenance)

4.2.1 Maintenance Principle 1: No Unnecessary Intervention

This basic principle is foundational to the SMP; that no unnecessary intervention in stream processes should occur and that maintenance is restricted to necessary and appropriate activities. The following questions help guide implementation of Principle 1.

- Has overbank flooding occurred at the reach threatening or causing damage to property or resulted in the area being designated as a flood hazard zone[1]?
- Is observed flooding due to the reduction in creek or channel conveyance capacity caused by in-channel sedimentation, excessive vegetation growth, or embedded trash and debris?
- Have creek or channel bed, bank, or vegetation conditions changed at the reach such that flooding in the coming rainy season, and associated safety hazards and property damage, are now more likely under typical or average annual flow conditions?
- Is there a clear and specific flow impediment (e.g., trees, shrubs, or sediment blocking culvert or storm drain outlet) that will increase or likely cause a flooding hazard under typical or average annual flow conditions?
- Has streambank erosion or a bank failure occurred that has led to (or may lead to) the loss of adjacent structures such as bridges, roads, or homes?
- Has streambank erosion or a bank failure occurred that reduces the strength and integrity of adjacent streambank areas and increases potential flood hazard?
- Has streambank erosion or bank failure occurred that leads to increased sediment yields into the creek or channel and downstream receiving waters?
- Are materials present within the creek or channel that are incompatible with or hazardous to focal species?
- Is an authorized activity requiring work in the creek or channel (e.g., water diversion)?

If answers to any of these questions are “yes” then maintenance may be necessary.

[1] The NFIP defines “flood” as, “a general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties at least one of which is the policyholder’s property) from one of the following: Overflow of inland or tidal waters; Unusual and rapid accumulation or runoff of surface waters from any source; Mudflow; Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above” (National Flood Insurance Program 2014).

4.2.2 Maintenance Principle 2: Understand the System and Its Processes

If maintenance is necessary, then prior to selecting sediment, vegetation, or bank stabilization treatments, the creek or channel system and its formative processes must be understood to know why the reach functions as it does. From this functional understanding, appropriate treatments can be selected. The following questions help illustrate Principle 2.

- What are the governing hydraulic and geomorphic conditions at the reach?
- Do the existing creek or channel cross section form, in-channel features (such as bars, benches, back channels, etc.), and reach slope indicate a creek or channel in dynamic equilibrium (a graded stream); where the creek or channel form reflects a relative balance of erosional and depositional forces as appropriate for the reach's location in the watershed? Or, is the reach strongly depositional or erosional, thus suggesting a non-equilibrium condition?
- What is the relationship between this creek or channel reach and upstream and downstream conditions? In particular, what are upstream sediment inputs to this reach and how are those inputs either stored in the reach or transported further downstream?
- Have historic maintenance activities at this reach strongly influenced its current functioning? Do such influences affect conditions either upstream or downstream?
- Has maintenance at this reach been on-going in past or recent years indicating a chronic issue?
- What ecological succession stage is this reach in? How will ecologic succession operate in this reach? In the absence of maintenance what is the foreseeable ecological progression or climax in this reach. Which stage should be managed for in this reach?

Where available, creek or channel as-built designs, streamflow records, historic maps and cross sections, photographs, and hydraulic modeling results may all be used to address the above questions during the annual creek and channel maintenance assessment process (see Chapter 9).

The information gathered through this step is applied under Maintenance Principle 4, below.

4.2.3 Maintenance Principle 3: Consider Adjacent Land Uses

Where creeks and channels are bordered by developed land uses, flood protection requirements may constrain stream management options. The needs of adjacent land uses will define the types of activities that can or should be conducted within the actively managed stream corridor. For instance, the width of the managed creek or channel corridor has several implications including the sensitivity or risk to flood hazard, the ease of access for maintenance activities, and the potential to manage for ecologic enhancement (as discussed in Maintenance Principle 5). Similarly, how narrow a creek or channel corridor is in relation to its adjacent land uses may constrain the maintenance activities or treatments, access, or ecological improvements that are possible. As a result, each reach presents certain management needs, based on current creek or channel functioning and the habitat and aesthetic values it provides. In parallel, each reach also presents constraints, with consideration of adjacent land uses and their sensitivity and risk to flooding being a major consideration.

For each reach, the adjacent land use needs and constraints will be considered to identify the suitable maintenance approach.

4.2.4 Maintenance Principle 4: Apply System Understanding to Maintenance Actions

Once it is determined that maintenance work is necessary (Maintenance Principle 1), the natural function of the system is understood (Maintenance Principle 2), and localized physical constraints are identified (Maintenance Principle 3), maintenance activities at the reach scale can be identified based on best available information. Applying this information to creek and channel maintenance actions may be as simple as determining that sediment removal and vegetation management are necessary to prevent flooding in a reach where flooding occurred the previous year.

The City currently tracks past maintenance activities through its work order system. As described above, implementation of the SMP will include ongoing management of a central creek and channel maintenance central database (SMP Tracker) chronicling past maintenance activities, flooding events, and natural resource conditions. Understanding the stream system can also lead to a more comprehensive and longer-term maintenance approach at the reach scale.

4.2.5 Maintenance Principle 5: Manage for Incremental Ecological Improvement

The City of Livermore's vision is to provide a balance between flood protection management and habitat support whereby over time, creeks and channels provide both functions with reduced maintenance needs. The management approach to achieve this vision recognizes each reach's existing functional condition, but also looks forward toward improving each reach's ecologic condition as a byproduct of creek and channel maintenance.

Answering the following questions will help guide the stream assessment and restoration plan development process for each annual work cycle (see Chapter 9).

- What are the existing natural habitats and aquatic resources at the reach?
- Are particular in-channel features such as large woody debris (LWD) or gravel bars present that provide valuable habitat?
- Do the presence of these features or resources influence how, where, and when maintenance activities might occur?
- Which habitat features and functions can be preserved in the context of hydraulic capacity?
- Are there known occurrences of threatened or endangered species at the reach?
- Can habitat conditions at the reach be improved to support additional species or sustain the quality of existing habitat?
- What would be the best way to preserve habitat function?

Depending on existing conditions, restoration options can be applied to improve a reach, even if only incrementally, due to other constraints. This principle emphasizes gradual adjustment of maintenance actions through adaptive management. Creek management in this way provides incremental improvement, or ecologic "lift," that moves the treated reach incrementally toward a longer-term vision.

The SMP program includes follow-up monitoring of all restoration and mitigation activities. Program monitoring is more specifically described in Chapter 8, *Program Mitigation*. For the program's reaches monitoring will be used to evaluate the effectiveness of the gradual stepwise ecological improvement approach described above.

4.2.6 Maintenance Principle 6: Integrate Maintenance Activities Toward Sustainability

The approach for creek and channel maintenance should integrate effective activities that in time will reduce the overall need for continued maintenance support. As an example, a feedback cycle can develop where (1) the accumulation of fine sediments are favored by emergent vegetation such as cattails, that (2) in turn encourages additional sediment trapping, which (3) ultimately reduces habitat quality and flood conveyance capacity. Preventing or breaking this cycle through reducing fine sediment loading is desired versus the continual removal of accumulated sediment and emergent vegetation. As another example, erosion control practices in headwater and upper watershed areas can reduce the sediment delivery and loading into the flood control channels downstream. Reducing upstream sediment loading reduces the need for in-channel maintenance activities in general. Watershed erosion control and off-site mitigation efforts are an important strategy of the SMP and are discussed in more detail in Chapter 8, *Program Mitigation*.

Although beyond the scope of the SMP, future capital project planning by the City may consider measures to reduce in-channel maintenance needs, particularly for sediment management.

4.2.7 Conclusion

The Maintenance Principles collectively guide the SMP's integrated maintenance approach while considering a variety of parameters including existing conditions, natural processes, and ecological health. According to the Maintenance Principles discussed above, opportunities for reach sustainability and enhancement will be identified based on the existing conditions, constraints, and maintenance needs. This approach then feeds into evaluation of long-term sustainability for focal species. The questions used in this chapter to illustrate the Maintenance Principles are incorporated into the annual creek and channel assessment process described in Chapter 9, *Program Management*.

4.3 Sediment Management Approach

4.3.1 Framing Considerations

Five key considerations frame the context and approach for sediment management activities.

- **The natural function of streams is to convey sediment from headwater source areas (or upstream in-channel source areas) to downstream reaches, lowlands, or basins where the sediment ultimately deposits.** In all streams, sediments are variably eroded, transported, or deposited. The movement of sediment along the stream system represents a beneficial natural function. It is also recognized that natural sediment transport processes are strongly affected by historic and current land use conditions, urban development, past engineering and alterations to the creek and channel network, and other modifications. As a result of these

influences, sediment transport processes and loadings may be augmented or depleted depending upon the reach. In a system already largely impacted through such conditions, additional maintenance is required to manage sediment and ensure the protection of streamside land uses.

- **Sediment transport is an inherently dynamic process.** Because of this dynamism, target conditions for sediment transport should not be stable or static, but should reflect some degree of variability and include the possibility of episodic high-magnitude events. For sediment management, target outcomes should reflect an acceptable range of conditions rather than a static prescribed form.
- **Sediment loading and vegetation growth are intimately related in a feedback loop.** Sediment supports the growth of vegetation within and along the creek or channel, and vegetation in turn benefits habitat quality by shading the creek or channel, reducing water temperatures, and improve oxygen exchange in the water column. However, excessive vegetation growth can reduce flood conveyance capacity; contribute to elevated nutrient loading, ultimately decreasing water quality; increase sediment deposition rates; and reduce habitat quality and complexity by creating shallow, diffuse flow conditions across the creek or channel bottom.
- **Sediment accumulation can reduce the creek or channel's ability to convey floodwaters.** This poses a particular challenge where streams that were historically broad, or part of a braided multi-channel system, are now confined into a single creek or channel. Historically, such systems deposited their sediments across wide floodplains. Now, such confined systems may be inherently depositional, depending on creek or channel hydraulics and the balance of slope vs. cross sectional area. In engineered systems, sediment is likely to deposit in reaches with relatively gentler gradients or where the creek or channel cross section is wider than necessary to convey expected loads. SMP stream managers recognize that some degrees of sedimentation or erosion will occur in a healthy stream—what is essential for stream management is to identify and address reaches where deposition or erosion are excessive. Sediment management triggers described below provide guidance on when sediment management should be initiated.
- **Accumulated sediment can obstruct infrastructure such as culverts and bridge underpasses.** This can lead to backwater conditions that further reduce transport, alter habitat, contribute to flooding, and potentially cause damage to in-stream and creek or channel bank structures.

4.3.2 Sediment Management Goals

Consistent with the Maintenance Principles and Framing Considerations described above, the goals of sediment management for the SMP are to:

- understand the way each reach functions as a sediment conduit within its stream, its subwatershed, and its land use context;
- identify an appropriate maintenance target condition that balances flood protection needs, economizes maintenance activities, and avoids and minimizes environmental impacts for that reach;
- contribute to improvement of water quality conditions through nutrients removal, invasive plants removal, and hydraulic improvement; and

- implement treatments that will enhance the stream's function toward the desired condition while minimizing the need for repeat maintenance.

Target conditions for each reach will be identified according to management needs, reach functioning, and other opportunities and constraints. The reach and its host stream will be managed to maintain and enhance sediment conveyance, water quality, and habitat.

Sediment will be managed for the following specific outcomes.

- a general balance between creek or channel aggradation and creek or channel erosion;
- adequate flood conveyance capacity;
- preservation and enhancement of beneficial in-stream bed forms and habitat features (including LWD) that support in-channel complexity, diverse cover, and local/micro habitats to the extent feasible; and
- development and preservation of the desired vegetation condition for the reach.

4.3.3 Sediment Management Triggers

In general, sediment management or removal activities are appropriate when any of the following conditions applies.

- The creek or channel is systemically aggrading such that creek or channel capacity is at risk. The degree to which creek or channel capacity has been reduced is determined based on visual assessment (during dry season and wet season conditions), cross section comparisons to the as-built channel condition (where appropriate), and any past record of flooding conditions.
- Accumulated sediment is covering culvert outfalls, drop-inlets in V-ditches, or filling box culverts, threatening to cause flooding or reduce the integrity and functionality of infrastructure such as bridges or culvert crossings.
- Sediment is accumulating in a way that supports excessive vegetation growth, threatening creek or channel capacity or creating undue roughness.
- In-stream structures designed to direct flows for flood management are causing excessive sediment deposition or bed or bank erosion.
- In-stream hardscape requires sediment removal to maintain as-built functions.

The need for sediment management action is unlikely if none of these trigger conditions are present.

4.4 Vegetation Management Approach

4.4.1 Framing Considerations

Five key considerations frame the context and approach for vegetation management activities.

- **Riparian vegetation provides physical stabilization for bank and terrace surfaces through the growth of root structure.** In addition to the structural benefits provided by roots, vegetation also contributes to bank stability by helping remove excess soil moisture, which can

contribute to slumping and other types of bank failure. This represents an important nexus between vegetation management and bank stabilization efforts.

- **Riparian vegetation benefits in-stream habitat by shading the creek or channel, drawing subsurface water up, lowering water temperatures, limiting in-channel emergent vegetation, and providing LWD.** Cooler water temperatures are preferable for cold water species. Shading of the creek or channel can also hinder the growth of in-stream emergent vegetation, in turn reducing the need for future in-stream vegetation management. Riparian vegetation pulls subsurface moisture up via the transpirational stream, in some cases, keeping water in the creek or channel. It also provides cover, forage, and breeding habitat for a variety of birds and other wildlife that use the streambank area.
- **Invasive species may limit the success of native, slower growing vegetation and can degrade habitat quality over time.** Because many invasive species (both native and non-native) grow quickly, they often out-compete non-invasive native species. This may occur to the point that entire creeks or channels are filled with fast-growing, invasive vegetation further degrading habitat quality.
- **Excessive vegetation growth can decrease a creek or channel's flood conveyance capacity.** This occurs in three ways. First, excess growth of in-stream and bank vegetation can obstruct the creek or channel by reducing its cross section and conveyance capacity of the floodway as a whole. Second, vegetation increases bed and bank friction or hydraulic roughness, resulting in energy losses, turbulence, decreased capacity, and leads to an increased threat of flooding. Third, increases in hydraulic roughness can encourage further sediment deposition as flow velocities slow.
- **Excessive vegetation growth can increase fire risks.** Many of the SMP Area creeks and channels abut residential areas. Excessive vegetation growth in these areas may provide tinder for fires that put homes and individuals at risk.
- **Excessive vegetation growth can undermine infrastructure.** Vegetation, particularly trees which may have wide or deep root structure, may undermine bridges, culverts and other infrastructure in the creeks and channels. Removal of such vegetation before it affects the integrity of such infrastructure will result in lower impact to the stream system than would be associated with replacement of infrastructure.
- **Establishing adequate flood protection may require aggressive vegetation management.** In areas where creeks are closely bordered by developed land uses or agriculture, the increased risk of flooding created by excess vegetation growth may be unacceptable, and it will be important to identify the threshold at which vegetation must be managed in each reach to provide adequate flood protection and ensure the safety of the community.

4.4.2 Vegetation Management Goals

Consistent with the framing considerations presented above, the goals of vegetation management are to:

- ensure that adequate flood conveyance capacity is maintained;
- ensure that fire risk is minimized;
- ensure that the integrity of infrastructure is maintained; and

- develop a mature and complex riparian canopy and corridor that offers substantial habitat, shading of the creek, and aesthetic value while minimizing future understory maintenance requirements.

In most creeks and channels, meeting these goals will require a balance between habitat and flood protection needs. Although it is possible to identify an ideal vegetation configuration, it may not be possible to achieve this condition in all reaches of all creeks and channels. As described in Chapter 3, *Environmental Setting*, a range of creek and channel vegetation conditions is observed in the SMP Area. The vegetation maintenance target for each reach is informed by an understanding of what potential conditions can be achieved. Vegetation should be managed to bring the reach as close as possible to its target condition. Over the longer term, management approaches will actively explore ways of improving the target condition of each reach, and to keep improving along the vegetation and habitat spectrum.

Within this context, vegetation will be managed for the following outcomes as appropriate for reach specific conditions:

- to develop riparian woodland/forest canopy closure;
- to encourage native vegetation and discourage non-native vegetation, particularly invasive species;
- to control emergent vegetation in the creek or channel;
- to minimize flow obstructions (particularly with respect to channel infrastructure such as bridges or culvert crossings; and
- to improve bank stability.

4.4.3 Vegetation Management Triggers

In general, vegetation management is appropriate when any of the following conditions occur:

- Vegetation growth is significantly decreasing flood conveyance capacity, particularly where infrastructure (e.g., bridges, culverts, storm drain outlets) or adjacent properties are at risk;
- Vegetation growth is significantly increasing fire risk, particularly where adjacent properties are at risk;
- Vegetation growth is beginning to impair the integrity infrastructure;
- Invasive non-native plants are reducing the success of native vegetation; or
- Vegetation management offers good opportunities to improve habitat value for fish and wildlife.

The decision to remove, thin, or preserve individual trees will be made in the field by SMP field staff familiar with regional and wetland ecology. Consideration for individual tree removal or thinning will be based on several factors including:

- What is the degree of blockage across the creek or channel and where is the tree located in the creek or channel?
- What is the type and age of the tree? Are there a lot of these trees already in the creek or channel reach? Are there better trees to preserve?

- Can the individual tree be pruned or thinned (before consideration of removal) to provide the necessary conveyance capacity?
- Does the tree under consideration provide shade or other habitat benefits?
- Does the tree under question provide longer-term canopy development or riparian corridor benefits?
- Does the tree or other vegetation under question pose a risk for catching on fire?
- Is the tree under question beginning to threaten the integrity of infrastructure?

The rationale to either thin, prune, or remove trees will be based on addressing these questions above. Answering these questions requires the oversight and guidance of a biologist or arborist that is familiar with the SMP Area's vegetation and knowledgeable of creek and channel botanical conditions.

4.5 Bank Stabilization Approach

4.5.1 Framing Considerations

The following five considerations frame the context and need for bank stabilization activities.

- **Bank failure is a natural occurrence.** Creeks and channels are dynamic environments whereby existing stream banks fail and collapse and new banks are formed through erosional and depositional processes. However, while bank failure happens quickly, stream bank formation takes a long time.
- **Human changes to the landscape affects floodplain functioning.** Under natural conditions, a stream's active channel or channels migrate laterally across the floodplain through a process of erosion and bank failure, through erosional avulsion and overtopping, or some combination of the two. Human intervention has historically attempted to control and constrain the sometimes erratic and unpredictable nature of streams. These attempts have been largely effective, but streams may continue to behave opportunistically, overtopping their banks and once again moving across the floodplain. At times, human intervention has been at the cost of proper geomorphic function and riparian habitat value.
- **Destabilized banks may restabilize naturally over time, but this is generally not feasible in urbanized areas.** The natural geomorphic recovery of eroded banks to reconstituted banks can occur through natural processes of vegetation recruitment and in-filling of sediment, but this can take several decades to occur (Wolman and Gerson 1978). The flood protection, land use, infrastructure, and water quality concerns in the SMP Area require more immediate corrective actions on failing streambanks. If bank failures occur in areas with homes or other infrastructure adjacent to the creek or channel, this presents a risk. In addition, eroding sediment from failing banks leads to increased sediment loading downstream.
- **Equilibrium can be restored or adjusted through intervention.** Under natural conditions, a stream's invert elevation, gradient, and shape self-adjust to balance discharge and sediment loading. This balance is dynamic, and to the extent that it is altered by human activities (including land uses in upper watershed and floodplain areas) intervention may be needed to restore balance, or guide a stream's response to disturbance.

- **City of Livermore creek and channel streambanks are mostly earthen.** Most of the streambanks in the SMP Area are earthen and not hardened. This is a different condition than more urban regions where flood control channels will typically be hardened. While several locations in the SMP Area do have rip-rap banks or concrete, these typically occur at crossings or other structures. The presence of mostly earthen banks provides the SMP with greater management and resource enhancement flexibility; though it does also increase the potential for bank instability, slumping, or erosion.

4.5.2 Bank Stabilization Goals

Consistent with the informed management approach described above, the goal of bank stabilization projects is to identify the cause or causes of instability in the affected reach, and implement the most appropriate solution based on that understanding. In general, bank protection will be designed to achieve one or more of the following related outcomes.

- Increased creek or channel and/or bank stability.
- Decreased need for repeat maintenance of banks.
- Reduced loading of eroded sediment into the creek or channel and to downstream reaches; reduced need for sediment management.
- Improved support for vegetation, facilitating increased habitat value.

Note that because improved bank stability reduces sediment input into the creek or channel and supports development of mature riparian vegetation, bank stabilization can be used as a coordinated treatment with sediment and vegetation activities. In this way, bank stabilization activities can provide several benefits to the overall health and function of the creek or channel.

4.5.3 Bank Stabilization Triggers

In general, bank stabilization is likely to be needed in reaches where one or more of the following conditions apply:

- Bank failure has occurred and the bank must be repaired to re-establish the banks of a flood control channel, preserve riparian vegetation, prevent additional sediment input to the creek or channel, and/or protect the creek or channel's flood conveyance capacity.
- Chronic bank erosion is occurring, leading to excess sediment loading and/or damage to riparian vegetation.
- Bank erosion or failure poses a threat to existing infrastructure or adjacent land uses.

4.6 Sediment Reuse and Disposal Approach

Though sediment reuse and disposal is not one of the three core activities of the SMP, it is an integral component of the maintenance program. Sediment removal activities described above (and in Chapter 5) will generate up to approximately 2,000 cubic yards of sediment per year. The majority of this material will be sediment but plant debris may be included. A small portion of the sediment can be reused onsite to support restoration activities or may be used for other City activities, but the majority will require offsite disposal. This section describes the planning approach

for sediment reuse and disposal as part of SMP maintenance activities. Sediment disposal activities will occur annually together with the core program activities. Sediment disposal planning also includes a longer-term consideration of sediment disposal needs as described below.

4.6.1 Sediment Disposal Goals

Federal and state regulations govern disposal of debris to land. The City must comply with these regulations, as well as ensure disposal activities do not harm people or wildlife. Thus, to ensure proper management of SMP maintenance activities and compliance with all appropriate regulations for disposal of sediment, the program has the following sediment disposal goals:

- Protect the safety of workers, the public, and the environment from potentially harmful debris;
- Beneficially reuse as much sediment as possible from maintenance activities;
- Do not use sediment to fill creeks, lakes, or wetland habitat, except as part of previously permitted projects that are seeking good quality fill material;
- Contain disposal sites to prevent the migration of sediment to nearby waterbodies;
- Comply with human health and environmental protection standards, as established by federal and state agencies, for all sediment disposal activities; and
- Protect and ensure that fragments of regenerative matter cannot re-enter local creeks and channels (e.g., invasive species such as *Tamarix*).

To meet these goals, the City will conduct annual planning for sediment disposal, as described below.

4.6.2 Annual Disposal Planning

Sediment disposal planning will be coordinated and integrated with the annual SMP work cycle (as described in Chapter 8). The annual sediment disposal planning process includes the following key steps:

Step 1: Identify the Need, Location, and Volume of Sediment Removal

The first step in annual sediment disposal planning is to determine the disposal needs for the identified maintenance work sites. As part of the maintenance project design process (see Chapter 8), specific locations and quantities of sediment will be identified. Surveyed cross sections may assist in calculating locations and quantities of sediment to be removed.

Once the volume and locations of the sediment to be removed are known, reuse or disposal options can be evaluated. Following the disposal goals presented above, all efforts will be made to reuse sediment on-site. However, it is likely that off-site disposal will be necessary.

Step 2: Identify Sediment Disposal Options

Sediment disposal options are grouped into seven categories based on potential reuse or disposal opportunities. These include on-site reuse, other City creek or channel reuse, other wetland supporting reuse, upland agricultural or commercial reuse (dry), upland agricultural or commercial reuse (wet), landfill disposal, and hazardous waste disposal options. These disposal options are

listed below in preferential order according to how well the options support program objectives for sustainability and avoidance of environmental impacts.

- **Option 1: Onsite reuse.** This includes reusing the sediment on-site (i.e., at the project site) within the creek or channel for various fill or restoration purposes. For example, sediment excavated from the creek or channel bottom could be placed adjacent to the active channel (remaining within the easement area), to enhance soil, vegetation, and riparian habitat conditions. Sediment could also be used on-site for bank stabilization purposes.
- **Option 2: Other City site reuse.** Similar to Option 1, this includes reusing the sediment within other City owned or managed creeks or channels, for fill or restoration purposes. The key difference is that Option 2 would occur at a different creek or channel within the SMP Area, but in a similar setting to where the sediment was originally removed.
- **Option 3: Wetland or floodplain restoration or enhancement.** Option 3 consists of beneficial reuse of the sediment outside or off-site of City creeks or channels, but in a wetland or floodplain setting to support ecologic functioning and habitat.
- **Option 4: Upland agricultural or commercial reuse (dry).** Sediment would be reused for upland agricultural or commercial reuses that are dry, whereby the sediment would not be secondarily eroded to creeks or channels or water bodies.
- **Option 5: Upland agricultural or commercial reuse (wet).** Under this option, sediment would be used as fill in an already approved and permitted wetland project. This is a specific case where an approved and permitted project requires the use of sediment to fill a wetland. It is important to note that this sediment disposal plan in no way encourages or sanctions the filling of existing wetlands. However, for projects that are already approved and permitted, it may be preferable to use sediment materials that share similar wetland properties. In this way, using good quality excavated creek or channel sediment for reuse in a wetland setting may be preferable or advantageous to using other fill material or soils.
- **Option 6: Landfill disposal.** In this option the sediment would be disposed at an approved and operating landfill for use as daily cover material for landfill operations. Locations could include Raymond Road, Altamont, or Vasco landfills.
- **Option 7: Hazardous waste disposal.** This option involves the disposal of sediments containing hazardous levels of contaminants. Hazardous waste will be disposed at appropriate hazardous waste facilities. The nearest hazardous waste landfill is located in Kettleman City, California.

These seven options will be pursued in decreasing preference. Multiple options can be selected in a given maintenance season for sediment disposal. It is anticipated that off-site disposal (Options 3, 4, 5, 6, and 7) will be required for the majority of maintenance activities. Option 7 would only be used if the sediment is deemed hazardous. The specific disposal sites for the options selected will be identified as part of annual sediment planning.

A resource assessment will be necessary for most potential disposal sites, though not necessary for the landfill and hazardous waste options. A resource assessment and screening will include delineating wetlands at the disposal site, evaluating site habitats for suitability and presence of sensitive species, and reviewing the site's cultural and historic resources. Other natural resources that may influence the site's suitability to receive sediment will also be evaluated. Similarly, the

assessment of site resources will guide and screen the selection of the most suitable disposal methods.

The following criteria were developed specifically for the SMP to guide sediment disposal activities:

- Disposal of sediment cannot conflict with previously planned land uses, as identified in city/county general plans or more site-specific plans.
- All required permits and approvals will be obtained prior to the onset of disposal activities.
- Biological and cultural surveys will be conducted at each site to determine the potential for impacts on sensitive resources. If sensitive resources have the potential to occur onsite, the site will not be selected for disposal unless measures can be implemented to avoid and protect the resources.
- Sediment disposal will not result in fill of wetlands or waters of the U.S. or state (unless previously permitted).
- Based on compliance with California Code of Regulations (CCR) Title 22 criteria, no sediment identified as hazardous or designated waste will be placed at the site.

This resource assessment information will be provided in the annual SMP notification and reporting process described in Chapter 9 to verify that the sites are acceptable. These criteria will be used to inform Steps 3 and 4 below, develop Step 5, and verify Step 6 as well.

Step 3: Characterize Physical and Chemical Properties of Sediment

Once the sediment removal sites and disposal options are identified, the characteristics of the sediment will be evaluated to determine the most appropriate disposal locations.

Identification of the physical and chemical characteristics of the sediment is also necessary to comply with federal and state regulations for disposal.

Sediment characteristics can vary according to site conditions. Sediment removed near a storm drain outfall may contain higher concentrations of urban contaminants, such as petroleum residue, compared to sediment removed from an upslope area as part of bank stabilization activities. Urban contaminants have the tendency to adhere to fine (silt and clay) sediments which settle to the creek or channel bottom, as opposed to coarser (sand and gravel) sediments located on the creek or channel banks. Additionally, large quantities of organic matter mingled with fine sediments encourage absorption of urban contaminants. Thus, when sediment is removed from the creek or channel bottom as part of creek or channel maintenance activities, the removed sediment may contain higher concentrations of pollutants than those found in sediment removed as part of bank stabilization activities. Also, the texture or size of bed sediments decreases from coarse sand and gravel to fine silts and clay moving from upstream to downstream, so fine sediment removed from areas lower in a watershed may contain higher concentrations of pollutants than those found in sediment removed from areas higher in the watershed. Therefore, every attempt will be made to collect representative samples at each project site.

The number of samples collected and sampling locations will be determined depending on the project type and volume of sediment to be removed. A minimum of four sediment samples will be collected at sites where less than 20,000 cubic yards are removed. However, if more than 20,000 cubic yards of sediment will be removed from a single reach, the San Francisco Bay RWQCB

Beneficial Reuse Guidelines (San Francisco Regional Water Quality Control Board 2000) will be followed to determine the proper sampling plan.

For all projects, any observed contamination as evidenced by chemical-like odors, oily sheens, or irregularly colored sediment will be immediately reported to the local fire department's hazardous materials team and the appropriate San Francisco Bay RWQCB staff person in the Cleanups and Investigations Unit. In addition, if results are found to exceed selected water quality criteria, the City will coordinate with the San Francisco Bay RWQCB to develop a contingency sampling plan. In this event, additional samples will be taken to determine the extent of contamination and pinpoint potential contamination sources. All samples will be analyzed for total metals and other contaminants, as required by the San Francisco Bay RWQCB.

The sediment must meet the Sediment Management Provisions as required by permits issued by the San Francisco Bay RWQCB. For reuse in wetland enhancement projects in contact with surface waters, such as creeks, wetlands, and lakes, the sediment must meet San Francisco Bay RWQCB Beneficial Reuse Guidelines and Basin Plan water quality objectives. Sediment must meet EPA Regional Screening Levels for chemical contaminants for reuse at upland agricultural or commercial sites. In order to be disposed as landfill cover, the sediment must meet landfill acceptance requirements of the participating landfill. Lastly, if testing results indicate that the sediment is hazardous such that the sediment would not be accepted at the preferred disposal location, it will be disposed at the nearest hazardous waste facility.

Step 4: Identify the Appropriate BMPs to Avoid or Reduce Impacts Generated by Sediment Loading, Transport, and Disposal Activities

All BMPs implemented for the maintenance activities, as described in Chapter 7, Table 7-1, will be applied to activities associated with loading, transport, and disposal of sediment. Based on the amount of sediment requiring off-site disposal, an estimate of the number of trucks required for transport to the disposal location will be identified, as well as the hauling routes.

Step 5: Notification

Consistent with the annual notification process for the SMP (Chapter 9) the City will also notify the appropriate regulatory agencies permitting the SMP on the status of annual sediment disposal needs (following the planning process outlined above) and the intended disposal site options. Sediment testing results will be provided to the agencies along with the notification package.

Step 6: Reporting

Consistent with the annual reporting requirements of the SMP described in Chapter 9, a description of the conducted sediment disposal activities and relevant information on sediment quality and testing (as necessary) will be included in the annual SMP summary report.

Chapter 5
Maintenance Activity Descriptions

5.1 Introduction

This chapter identifies and describes the activities of the SMP. The primary program actions include sediment management, vegetation management, and bank stabilization. These primary activities are described below in Sections 5.2, 5.3, 5.4, and 5.5 respectively. Descriptions for these three core activities are focused on maintenance of creeks and channels with the SMP Area. This chapter describes other program activities as well (Section 5.6 and 5.7), including bridge maintenance, trash and debris removal, and access and trail maintenance.

The implementation of maintenance activities will be guided by the Maintenance Principles described in Chapter 4, whereby in-channel work will not occur unless the conveyance capacity is considered reduced below design capacity such that a flood hazard exists. The activities described in this chapter will also incorporate the program-wide impact avoidance and minimization approaches and activity-specific BMPs discussed in Chapter 7, *Impact Reduction and Minimization Measures*, and identified in Tables 7-1 and 7-2.

5.2 Timing of Work

Sediment management, vegetation management, and bank stabilization can be classified either as causing ground disturbance or not. In Table 7-1, BMP GEN-1 *Work Window* describes the annual timing of maintenance work according to the status of the maintenance project as either causing or not causing ground disturbance. All ground-disturbing maintenance activities occurring in the creek or channel (e.g., sediment removal, bank stabilization) will take place during the low-flow period, between May 1 and October 31. Exceptions may be made for emergencies or on a project-by-project basis with advance approval of the USACE, San Francisco Bay RWQCB, CDFW, and/or USFWS as appropriate. Ground-disturbing activities will only be conducted during periods of dry weather. In the fall season, once the first significant rainfall occurs, all in-channel equipment and/or diversion structures shall be removed. Exposed soils in upland creek or channel areas will be stabilized via hydroseeding or with erosion control fabric/blankets. Significant rainfall is defined as 0.5 inch of rain in a 24-hour period. Non ground-disturbing work on the upper banks of creeks or channels (e.g., vegetation removal, road, and v-ditch maintenance) may be conducted year round. Non ground-disturbing work (vegetation thinning/pruning) may be conducted in the creek or channel zone beyond the primary maintenance work window of May 1 to October 31, if the creek or channel is dry (and with notification and approval by the regulatory agencies).

5.3 Sediment Management

Sediment management refers to the removal of excess sediment from constructed flood protection facilities such as culverts and storm drain outlets. Sediment removal will occur at individual crossings, culverts, outlets, other in-channel facilities, or other individual reaches where sediment

accumulation is determined to be a concern. All creek and channel sediment removal activities will follow the impact avoidance and minimization approach and principles described in Chapter 4 and will incorporate the best management practices described in Chapter 7 and presented in Table 7-1.

The SMP primarily involves sediment removal to maintain storm flow conveyance from adjacent streets into the creek and channel system. There are currently 149 storm drain outlets and 50 road and bridge crossings in creeks and channels within the SMP Area that require routine maintenance for flood protection. In some instances, such as the stretch of Arroyo Las Positas above its confluence with Altamont Creek, the SMP also includes reestablishment of channel capacity through sediment and vegetation removal focused on maintaining an open low flow stream within the wider channel flood zone. One of the objectives of the City General Plan is to maintain the creeks in as natural state as possible while maintaining the health and safety of the community. Every creek reach will be evaluated for opportunities to provide for habitat restoration benefits.

The number of outlet and culvert locations identified for sediment removal and the quantity of sediment removed in a given year will depend on the frequency and extent of past maintenance activities, and the weather and hydrologic conditions during recent years. Sediment removal requirements are generally greater following a wet winter with higher than usual runoff, slope erosion, and sediment delivery compared to an average or dry winter when sediment yields are less.

The City anticipates that on average, the SMP will involve removing between 1,000 and 2,000 cubic yards of sediment per year, not including the Holmes Street bridge site which averages closer to 20,000 cubic yards of gravel per year.

The following sections further describe the program's sediment removal approach.

5.3.1 Sediment Sources

Three primary mechanisms are observed to explain abundant sedimentation in certain SMP Area reaches. These primary mechanisms are watershed sediment sources, creek or channel geometry, and flow conditions (hydrology and hydraulics).

In general, sediment is delivered to a reach as transported material from upstream areas. This source material may be derived from upland areas (including landslides, gullies, or sheetwash erosion) or may be eroded directly from the creek or channel bed or banks upstream. Upstream sediments are transported downstream through the drainage network of joining tributaries.

In terms of creek or channel geometry components, gradient, creek or channel width, and depth of flow are the key causal factors. A low gradient stream may favor sediment to fall out of suspension or result in bedload transport. A wide creek or channel cross-section may cause the dispersion of flows and reduced flow velocities resulting in net deposition and bed aggradation. The lack of a defined channel that can contain small and medium sized flows (approximately less than the 2-year return interval) within the broader cross-section can also be a cause for sedimentation. In such cases, shallow diffuse flows are not adequate to transport sediment downstream. This results in deposition and aggradation across the entire width of the creek or channel bed. The potential use of two-staged low-flow channels to improve fine sediment transport and reduce deposition is described in Section 5.3.2.4, *Creation of Two Stage Low Flow in a Creek or Channel*.

Hydrologic processes including intensity and duration of precipitation, infiltration, runoff, shallow throughflow, and recharge determine the water balance of the watershed and how much flow is

carried in the creek and channel system. Such hydrologic processes determine the magnitude, duration, and frequency of flows arriving to a reach. The in-channel hydraulic conditions will determine whether sediment will be deposited in a given reach, be eroded from the reach, or be transported through the reach. Sediment transport processes are complex and a combination of any or all three of these processes could occur in a given reach.

It should be noted that prior to European settlement the Tri-Valley floor was a depositional area, and there were probably few if any channels that traversed the Tri-Valley floor. Flows from the hills collected in the large Tule Lake in the valley. Separate channels on the western side of the valley conveyed high flows from Tule Lake to the lower Alameda Creek watershed. Because of this, the region does not contain gradients that are sufficient to convey all sediment through the valley floor, and some level of anthropogenic sediment removal will always be necessary to maintain flood flow capacity in the SMP Area channels. The frequency of sediment removal and the volume of sediment that must be removed can be reduced by incorporating low flow channels into the larger channels. But some level of sediment removal will always be necessary.

5.3.2 Sediment Removal Areas

Sediment removal areas will be targeted at appropriate locations. Typically this will be limited to a maximum 15-foot radius at specific storm drain outlet locations, and may occasionally necessitate the creation of a low flow channel (upwards of 50 feet in length by 3 feet wide) to convey storm drain flows into established low-flow channels. Sediment removal also might involve material removal from a 200-foot section of creek or channel immediately upstream or downstream of a site where sediment is known to collect, such as a bridge or culvert (e.g., the Holmes Street culvert crossing). The principal objective of sediment removal is to ensure adequate flood conveyance by removing accumulated sediment and debris from inside culverts, underneath bridges, and at outlet structures. Culverted crossings often accumulate sediment and debris either due to their design conditions (size and slope) or due to debris or vegetation obstructions which cause secondary sedimentation.

Though typically occurring at culvert or bridge crossings, localized sediment removal activities can also occur at specific focus points at a mid-reach location. When required, the creek or channel will be excavated to near as-built conditions locally within the creek or channel footprint; however, the area of disturbance will be limited such that habitat continuity is maintained for focal species. As an example, sediment removal could be limited to no more than one half the width of the creek or channel in any given year in order to provide for ongoing forage and cover habitat for focal species. This excavated zone will capture future deposited sediment and continue to provide easy access for removal. In other locations, sediment removal may be focused in critical areas, such as around storm drain outlets, instead of an entire reach.

Sediment removal projects will typically involve the following activities:

- removal of accumulated sediment from box culverts, corrugated metal pipes (CMP), storm drain outlets, and areas immediately upstream and downstream of the culverts or bridge crossings (typically 100–200 linear feet and 500–1,000 cubic yards of sediment removal per crossing);
- installation of temporary access ramps if needed to enter the sediment removal site;
- dewatering if necessary;
- selective removal or thinning of vegetation at sediment removal locations;

- placement of weed barrier fabric and riprap at storm drain outlets following sediment removal; and
- flushing of storm drain outlets, as necessary, back to the nearest street manhole using dechlorinated water.

Most of the culvert crossings that the City maintains are concrete box culverts. Culverts greater than 36 inches in diameter tend to require use of an excavator from the road crossing above or directly inside the culvert if space allows. Large box culverts with cement bottoms and enough space for a person to enter may be cleared with a small Bobcat®, skidsteer, or walk-behind power-shovel. A vacuum truck can also be used to remove sediment from culverts.

Sediment removal from culvert crossings will also often include the removal of sediment and the clearing of debris both immediately upstream and downstream of the culvert. As described above, a designated in-channel sediment removal area immediately upstream or downstream of the culvert provides maintenance and environmental benefits. This is particularly advantageous at crossings because access from a roadway above is available.

Using such in-channel targeted collection areas near crossings can reduce the need for additional in-channel disturbance further upstream or downstream of the crossing.

A storm drain outlet blocked with sediment or vegetation will not drain properly. Removing sediment from a small culvert outlet may require similar techniques as described above for culvert crossings, but may also simply require digging out the culvert outlet by hand. Following the removal of sediment and vegetation, it may be necessary to flush the storm drain outlet back into the storm drain pipe and remove this debris water at the nearest upstream manhole using a vactor truck. Water used for this activity will be dechlorinated beforehand per the BMP in Table 7-1. As a final step, weed barrier fabric and riprap will be placed within the sediment/vegetation removal zone in an effort to minimize the frequency of future maintenance impacts.

5.3.2.1 Mechanized Sediment Removal

Aggraded sediment is removed with a long-reach excavator, bulldozer, scraper, or front loader. When using a long-reach excavator, sediment is excavated from the creek or channel bed, collected, and removed with the excavator usually positioned on the maintenance roads located along the top-of-bank. If the creek or channel shape or the presence of large mature vegetation along the creek or channel banks prevents working from the top-of-bank, then the excavator may be positioned lower on the creek or channel banks using an access ramp. Use of access ramps are described below. When working near the upstream or downstream limit of a reach the excavator may be positioned on the stream road crossing or culvert.

Once excavated, sediment is either placed directly into dump trucks parked on the access road or stockpiled into central locations along the creek or channel to drain, after which it is subsequently lifted to the adjacent dump trucks.

BMPs and avoidance and minimization measures will be applied to sediment removal activities based on equipment used, site conditions, and access to the site. If equipment is operated in such a way that loose sediment may possibly enter the active channel, erosion control fabric will be installed at the toe-of-slope or along the edge of the active channel to avoid delivery of any dislodged sediment into the creek or channel and/or low-flow channel. If equipment is used within the creek or channel, or if activities conducted from top-of-bank may affect the active channel, the work area

will be isolated from flowing stream segments using silt fences, wattles, and/or cofferdams (see Section 5.3.2.5, *Dewatering*, below for more details).

Additional BMPs are identified in Table 7-1 and will be applied as appropriate to all sediment removal projects.

5.3.2.2 Creek and Channel Access and Staging

Access to the project site and staging of equipment and vehicles will take place on existing access roads adjacent to the creek or channel. The engineered channels have at least one access road running along the top-of-bank on one side of the channel. More often channels have an access road on either side of the channel.

When necessary, sediment removal activities can be conducted from within the creek or channel bed. This approach is favored where top-of-bank or side-bank access is unavailable, or would require unnecessary damage to trees along the riparian corridor. In-channel sediment removal activities would occur under dry creek or channel conditions when possible. If sediment removal activities are required in a flowing stream, dewatering actions as described in Section 5.3.2.5 would be implemented. Scrapers, skid loaders, bulldozers, and smaller Bobcat® type loaders are used when working directly in the creek or channel bed.

Access ramp locations are selected to minimize impacts to vegetation, while providing efficient, safe equipment access to the work area. If used, access ramps will be regraded and replanted following the sediment removal activities. The ramps will be seeded with native grasses and erosion control fabric will be installed. In this way, access ramps can provide habitat value on an interim basis between maintenance events. Access ramps will be maintained free of trees such that future access to the channel can be gained through the same route without additional loss of trees.

All removed sediment, whether working from top-of-bank, or in-channel will be dried onsite as necessary and placed in 10- or 20-cubic-yard dump trucks located on the access road or within the staging area. As appropriate, exposed soil on streambanks that remains after sediment removal activities will either be seeded with grass and covered with erosion control fabric or planted according to the on-site restoration planting designs described in Chapter 8, *Program Mitigation*.

5.3.2.3 Vegetation Thinning or Removal

Sediment removal projects often require some degree of vegetation removal or thinning in order to access a project site or begin conducting work on the creek or channel bed or bank surface. Cattails, willows, Himalayan blackberry, palm trees, and various non-native grasses are the plants most typically thinned or removed.

Whenever possible, access points will be sited to avoid trees and shrubs and will take place in locations where vegetative cover is minimal. If vegetation must be removed to provide short-term equipment access, removal of non-native species or less desirable species will be prioritized. Other vegetation characteristics such as age/size of tree, local vegetation diversity, and if the vegetation is providing a particular habitat value will also be taken into consideration when prioritizing removal of vegetation for creek or channel access. In areas where routine or repeated sediment removal is needed (once every three years or more often), an access route to the creek or channel will be maintained free of woody trees and shrubs. These access points will be stabilized with native grasses and fabric. To reduce effects on habitat quality, the width of the access point should be the

minimum needed to provide safe access for equipment. Please see Section 5.4 for additional discussion regarding tree removal.

For in-channel vegetation removal prior to conducting sediment removal activities, an effort will be taken to maintain and not remove vegetation that provides creek and channel stability, anchors in-channel bars, or provides habitat benefits through the presence of LWD. Vegetation located on in-channel bars is particularly important at the bar's downstream tip (head) and/or along the bar's periphery. Allowing this vegetation to remain also provides shading benefits to the adjacent low-flow channel. Similarly, the presence of LWD will be evaluated for the opportunity to leave such material in place. Key determinants include whether the LWD is deflecting flow toward banks and the proximity to a creek or channel crossing or other facility. While the habitat benefits of LWD are generally desirable in the SMP Area, these benefits will be evaluated in balance of the potential flooding or erosion effects, or threats to infrastructure downstream due to the presence of LWD. Low flow channels will remain free of LWD. Any removal of LWD will be considered for reuse elsewhere within the SMP Area and in a restoration location that would not increase flooding potential, erosion effects or threaten infrastructure downstream.

Invasive vegetation will be targeted for removal. Section 5.4 below describes vegetation management approaches in more detail.

5.3.2.4 Creation of Two-Stage Low-Flow in a Creek or Channel

Developing a low-flow channel within a creek or channel that can successfully transport sediment under lower flow conditions (annual flows and smaller) is an important strategy to reduce sediment deposition. The City will utilize this approach when necessary in individual creek and channel reaches. This approach is not only advantageous in terms of preserving creek and channel capacity, but also provides important water quality and habitat benefits. The general approach is to design a smaller conveyance channel nested inside the overall creek or channel width. This smaller nested channel will have the hydraulic geometry conditions adequate to convey and pass sediments under lower flow conditions. As described above, where a defined channel is absent, gradients are gentle, and flows are shallow and diffuse across the creek or channel bed, on-going deposition will occur.

To the extent possible, excavation of a low-flow channel should follow the channel thalweg (low point or bottom) or the location of the existing (or pre-existing) low-flow channel. If the low-flow channel has been fully aggraded, a new low-flow channel will be designed and excavated to an appropriate width, depth, and slope for the reach. Sediment removal and low-flow channel excavation activities will not exceed the depth of the original channel design. To the extent possible, the low-flow channel form and alignment will be based on creek or channel forms and sinuosity in the existing creeks or channels observed in the SMP Area.

If the reach easement and creek or channel cross section is too narrow for a sinuous low-flow alignment, the low-flow channel will be sited to the side of the creek or channel that receives the most shade. In east-west aligned creeks and channels, this would be on the south side of the creek or channel where the low-flow channel would receive the most shade from any vegetation present on the south bank. If the creek or channel does not have much existing vegetation, either on the south or north sides, tree planting will be integrated with the project during the following planting season, as with all creeks and channels receiving maintenance that have planting opportunities (see Section 5.4 and Chapter 8, Section 8.4.1, for additional detail on tree planting).

5.3.2.5 Dewatering

Dewatering of the stream may be required in order to conduct sediment removal in the creek or channel. Many SMP Area creeks are intermittent or ephemeral and are dry in the summer maintenance season. Other creeks and channels are perennial and carry flow year-round.

Several of the creeks and channels in urbanized areas, or downstream of urbanized areas that were historically dry in summer, now receive flows from urban runoff and contain water year-round. If the creek or channel is conveying water or ponding at the time of maintenance, dewatering techniques may be used. Typically a coffer dam, pump, and re-routing pipeline are used together to dewater a short section of creek or channel at a time. The coffer dams are typically constructed using gravel bags or, if necessary, an inflatable rubber cofferdam. Pumping rates are set to match inflows to the coffer dam with the downstream release of the diverted flows. Pump intake lines are protected with screens according to NMFS and CDFW criteria to prevent the entrainment of aquatic species. The diverted flows are released back into the creek or channel as near as possible to the downstream end of the project area. Silt bags are used at the end of the diversion pipe to reduce any sediment discharge downstream and to dissipate flow velocity and prevent scour at the discharge site.

Creeks and channels will only be dewatered to the extent necessary to conduct sediment removal activities while protecting water quality and avoiding impacts to aquatic species. Specific BMPs for creek and channel dewatering are described in Table 7-1, *Biological Resources Protection*.

5.3.3 Sediment Disposal

Sediment disposal activities are essential to the completion of the sediment removal, bank stabilization, and vegetation removal activities. As discussed in Chapter 4, Section 4.6.2, annual sediment disposal planning will occur to facilitate the safe removal and disposal of the program's sediment. Through pre-planning efforts, disposal sites will be identified and permitted for use in accordance with federal, state, and local regulations, and appropriate landowner permits or agreements. The sediment disposal plan, developed along with the workplan for annual maintenance activities, will identify disposal sites; loading, transportation, and placement BMPs; transportation routes; and other procedures to avoid or minimize potential impacts on people and the environment. Once the sediment has been tested (if required), disposal locations confirmed and the quantity of sediment requiring off-site disposal are identified, implementation of the annual sediment disposal plan will proceed.

Sediment disposal activities off-site will involve loading, transport, and placement of sediment at the selected disposal locations. Sediment loading will take place at or near the creek or channel maintenance site and involve use of front-end loaders and bobcats to collect and place sediment into hauling trucks. Multiple hauling trucks may be filled depending on the quantity of sediment to be disposed. The trucks will be covered to prevent spillage during transport, and applicable BMPs described in Table 7-1 will be implemented to prevent impacts during handling and transport of the sediment. Sediment may be temporarily staged near the creek or channel maintenance site a minimum distance of 100 feet from the creek or channel to allow an appropriate drying time prior to transport (upwards of three days). Applicable BMPs described in Table 7-1 will be implemented in this circumstance to prevent movement of sediment back into the creek or channel.

Transport from the maintenance site to the disposal locations will occur through preplanned routes identified in the sediment disposal plan. These routes will avoid congested areas, to the extent

feasible, and transport will occur outside of peak traffic periods. Placement of the sediment at the offsite locations may involve use of equipment, such as bulldozers. The same BMPs applied during loading of the sediment, including those relating to equipment staging and maintenance, will be applied while activities are conducted at the disposal site. The disposal site will be managed in the same manner as the maintenance sites. If sediment is transported to a landfill for disposal, the trucks will unload the sediment at the landfill. The landfill operators would then handle the sediment. Extra handling and transport precautions may be required if the sediment is classified as a hazardous material.

Typically, the City either hauls sediment directly to a landfill or to their maintenance service center where the material is held for future reuse.

5.4 Vegetation Management

The presence of cattails and other dense vegetation along the creek or channel bed has resulted in diminished hydraulic capacity within some creek and channel reaches. The presence of this vegetation and the resulting reduction in flow capacity increases the flooding potential. In addition, the overgrowth of vegetation leads to increased fire risk during the dry season, or could compromise existing infrastructure (e.g., bridges). The SMP seeks to manage vegetation to reduce the flooding and fire potential, prevent damage to infrastructure, and preserve and enhance creek and channel habitats as much as possible.

Vegetation management refers to the trimming and removal of vegetation that is significantly decreasing flood conveyance capacity or presenting a fire hazard, particularly where infrastructure (e.g., bridges, culverts, storm drain outlets) or adjacent properties are at risk in SMP Area in creeks and channels and flood control facilities. Vegetation management also includes planting of new trees in creeks and channels at the top-of-bank and just above the toe-of-slope.

As described above in Section 5.2, *Timing of Work*, non ground-disturbing vegetation work on the upper banks of creeks and channels may be conducted year round. If the creek or channel is dry, and with notification and approval by the CDFW, non-ground disturbing vegetation thinning/pruning work may be conducted in the creek or channel zone beyond the primary maintenance work window of May 1 to October 31. More specifically, vegetation management occurs on different schedules depending on the type of thinning or removal being conducted.

Vegetation management activities and general period of implementation are shown below.

- Routine vegetation pruning and removal (trees, *Tamarix*, cattails, blackberries) on the lower bank and in-channel bed—May 1st to October 31st (with the potential for an extension dependent upon dry conditions and agency notification and approval).
- Tree planting and irrigation (as required)—all year.
- Upper bank planting and irrigation, pruning, and removal, access road and v-ditch clearing—all year.
- Top of bank mowing (access roads and trails as required)—April 15th to October 31st.
- Access road spraying—April 1st to May 31st.

To the extent feasible, vegetation pruning and removal will take place outside the migratory bird and raptor nesting period (February 15 through August 15 for most birds). During the nesting bird season, work sites that are less densely vegetated will be prioritized, to facilitate pre-maintenance surveys and decrease the likelihood of disturbing undiscovered nests. If maintenance activities must be scheduled to occur during the nesting season, a qualified wildlife biologist, familiar with the species and habitats in the SMP Area, will be retained to conduct pre-maintenance surveys for raptors and nesting birds within suitable nesting habitat within 300 feet of SMP activities (see Table 7-1, BMP BR-8). If active nests are identified within the SMP area, non-disturbance buffers shall be established at a distance sufficient to minimize disturbance based on the nest location, topography, cover and species' tolerance to disturbance. Buffer size shall be determined in cooperation with CDFW.

Vegetation management and removal activities are relatively consistent from year to year, though locations change. Years that experience flooding or strong winds may require additional work to clear downed trees or vegetation debris. Conversely, vegetation management needs following dry or drought years are generally reduced. Some creeks and channels may require annual vegetation management while others do not. This largely depends on the type of vegetation in the creek or channel. For example, creeks and channels characterized by cattails or willows may need annual pruning while creeks and channels with a mature riparian canopy generally require less maintenance to maintain flow capacity.

All listed plants are native riparian species found in Alameda County waterways. Not all species will be equally appropriate for all sites; the planting list for any given site should be developed in consideration of the current and known historic native flora of the site and the local subwatershed area.

Vegetation management techniques include hand removal using small tools and hand-held equipment, mechanical removal using heavy equipment, and spot chemical control. Heavy equipment used for vegetation removal may include a flail mower attachment on an excavator or Bobcat® that is used to cut cattails, or a backhoe or rubber-tracked excavator that is used for removing material from the creek or channel (see Section 5.4.1 for more detail on when these techniques may be used and the equipment used).

Vegetation management activities vary depending on the type of creek or channel involved. While the methods described here are the common practices of the City, maintenance techniques may shift over time and by location depending on site constraints and new technologies. The following paragraphs describe vegetation management activities in the different types of creeks and channels within the SMP Area.

BMPs and avoidance and minimization measures are identified in Table 7-1 and will be applied as appropriate to all vegetation management projects.

5.4.1 Vegetation Management in Creeks and Channels

5.4.1.1 Willow Removal

Willows are commonly found in reaches throughout the SMP Area. These species generally grow from the bank slope, near or at the toe-of-slope, and can grow into and across the creek or channel bed quickly, often within a single season. Arroyo willows (*Salix lasiolepis*) can be an issue for creeks and channels due to their rapid growth and the bushy structure of the plant which is effective at

slowing flows and trapping debris. Red, yellow willow (*Salix lutea*), and shining willow (*Salix lucida* Muhl.) species are better suited as they generally form a main trunk that can be limbed up, allowing room for flows. Species like red, yellow, and shining willow are retained where they do not present issues for flows or roughness. Arroyo willows will be removed wherever they are significantly impeding the flow of water, or in areas that contain more desirable tree species. If arroyo willows are not removed, they will be pruned to minimize their ability to catch debris and impede the flow of water.

When willow removal is conducted, it will be implemented selectively such that vegetation is not removed along entire reaches. Potential examples of how willow removal will be conducted include only targeting areas of dense growth, areas along one side of the creek, or areas around culverts or inlets. In subsequent years, maintenance activities will target areas not maintained in the previous cycle. This approach will ensure that some function of vegetative cover (e.g., stream shading, cover for amphibians) is retained in each maintained reach.

Willow removal generally requires hand clearing using chainsaws, pole saws, pruners, and loppers. Willow stumps may be hand treated with an herbicide such as Aqua Master® (formerly known as Rodeo®) to prevent future growth. Cut vegetation must then be removed from the creek or channel. This is achieved using a variety of methods including hand removal (passing branches up the slope), attaching a line to the cut limbs and pulling them up the slope with the aid of an excavator arm, using an excavator reaching into the creek or channel from top-of-bank, or using a skid-steer with a grapple bucket. In cases where willow root wads protrude from the creek or channel bottom after limbs have been pruned, these are generally left in place but depending on the creek or channel size and geometry, the root wad may require removal to reduce roughness on the creek or channel bed. Removal of a root wad generally requires the use of heavy equipment such as an excavator.

Any use of heavy equipment in the creek or channel for vegetation management purposes will follow and utilize the avoidance measures and BMPs identified for sediment removal projects in Table 7-1.

5.4.1.2 Cattail Removal

Cattails are commonly (but not necessarily) found in reaches with little to no riparian canopy. Cattails generally establish in low-gradient creeks and channels that support flows throughout much of the year. This often means cattails are found within the active channel in areas of slow-moving flow. Finer sediments naturally settle out in these locations, but further sedimentation is encouraged by cattails that slow flows and trap sediments.

Maintenance generally occurs later in the summer so that cattails do not have time to reestablish and grow before winter. Cattails are generally removed using bladed weed-eaters. In areas where mature trees do not prohibit access, heavy equipment, such as an excavator with a flail mover extension positioned at top-of-bank, may be used. This approach to cattail management is a shorter term solution as cattails readily grow back.

Cattail removal may also be combined with sediment removal. In such cases, the creek or channel is cleared of both sediment and cattails using methods described in Section 5.3.2 in order to increase creek or channel capacity. This approach includes removal of cattail roots along with the sediment and has proven successful in reducing in-channel cattail re-growth for several years. Whether implemented only as a vegetation management activity, or a combined vegetation management and sediment management activity, the approach applied will be similar to that described in Section

5.4.1.1 and Section 5.3.2 where maintenance actions will avoid complete removal of all vegetation in any single maintenance season when feasible.

Over the long-term, cattail growth is further discouraged by the development of a canopy over the creek or channel, strategic planting of cattail competitors, and the establishment of a low-flow channel.

Cattail management requires a multi-pronged approach that considers vegetation interactions (canopy shading, competition, and ecological succession stage) as well as geomorphic processes (sediment accumulation and flow frequency). Early seral vegetation can provide light shading and has a higher stem density then an established riparian corridor and can be an initial and effective retardant to cattail development. Climax riparian vegetation such as large oaks, bays, alders, box elders and maples over hanging the creek or channel will provide more complete shading and exclude cattails.

5.4.1.3 Tree Pruning and Invasive Species Removal

Maintenance activities related to tree pruning and exotics removal focus on selectively thinning brush and multi-trunked trees. The preferred maintenance approach is to prune lower limbs up to the top of the creek or channel banks, if possible. Multi-stemmed trees are pruned down to a single trunk and lower limbs are removed up to the top of the creek or channel banks, if possible. The goal of this maintenance approach is to develop a native canopy over the creek or channel but not to increase creek or channel roughness such that the flood hazard is increased.

In the top-of-bank area outside the creek or channel (including the access road and adjacent above channel area), healthy native mature trees are only trimmed if a limb is blocking the access road, hanging over a fence into a private yard, or appears unbalanced or broken. Enough space will be maintained along the access road to allow maintenance and emergency vehicles.

The California Invasive Plant Council (Cal-ICP) maintains an inventory of all known invasive plants in the state. In addition, the Cal-ICP developed the Cal Weed Mapper tool (http://calweedmapper.cal-ipc.org/) to provide guidance on the invasive plant species local to a selected region. The invasive plant species known to occur in and around the Planning Area, as defined by the Cal Weed Mapper tool and based on local knowledge, are shown in Table 5-1.

Non-native, invasive trees and bushes, may be cleared from the top-of-bank area or within the creek or channel. Invasive species removals shall be handled in a manner to prevent spread of seed and shall be contained such that stray plant parts do not leave the site or contaminate adjacent areas. Additionally, invasive species removal shall occur before weed species seed set whenever feasible.

Non-native, mature trees that provide canopy or may provide habitat to nesting birds or raptors, such as eucalyptus, may be selectively removed if other native mature trees are present nearby and the loss in canopy and/or habitat is not considerable. If these trees are the only mature trees along the creek or channel and provide the only canopy and habit in the area, they will be left in place until such a time as a native canopy is developed.

Tree pruning will take into consideration the extent of local riparian canopy and vegetation in general. For example, if the active channel is fully shaded by arroyo willow, the removal of which would expose the creek or channel to direct sunlight, pruning techniques, such as allowing a narrow strip of vegetation to persist on the south side of the bank to shade the creek or channel, will be

used. The reach will also be identified for planting of more desirable trees the following planting season.

Hand clearing is usually required on bank slopes using chainsaws, pole saws, pruners, and loppers. Hand clearing may also be used at the top-of-bank to remove hazard trees (e.g., snags, dying or dead trees, broken branches) from areas with high public use or that are adjacent to residences or other structures.

The BMPs identified in Table 7-1 and will be applied, as appropriate, to all tree and exotics removals.

5.4.1.4 Tree Removal

Mature, healthy, native trees are generally only removed if creek or channel capacity is significantly limited, if the tree is creating unacceptably high hydraulic roughness in the creek or channel and the situation cannot be rectified though use of pruning, or if the tree is posing a threat to infrastructure. This includes species such as Western sycamore which shall be avoided whenever feasible. Sick, dying, or dead mature trees may be removed if they are determined to be reducing creek or channel capacity, increasing roughness, has the likely potential of falling into the creek or channel and increasing the flood hazard, or presenting a potential safety hazard to recreational users (in areas where the access road is accessible to the public) or adjacent structures. The determination of tree health and likelihood of being a hazard to people or creek or channel capacity is made on site by appropriate environmental staff (arborist or biologist). Snags will be left in place to provide habitat for birds and small mammals if it is determined by staff that they do not otherwise pose a flood or safety hazard. Sick, dying, or dead trees/snags may also be pruned so that the flood and/or safety hazard is reduced and so that at least a portion of the tree may remain in place to provide habitat.

As described above in Section 5.3, the presence of LWD will be evaluated for the opportunity to leave such material in place. Key determinants include whether the LWD is deflecting flow toward banks and the proximity to a creek or channel crossing or other facility. While the habitat benefits of LWD are generally desirable in the SMP Area, these benefits will be evaluated in balance of the potential flooding or erosion effects due to the presence of LWD.

Removal of trees from the creek or channel bed may require heavy equipment in the creek or channel depending on the size of the tree and the site conditions. This may require a backhoe, excavator, or Bobcat® with a tree-spade attachment.

5.4.1.5 Top-of-Bank Maintenance

Grasses in the top-of-bank area are mowed or weed-whipped up to three times annually. All slash, sawdust, cuttings, will be left in place as mulch (except in the active channel).

5.4.2 Access and Staging

Access to maintenance sites will occur via the adjacent access roads where present. At project sites with no access road, access will be provided via the least environmentally damaging, yet feasible, route (typically along the top-of-bank area). Access to vegetation maintenance sites occurs via the adjacent access road to the general location, and by foot into the creek or channel. Removal of mature trees for access to the creek or channel bed by foot is generally not necessary. Selective clearing of shrubs or trees may be necessary on the banks to provide access to the creek or channel

bed. If clearing is required, invasive species such as blackberry or fast-growing species such as arroyo willow will be targeted.

Staging for vegetation maintenance activities will occur to the extent possible on the adjacent access road. Cut vegetation will be transported from the creek or channel bed up the bank slope to the access road by hand or by mechanical equipment such as a an excavator or back hoe. Cut vegetation will be chipped on site and/or hauled away in a dump truck.

5.4.3 Herbicide Use

Herbicide use in creeks and channels within the SMP Area is minimal. In-channel use of herbicides is limited to direct application on stumps of trees, such as willows that have been removed during maintenance, and for invasive species eradication. Herbicides are also used on unpaved access roads during the spring to suppress weeds from the roadway and to protect the integrity of the road. However, there is no use of herbicides on portions of access roads that are set within the creek or channel banks.

For the top-of-bank access roads, herbicides are sprayed from a truck-mounted rig. The area sprayed is limited to as a narrow a width as practicable. Spraying usually occurs early in the morning to reduce the possibility of contact with recreational users at the sites that are also recreational facilities.

The City generally uses Aqua Master® (formerly known as Rodeo®), an aquatic contact herbicide that consists of glyphosate isopropylamine salt and water, for treatment of stumps and access roads, but other herbicides may be used depending on the target plant species. A drift-reduction agent such as Stay-Put® is mixed with the herbicide. Drift-reduction agents such as Stay-Put® commonly consist of poly-acrylamide or polyvinyl polymers.

All herbicide application activities are conducted in accordance with applicable federal, state, and local regulations (under regulatory authority of the EPA, the DPR, and the Alameda County Agricultural Commissioner, respectively) and the City will utilize BMPs as identified in Table 7-1 when applying herbicides. See Chapter 2, Section 2.2.4, for a more complete description of relevant regulations pertaining to herbicide use and the SMP compliance approach.

5.4.4 Vegetation Control with Grazing Animals

As an alternative to herbicide use, grazing animals (e.g., sheep and goats) may be employed to manage vegetation for flood and fire control purposes. The animals would be confined to the creek and channel banks using one or more of the following: fences, low voltage electric fences, sheep dogs, and human sheep herders who would remain with the animals at all times. The Contra Costa County Flood Control and Water Conservation District (CCCFCWCD) is currently experimenting with this vegetation management technique (Contra Costa County Flood Control and Water Conservation District 2012).

5.5 Bank Stabilization

Bank stabilization involves the repair and stabilization of eroded or eroding stream or reservoir banks. Bank stabilization activities occur in creeks and channels, including culvert outlets in

streams. Bank stabilization activities are generally conducted from May 1st to October 31st when streams are at their driest. Work shall be planned to be completed prior to October 31st. In years that are dry, the City may request work be authorized by the regulatory agencies to begin earlier than May 1st and extend past October 31st (usually not longer than an extra two weeks on either end) subject to agency approval. Based on past activities, bank stabilization projects in the SMP Area typically require two to four days to complete.

5.5.1 Bank Stabilization in Creeks and Channels

Similar to the sediment removal activities described above, the number of new bank stabilization projects undertaken in a given year depends on weather and hydrologic conditions during recent years. Over the past ten years, the City has only implemented one bank stabilization project. It is estimated that upwards of three bank stabilization projects could occur over the ten-year SMP program term. The need for bank stabilization is more likely in wet years when banks shear or slump due to bank soil saturation, high soil pore water pressure, and high stream velocities. Another key factor influencing bank stability is rodent activity and the presence of burrows within the bank that can reduce bank integrity.

The bank stabilization designs and implementation activities described below draw upon a palette of bioengineering techniques addressing slope stability. These approaches include using engineered back filled soils, erosion control fabric, and planting of native riparian trees at the top-of-bank and the toe-of-slope to provide additional bank stability and increased canopy in the creek or channel. As availability allows, sediment used in bank stabilization projects will be taken from stockpiled sediment collected during sediment removal projects. Where soil compaction, erosion control fabrics, and revegetation are not adequate in providing a stable slope on their own, other bioengineered solutions would be prioritized over the use of hardscape installations.

Use of hardscape is discouraged in the SMP. Hardscape will only be used in cases where other alternatives would not result in a sufficiently stabilized slope. A typical condition where a hardscape solution may be expected to be used is to stabilize an emerging culvert outlet to prevent reoccurring erosion. In such cases, rock will be used only beneath and below the culvert outfall, as well as on the sides to ensure stability of the culvert. Rock sizes are typically 1 foot in diameter or less (sized accordingly for culvert size). If riprap must be used for other bank slope stabilization purposes, it will consist of rock typically between 1 foot and 2 feet in diameter.

The specific design of a bank stabilization project depends on site-specific conditions such as: (1) the type of bank failure (sheered slope, undercut bank, rotational slump, culvert failure, etc.); (2) hydraulic conditions (bank height, angle, shear stress, etc.); (3) geomorphic setting (such as the inside or outside of a stream bend); and (4) the characteristics of the creek or channel adjacent to the site. These site-specific conditions will be considered when selecting treatments.

Chapter 9 provides more detailed information on program implementation including the site reconnaissance, evaluation, prioritization, and design steps that would be considered in developing a suitable bank stabilization design.

Bank stabilization sites will be revegetated with native riparian trees regardless of whether or not a riparian canopy existed at the site prior to the repair project. Native riparian trees will be planted just above the 2-year event water level and/or at the top-of-bank, spaced appropriately based on tree species and the desired canopy extent. Tree selection will consider site location, how appropriate the site is for the tree type, and the potential for the tree to destabilize the bank slope in

the future. Arroyo willow (*Salix lasiolepis*), which is common to these systems, will not be planted due to its wide shrub-like form and the increases in creek or channel roughness this species causes. Native grasses will be seeded or planted in areas disturbed by bank stabilization activities, including between existing or newly-planted trees.

When repairs are made, banks are recontoured to match the adjacent bank slope (i.e., returned to pre-failure condition). Most creeks and channels within the SMP Area have bank slopes of 2:1 or steeper. If site conditions allow, the bank slope may be stabilized at a less steep slope (reducing the likelihood of renewed failure), but only if the work is conducted within the confines of the original creek or channel as-built condition. Stabilized banks will be flush with the existing bank slope, and only limited new material may protrude from the bank.

Individual bank stabilization projects covered under this program should not affect more than 300 consecutive linear feet of bank. Repairs shall be confined to an area not to exceed 10 feet beyond the failed or failing bank or structure. 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, as necessary. Bank failure sites may contain exposed soils or, by the time of bank repair, be covered by vegetation such as grasses or blackberries. Overgrown vegetation will only be removed to the extent necessary to repair the bank.

Equipment used for bank stabilization activities may include excavators, bulldozers, frontend loaders, and 10- and 20-cubic-yard dump trucks. Staging will occur on adjacent access roads. Soil and rip-rap will be staged in areas that have been previously disturbed (i.e., service road, turn-outs, etc.).

BMPs and avoidance and minimization measures will be applied based on the equipment used, site conditions, and access to the site. If repair activities affect the active channel, the work area will be isolated from flowing stream segments using silt fences, wattles, and/or cofferdams. Additional BMPs are identified in Table 7-1 and will be applied, as appropriate, to all bank stabilization projects.

5.6 Other Maintenance Activities

5.6.1 Bridge Maintenance

Bridge maintenance consists of repairing existing bridges (e.g., concrete patching or localized reinforcement), treatment of scour erosion around bridge structures, painting, graffiti removal and cleaning. Such maintenance will require foot and vehicle access into the creek or channel bottom. Where existing access is not present, it will be established per the description above for sediment removal (Section 5.3.2.2).

5.6.2 Culvert Repair and Replacement

Culverts in the SMP Area occasionally require repair or replacement. The installation and repair of drop-inlet culverts and the clearing, repair, or replacement of road crossing culverts are the most common routine culvert maintenance activities. A discussion of these culvert activities is provided below.

5.6.2.1 Drop-Inlet Culverts

Drop-inlet culverts are typically used to route drainage from V-ditches on the outside edge of the channel access roads (or other upland areas) to the stream channel below. These culverts cross beneath the access road and generally exit into the channel bank a few feet above the toe-of-bank.

Installation of a new drop-inlet culvert may be appropriate where existing V-ditch drainage and routing are not adequate. Pooled water in the V-ditch that is not adequately drained can overtop the bank and then directly flow down the bank face causing surface erosion or rotational failures due to saturated soils. Additionally, flows entering the upper bank area increase the opportunity for bank failure. New drop-inlet culverts would be installed to drain areas within the channel right-of-way to reduce bank failure issues related to pooling water.

Beside installation of new drop-inlet culverts to aid drainage, the repair of existing drop inlet culverts is also a routine maintenance activity.

The following design guidance is provided to ensure proper drop-inlet culvert functioning while avoiding and reducing impacts:

- Repair or replacement of an existing culvert will occur within the same footprint as the original culvert. The existing culvert may be replaced with a larger size culvert if it is determined that the existing culvert was undersized for the anticipated range of flows.
- The culvert outfall path, from the culvert edge down to toe-of-slope should be protected with erosion control material as needed to dissipate energy and reduce the erosion potential.
- The culvert placement and slope will be installed to minimize outfall velocity and reduce the potential for future bank erosion and scour from outfall. Energy dissipation approaches will be used as needed.

5.6.2.2 Road-Crossing Culverts

Road crossing culverts may require repair or replacement due to structural failures of the culvert or supporting footings or headwalls, or the partial or complete internal failure of the culvert itself. Causes of failures may include improper sizing, misalignment, the road design and its loadings, and the age of materials. Culvert failure typically reduces hydraulic capacity due to flow obstruction by the culvert, sediment, or debris that collects as a result of the failure. Failure may also lead to increased erosion downstream of the culvert where concentrated flows may become more erosive.

Repair or replacement of an existing culvert will occur within the same footprint as the original culvert. The existing culvert may be replaced with a larger size culvert if it is determined that the existing culvert was undersized for the range of flows that occur in the channel. Culvert replacement will include replacing the culvert (generally CMP or reinforced concrete pipe [RCP]) and anchoring it in place as appropriate depending on existing road crossing conditions. Culverts will generally be installed using an excavator working above the channel from top-of-bank. Culverts will be placed at grade and anchored to subgrade. The excavation will be backfilled and the bull walls poured. When forms are removed the remaining fill material will be added and protective rip-rap installed at the outfall. Road material will be laid, graded, and compacted.

Like with other maintenance projects, staging will occur to the extent possible on the access road adjacent to the channel. Rip-rap for the replacement will also be stockpiled on the access road, or other disturbed areas.

This SMP intends to cover repair activities for existing culverts of all sizes. Where feasible, arched culverts, or culverts with buried bottoms that allow natural substrate to be present along the length of the culvert, will be incorporated into the replacement design. The use of arch culverts is not feasible in circumstances where existing road height or soil types are incompatible.

5.6.3 Habitat Restoration and Landscape Maintenance

Habitat restoration includes wetland and upland enhancement, restoration, and creation activities (e.g., site clearing, grading, planting, and irrigation) and long-term management of restored habitats (e.g., maintenance weeding, replanting or reseeding, irrigation repair and removal, biological resource data collection) along creek channels in conjunction with or as mitigation for SMP maintenance activities.

Landscaping and irrigation systems adjacent along creek channel banks must be occasionally maintained to keep vegetation along the banks alive and healthy. In many places, these areas provide a buffer between the creek channel and adjacent trails. Landscaping may include new or replacement plantings and seeding. Plant and seed material selection would include non-invasive non-hybridizing (based on best available information) native or ornamental species that are compatible with the adjacent channel habitats and landscaping.

Irrigation systems in Livermore deliver both potable and recycled water. Both types of water have been used for irrigating plant material in creeks and channels. Flushing of the water system and repairs are subject to the regulations specific to water systems. Where irrigation systems are near or within the creek or channel banks special care must be taken when maintaining the irrigation system including best management practices used for flushing storm drain outfalls and doing any construction work within or near a creek. BMPs identified in Table 7-1 will be applied, as appropriate.

5.6.4 Trash and Debris Removal

Trash and debris consists of all non-sedimentary materials deposited in creeks and channels as a result of floodwaters or through human activity, including such materials as downed trees and/or tree limbs, tires, shopping carts, trash, furniture, homeless encampments, and other substances. Debris removal is performed infrequently in creeks and channels. Debris removal may also be required to provide access for minor maintenance activities at stream gages, outfalls, culverts, flap gates, and grade control structures.

The SMP approach to the removal of woody debris is described above in Sections 5.3.2.3, *Vegetation Thinning or Removal*, and Section 5.4.1.4, *Tree Removal*. The City patrols its creeks and channels to remove debris that could significantly increase the potential for flooding. Debris removal activities are generally conducted either by trained volunteers who are supervised by City work crews or work crews alone using hand tools and occasionally a winch. Heavy equipment is typically not used for debris removal. Vegetative debris may be chipped on site or simply removed via dump truck.

Non-vegetative debris is removed from the site via dump truck for disposal at a solid waste landfill. However, containers of hazardous waste, such as paint and oil, are sealed in protective containers and disposed at an appropriate hazardous waste facility. BMPs identified in Table 7-1 will be applied, as appropriate.

Related to debris removal, the City utilizes its law enforcement resources to control the establishment of homeless encampments on the creeks and channels that it owns. Such encampments can be major sources for debris, garbage, and water pollution.

5.6.5 Access Road and Trail Maintenance

Access road and trail maintenance may include grading and/or resurfacing road repairs and vegetation removal. Access road and trail maintenance work may involve hand tools, mechanized equipment, or chemical application (for vegetation treatments).

The potential timing for road and trail maintenance activities is:

- **Access Roads**
  - Road repairs, grading, and/or resurfacing—All year.
  - Access road pruning—All year.
  - Spray dirt/gravel access roads for weeds—March 1st to April 30th.
- **Trails**
  - Trail repairs, grading, and/or resurfacing—All year.
  - Access road and trail pruning—All year.
  - Spray dirt/gravel trails for weeds—March 1st to April 30th.
  - Signage and striping—All year.

To the extent feasible, access road and trail maintenance activities will take place outside the migratory bird and raptor nesting period (February 15 through August 15 for most birds). If maintenance activities must be scheduled to occur during the nesting season, a qualified wildlife biologist, familiar with the species and habitats in the SMP Area, will be retained to conduct pre-maintenance surveys for raptors and nesting birds within suitable nesting habitat within 300 feet of SMP activities (see Table 7-1, BMP BR-8). If active nests are identified within the SMP area, non-disturbance buffers shall be established at a distance sufficient to minimize disturbance based on the nest location, topography, cover and species' tolerance to disturbance. Buffer size shall be determined in cooperation with CDFW.

Road repairs will generally require grading to restore the original contours of the road. Road repairs may also include replacement of culverts, pipes, valves, drop-inlets or other similar structures that help to drain the road. Equipment used may include a motor grader, roller, and trucks. All repairs will be conducted in compliance with the City's Standard Plans, Details and Specifications.

Vegetation removal for road and trail repair and maintenance will be accomplished by pruning of limbs and branches that overhang the road or trail, mowing, and/or application of contact herbicides approved for use in aquatic environments. The access road and the area between the access road and the fence lines enclosing City right-of-ways or easements will be mowed to reduce fire hazards and protect the integrity of the roadway and fence.

During the spring, the City will use AquaMaster® herbicide or a similar product on the surfaces of gravel access roads to discourage weeds from establishing in the roadway and protect the integrity of the road. Spraying is limited to as a narrow a corridor as possible, and only gravel road surfaces will be treated.

As described in Section 5.4.3, all herbicide application activities will be conducted in accordance with all applicable federal, state, and local regulations as referenced in Chapter 2, Section 2.2.4, (under regulatory authority of the EPA and the Alameda County Agricultural Commissioner, respectively) and the City will utilize BMPs as identified in Table 7-1 when applying herbicides.

Table 5-1. Invasive Plant Species Known to Occur In and Around the Planning Area

Scientific Name	Common Name
Agrostis stonifera	creeping bentgrass
Ailanthus altissima	tree-of-heaven
Arundo donax	giant reed
Atriplex semibaccat	Australian saltbush
Avena barbata	slender wild oat
Bellardia trixago	bellardia
Brassica nigra	black mustard
Brassica rapa	birdsrape mustard, field mustard
Briza maxima	big quaking grass, rattlesnake grass
Bromus diandrus	ripgut brome
Bromus hordeaceus	soft brome
Bromus japonicus	Japanese brome, Japanese chess
Bromus madritensis ssp. *rubens*	red brome
Bromus tectorum	downy brome, cheatgrass
Carduus tenuiflorus and *C. pycnocephalus*	slenderflower and Italian thistle
Centaurea calcitrapa	purple starthistle
Centaurea melitensi	Malta starthistle
Centaurea solstitialis	yellow starthistle
Cirsium vulgare	bull thistle
Conium maculatum	poison -hemlock
Cotula coronopifolia	brass buttons
Cynara cardunculus	artichoke thistle
Cynodon dactylon	bermuda grass
Cynosurus echinatus	hedgehog dogtailgrass
Dittrichia graveolens	stinkwort
Elymus caput-medusae	medusa head
Erodium ciciutarium	redstem filaree
Eucalyptus globulus	Tasmanian bluegum
Festuca arundinacea	tall fescue
Festuca myuros	rattail fescue
Festuca perennis	Italian ryegrass
Foeniculum vulgare	fennel
Genistamon spessulana	french broom
Geranium dissectum	cutleaf geranium
Helminthotheca echioides	bristly oxotongue
Hirshfeldia incana	shortpod mustard, summer mustard
Hordeum murinum	hare barley

Hypochaeris glabra	smooth catsear
Hypochaeris radicta	rough catsear, hairy dandelion
Lepidium chalepenses	lens-podded whitetop
Lepidium latifolium	perennial pepperweed
Lobularia maritima	sweet alyssum
Lythrum hyssopifolium	hyssop loosestrife
Manthapulegium	pennyroyal
Marrubium vulgare	white horehound
Medicago polymorpha	California burclover
Myriophyllum aquaticum	parrot feather
Myriophyllum spicatum	eurasian watermilfoil
Nicotiana glauca	tree tobacco
Olea europaea	olive
Oxalis pes-caprae	Bermuda buttercup, buttercup oxalis
Pharlaris aqautica	hardinggrass
Phoenix canariensis	Canary Island date palm
Plantago lanceolata	buckhorn plantain, English plantain
Polypogon monspeliensis	rabbitfoot polypogon
Pyracantha angustifolia, crenulata, seratus	pyracantha, firethorn
Raphanus sativus	radish
Robina pseudoacacia	black locust
Rubus armeniacus	Himalyan blackberry
Rumex acetosella	red sorrel, sheep sorrel
Rumexcrispus	curly dock
Salsola tragus	Russian-thistle
Schinis molle	Peruvian peppertree
Schinus terebinthifolius	Brazilian peppertree
Schismus arabicus and *S. barbatus*	mediterranean grass
Silybum marianum	blessed milkthistle
Stipa miliacece var. *miliaceca*	smilograss
Tamarix parviflora	smallflower tamarisk
Tamarix ramosissima	saltcedar, tamarisk
Trifolium hirtum	rose clover
Verbascum thapus	common mullein, wolly mullein
Vinca major	big periwinkle
Washington robusta	Mexican fan palm

Chapter 6
Estimated Maintenance Activity Impacts

6.1 Introduction

This chapter provides an overview of program impacts related to water quality, habitat, aquatic functions, and focal species. The impact summary is not a comprehensive disclosure of program impacts, nor is it a complete statement of environmental impacts to be used for compliance with CEQA. A comprehensive description of program impacts will be provided in the SMP IS/MND. Rather, the impact discussion in this chapter provides a context and rationale to understand the program's mitigation approach (Chapter 8) given the resources over which the regulatory agencies have jurisdiction.

The impact discussion in this section is organized through the framework of Beneficial Uses. Beneficial Uses are a collection of functions and values identified for water bodies in an RWQCB Basin Plan. The CWA and Porter-Cologne Act grant the RWQCBs authority to assign and protect these Beneficial Uses. One of the ways in which the San Francisco Bay RWQCB protects Beneficial Uses is to set water quality objectives for physical parameters and pollutants in waters of the State; compliance with water quality objectives is intended to sustain some of the Beneficial Uses assigned to the water body. The San Francisco Bay RWQCB is also responsible for assuring that activities that it authorizes do not result in a net loss of waters of the State. In practice this means that projects authorized by the San Francisco Bay RWQCB should not result in a net loss of acres of wetlands and other waters or net loss of linear feet of stream channels.

Beneficial Uses include a wide range of resource topics such as aquatic functions and values, fish and wildlife habitat protection, and effects on state- and federally-listed species. The Beneficial Uses identified for and applicable to water bodies within the SMP Area are shown in Table 6-1. The SMP Manual describes three main activity types: sediment management, vegetation management, and bank stabilization. This section describes the potential direct and indirect impacts to aquatic and terrestrial habitat and water quality Beneficial Uses that may occur as a result of implementing SMP activities. These impacts are characterized as temporary or permanent, as appropriate, and any residual impacts remaining after implementation of avoidance and minimization measures are discussed. Additionally, beneficial impacts resulting from the maintenance activities are discussed in light of their effect on Beneficial Uses.

The impact discussion considers the approach to maintenance presented in Chapter 4, the description of activities presented in Chapter 5, and the avoidance and minimization approach presented in Chapter 7. In other words, this impact discussion assumes that the pre-maintenance planning and impact avoidance measures described in Chapter 4 and the BMPs described in Chapter 7 have already been applied. As such, the impact discussion focuses on the residual impacts of SMP activities that cannot be completed avoided or minimized, and may still require additional compensatory mitigation.

6.2 Summary of Program Impacts by Activity Type

6.2.1 Sediment Removal Activities

6.2.1.1 Potential Adverse Impacts

Sediment removal activities could adversely impact Beneficial Uses due to disturbance to sensitive species habitat, creek or channel dewatering, and hazards from use of equipment in the creek or channel. Potential adverse impacts on Beneficial Uses are summarized in the first row of Table 6-1.

Sediment removal activities may adversely affect habitat for sensitive wildlife, fish, and plant species. Impacts on sensitive species from sediment removal activities would potentially result from direct disturbance to the streambed and bank, in-channel vegetation removal, and creek or channel dewatering.

Removal of sediment in the creek or channel would also remove vegetation (small willow trees and cattails) established in the accumulated sediment. As a result of the nature of sediment movement in the creeks and channels maintained under the SMP, in-channel vegetation quickly reestablishes, largely on an annual basis. Thus, in-channel vegetation will reestablish and the disruption to habitat is temporary.

However, in some areas of Livermore, irrigation runoff is leaching boron and other alkali salt components from soils and discharging alkaline waters to stream channels and ponds. While well-established vegetation may be somewhat resistant to the impacts of elevated surface water salinity, it may be more difficult for new vegetation to become established in more alkaline conditions. For example, at a 10-year old sediment removal project in Altamont Creek adjacent to the Springtown Golf Course, elevated boron levels in surface waters have prevented vegetation in the impacted reach from becoming established at pre-sediment removal levels. Therefore, it may be necessary to assess alkalinity levels in soils and surface water at some project sites. In addition, some sites may require soil amendments before vegetation can be successfully restored at the impact sites.

Temporary creek and channel dewatering for sediment removal activities may adversely impact water quality and biological resources. Installation, operation, and removal of dewatering systems will involve disturbance to the streambed and bank, which can temporarily increase turbidity in the water column surrounding the work site and encourage transport of sediment downstream. Additionally, isolation of the work site and redirection of creek flow could harm aquatic species, such as fish and frogs. Implementation of BMP BR-4 *Impact Avoidance and Minimization during Dewatering* in Table 7-1 will alleviate these impacts. Once maintenance activities are complete, creek or channel flow would be restored as would water quality and biological resources. Use of mechanized equipment such as bobcats and front-end loaders for sediment removal in the creek or channel would present an opportunity for accidental release of hazardous materials to the environment. Spills or leaks of fuel or lubricants could temporarily or permanently contaminate water quality and habitat, as well as harm maintenance workers and residents. This impact would have the potential to occur only during maintenance activities and would be mitigated by implementation of BMPs HAZ-1 through HAZ-8, as described in Table 7-1.

These temporary sediment removal impacts will be avoided or minimized through the maintenance approach described in Chapter 4 and the BMPs listed in Tables 7-1 and 7-2 for sediment removal

activities. However, even after implementation of appropriate BMPs, some residual impacts are expected to be unavoidable.

6.2.1.2 Potential Beneficial Impacts

In addition to the adverse impacts of sediment removal discussed above, long-term permanent beneficial impacts will result from sediment removal activities, as summarized in Table 6-1. Sediment removal activities would not significantly alter creek functioning nor would they reduce the quantity of habitat supported by the reaches.

In terms of water quality and biological resources, removal of fine sediment from the creek or channel bed will improve water quality filtration and groundwater recharge functions. Creation and maintenance of low-flow channels will encourage fine sediment to settle on small benches, similar to floodplain functioning. In this way, under small storm events or during the dry season, the low-flow channel will be free flowing as sediment accumulates on the benches, thus enhancing future fish passage opportunities and in-stream fish habitat.

Removal of invasive in-channel vegetation, such as cattails, will not only improve flow conditions but also provide opportunities for a diverse variety of wetland vegetation to establish in the creek or channel, if the site is actively managed to promote revegetation with a more diverse species palette. Having a variety of in stream vegetation enhances overall function by providing a mixture of stream inputs (leaf litter and decomposition, stem runoff, etc.) and diverse soil-root-water interactions.

In the absence of sediment removal, most City-maintained creeks and channels in depositional areas will develop to cattail dominated and blocked streams. For several reasons previously discussed, large expanses of cattails are not ecologically desirable, nor compatible with flood management objectives. Overall, periodic sediment removal in conjunction with selective tree and shrub removal, thinning, and planting activities are anticipated to provide an overall benefit to native plant and wildlife habitat.

6.2.1.3 Conclusions

While sediment removal activities will result in several long-term benefits as described above, they will also result in adverse impacts to water quality and biological resources through direct disturbance to in-stream habitat. As part of ongoing program development and refinement (per Chapter 9, Section 9.8, *Annual Reporting*, Section 9.9, *Data Management*, and Section 9.10, *Five-Year Program Review*), SMP monitoring efforts will document changes in creek or channel composition and function resulting from sediment removal activities. In this way, the true measure of program impacts and benefits will be better understood over time.

6.2.2 Vegetation Management Activities

6.2.2.1 Potential Adverse Impacts

Vegetation management is generally categorized into three types of activities: vegetation removal, pruning, and planting. Management of both native and non-native or invasive plant species is conducted throughout the SMP Area. Methods for vegetation management vary from use of heavy machinery and chemical controls to selective tree pruning and hand weeding.

These activities are focused on clearing over-grown vegetation, fallen trees, or other debris that is inhibiting flow. These activities are targeted and generally small scale in nature. Creek and channel vegetation removal is focused on maintaining movement of water through the system. Such maintenance activities are localized, have a limited footprint (typically less than 0.8 acre), and are usually targeted at road crossings, culverts, and at storm drain outlets.

Potential impacts associated with vegetation management activities include temporary loss of understory vegetation, creek or channel canopy, and nesting habitat, as well as temporary water quality degradation, as summarized in Table 6-1. Selective pruning and removal activities may result in the short term reduction of canopy provided by understory trees, shrubs, and vines plants. Shrubby vegetation, such as arroyo willow (*Salix lasiolepis*), will be removed to improve flow conveyance and promote taller upright tree species to establish canopy cover over the creek or channel. Pruning and removal of exotic trees or arroyo willow growing on the lower bank may also reduce the existing creek or channel canopy cover. Loss of canopy cover may encourage growth of invasive plants, such as cattails, in the creek or channel. Loss of taller trees could reduce available nesting habitat for birds such as raptors. However, removal of tall exotic trees within the riparian corridor that provide shading over the creek or channel will rarely occur as the benefit provided by their shade and nesting habitat in most cases outweighs their adverse effects. In general, large exotic trees will not be removed (unless identified as an immediate hazard) until an appropriate replacement has been planted and has grown large enough to provide similar habitat and wildlife functions (shade, perching, nesting, foraging, etc.).

The methods employed for vegetation management will have varying impacts on water quality and biological resources in the creek or channel. Similar to the impacts for sediment removal activities, any vegetation removal work in the creek or channel that involves ground disturbance, such as root wad removal, may result in increased sediment loading to the creek, particularly if heavy equipment is used. Avoidance and minimization measures will be required for any mechanized vegetation removal activities. Hand removal activities, such as tree pruning and invasive species removal, will minimally impact water quality and biological resources. Planting activities will minimally impact creek or channel habitat because the majority of these activities are conducted by hand.

The physical removal of invasive plants, such as *Arundo donax*, could result in the spread of invasive plant seeds, stems, or rooting structures (e.g., rhizomes) into adjacent habitats and downstream areas resulting in further habitat degradation. Additionally, imported materials for bank stabilization, restoration, or erosion control activities could contain seed or plant materials that would be undesirable and unsuitable to creeks and channels in the Planning Area. To prevent these impacts, invasive plant species control measures (described in Table 7-1) would be implemented. These include requirements to import only certified weed-free materials, focus invasive species removal before flowering and seed set, and containment of invasive plant parts being removed to prevent their spread.

Herbicides used to prevent growth of invasive plants, such as willows and blackberry, or to keep access roads free of vegetation, could impact non-target vegetation or water quality if improperly used. Accidental herbicide spills could adversely impact water quality and biological resources. To prevent these impacts, herbicide use will be restricted to hand application to vegetation in the creek or channel and strictly controlled spray application on access roads. Additional minimization measures for herbicide application activities are described in Chapter 7 and Table 7-1.

The use of grazing animals for vegetation management could result in direct impacts to creeks and channels including the trampling of focal species, soil degradation, nutrient inputs and bacterial contamination from dung and urine, and the introduction and dispersal of non-indigenous seeds and propagules (Reeves and Champion 2004). BMPs implemented during maintenance will reduce these potential impacts (Table 7-1).

6.2.2.2 Potential Beneficial Impacts

The longer-term vegetation maintenance approach will achieve incremental habitat lift, whereby larger single-trunked trees are preferentially pruned and planted in place of shrubby bank species or dense trees such as arroyo willow. As a mature canopy develops, less light may reach the creek or channel bed and banks below reducing the presence of shrubby vegetation beneath the canopy. Reduction of shrubby in-channel vegetation improves flow conveyance capacity in the creek or channel, thus reducing the potential for flooding. Wildlife habitat in the majority of stream reaches in the SMP Area will benefit from development of upper bank riparian, as opposed to in-channel, vegetation.

A developed riparian overstory helps provide water temperature control for the benefit of cold water species, such as steelhead trout. Therefore, loss of understory vegetation that is replaced by other canopy-providing vegetation is not considered adverse. The replanting of in-stream overhanging sedges and grasses will also provide some habitat value for frogs and a variety of insects.

6.2.2.3 Conclusions

Maintenance Principles (Section 4.2), *Vegetation Management Approach Framing Considerations* (Section 4.4.1), and *Program-Wide Best Management Practices* (Section 7.2) including BMPs will assist in avoidance and minimization of potential impacts for vegetation management activities. While Maintenance Principles and other maintenance or BMPs minimize impacts to vegetation, there may be occasions when vegetation planted as mitigation for SMP activities does not perform to success criteria (such as in the example noted above where soils have become too alkaline to support some types of riparian vegetation). This would be considered a permanent loss and measures to mitigate this impact are discussed below. However, in general vegetation management activities do not result in residual impacts that require compensatory mitigation, unless they are conducted in coordination with other activities that require such mitigation (e.g., sediment removal, bank stabilization).

As described above for sediment removal activities, SMP monitoring efforts (per Chapter 9, Section 9.8, *Annual Reporting*, Section 9.9, *Data Management*, and Section 9.10, *Five-Year Program Review*) will document changes in creek and channel composition and function resulting from vegetation management activities. In this way, the true measure of program impacts and benefits will be better understood over time.

6.2.3 Bank Stabilization Activities

6.2.3.1 Potential Adverse Impacts

Impacts to Beneficial Uses associated with bank stabilization will be similar to those described above for sediment removal activities. However, bank stabilization activities would also cause

disturbance to upslope areas of the creek or channel, and in some cases, hardening of the creek or channel would be necessary where rip-rap is placed as part of slope repairs. Potential impacts on Beneficial Uses associated with bank stabilization activities are summarized in Table 6-1.

Bank stabilization activities will disturb a different habitat type compared to sediment removal activities because maintenance could extend to upslope areas above the OHWM, up to the top of the bank. Upland areas support a different suite of habitat for plants and wildlife. For example, tree species like bay and oak prefer upland areas as opposed to wetted portions of the creek or channel, and California tiger salamanders may utilize burrows in upland habitat during certain times of the year. Impacts from dewatering and use of equipment in the creek or channel will create similar impacts on water quality and wildlife as described above. However, because maintenance would also extend to upland areas, the degree of impact on wildlife, in particular, could be slightly more adverse depending upon wildlife use. As discussed below, implementation of BMPs and complete restoration of the site would minimize short-term impacts, and alleviate almost all long-term impacts.

Additional impacts from bank stabilization activities may occur through hardening of the natural bank (i.e., placement of rock rip-rap on the bank) if a project requires rock rip-rap to stabilize the toe-of-slope as part of the bank reconstruction. To begin with, placement of rock rip-rap to stabilize the toe-of-slope during bank stabilization and storm drain outfall activities may result in fill to waters of the United States and/or waters of the state. In all such cases, the minimum amount of fill is placed to the extent necessary to repair the bank. In other words, work is only conducted to maintain the original creek or channel structure, and there would be no permanent fill of waters of the United States or water of the state beyond the pre-existing footprint of the as-built creek or channel design. The rip-rap would result in minor permanent changes to creek or channel, water quality functioning, and wildlife habitat.

6.2.3.2 Potential Beneficial Impacts

Bank stabilization projects provide long-term beneficial impacts by reducing erosion and sediment loading to the creek or channel and downstream resources. Destabilized banks that are not repaired will continue to erode and shed sediment into the creek or channel. To further reduce the risk of additional sediment loading to creeks, bank stabilization sites are seeded with grasses and planted with trees which will foster development of riparian overstory. Thus, a site which was devoid of vegetation and exposing bare soil will be stabilized and restored with native riparian vegetation. Remediation of eroding banks will reduce the need for maintenance activities, such as sediment removal, downstream.

6.2.3.3 Conclusions

As discussed in the sediment management and bank stabilization framing considerations in Chapter 4 (Section 4.3.1 and Section 4.5.1, respectively), sediment movement, including bank erosion, is a natural process. However, the channelizing of SMP Area streams together with changes to surrounding land uses has altered the balance between discharge and sediment loading, and as such, intervention may be needed to guide a stream's response to disturbance. Though sensitive species and habitat would be temporarily impacted during maintenance activities, the overall effect of some bank stabilization projects would be long-lasting and beneficial. The *Maintenance Principles* (Section 4.2), *Bank Stabilization Framing Considerations* (Section 4.5.1), and *Programmatic Avoidance and Minimization Measures* (Chapter 7) discussed previously will ensure that potential impacts from

bank stabilization activities are avoided and minimized. If necessary, placement of rip-rap in the creek or channel would harden the bank and result in a permanent and residual impact of bank stabilization. This impact will be mitigated following the guidelines discussed in Chapter 8, *Program Mitigation*.

SMP monitoring efforts (per Chapter 9, Section 9.8, *Annual Reporting*, Section 9.9, *Data Management*, and Section 9.10, *Five-Year Program Review*) will document changes in creek or channel composition and function resulting from bank stabilization activities. In this way, the true measure of program impacts and benefits will be better understood over time.

6.2.4 Other Maintenance Activities

This section discusses several smaller-scale activities to be conducted by the City as part of ongoing stream maintenance. These activities include bridge maintenance, culvert repair and replacement, irrigation system maintenance, trash and debris removal, and access road and trail maintenance. Potential impacts associated with each of these additional items are discussed below.

6.2.4.1 Bridge Maintenance

Bridge repair and scour reduction activities are described in detail in Section 5.6.1. These activities require vehicular and foot access into the creek to perform the patching, minor structural repairs and reduce scour. Channel dewatering, temporary loss of vegetation due to clearing for access, hardening of the channel at the base of the bridge to reduce scour if the scour occurring is threatening the bridge foundation may impact Beneficial Uses, as described in Table 6-1.

Potential impacts for this maintenance activity are similar to those described for localized sediment removal activities. Temporary impacts on water quality and biological resources would primarily result from channel dewatering and work in the channel. As discussed previously, BMP measures implemented during maintenance will reduce these temporary impacts (Table 7-1).

When possible, work beyond the bridge footprint will be minimized, resulting in minor if any additional hardening of the channel. However, in some cases it may be necessary to extend the bridge apron or provide rock rip rap around the edge of the apron, along the bed and bank, to prevent undermining of the bridge structure. Fill and hardening of the channel constitute permanent impacts on biological resources and water quality. This impact will be mitigated following the guidelines discussed in Chapter 8, *Program Mitigation*.

Bridge repair and scour reduction activities are a small subset of maintenance activities conducted under the SMP. Though the majority of impacts associated with this activity are temporary, the proper maintenance and design of stream crossings will contribute to beneficial impacts on wildlife habitat and water quality within the SMP Area.

6.2.4.2 Culvert Repair and Replacement

Culvert repair and replacement activities are described in detail in Section 5.6.2. These activities include the repair or full re-installation of stream crossings for which the City has maintenance responsibilities. Channel dewatering, temporary loss of vegetation due to clearing for access, hardening of the channel if the stream crossing footprint is expanded, and disturbance to biological resources during culvert maintenance may impact Beneficial Uses, as described in Table 6-1.

Potential impacts for this maintenance activity are similar to those described for localized sediment removal activities. Temporary impacts on water quality and biological resources would primarily result from channel dewatering and work in the channel. As discussed previously, BMP measures implemented during maintenance will reduce these temporary impacts (Table 7-1).

When possible, culverts for stream crossings will be replaced within the same footprint, resulting in no additional hardening of the channel. However, in some cases it may be necessary to expand the crossing footprint to upgrade the crossing (e.g., because the existing culverts are undersized). Fill and hardening of the channel constitutes a permanent impact to jurisdictional waters and their associated biological resources and water quality. This impact will be mitigated following the guidelines discussed in Chapter 8, *Program Mitigation*.

Culvert repair and replacement are a small subset of maintenance activities conducted under the SMP. Though the majority of impacts associated with this activity are temporary, the proper maintenance and design of stream crossings will contribute to beneficial impacts on wildlife habitat and water quality within the SMP Area.

6.2.4.3 Habitat Restoration and Landscape Maintenance

Habitat restoration and landscape maintenance activities are described in detail in Section 5.6.3. These activities include the repair or full re-installation of irrigation systems for the establishment or ongoing maintenance of vegetation in or on the creek or channel bank for which the City has maintenance responsibilities. Temporary loss of vegetation and disturbance to biological resources due to clearing for access, restoration site grading/planting/irrigation, and maintenance of restored or landscaped areas may impact Beneficial Uses, as described in Table 6-1.

Potential impacts for this maintenance activity are similar to those described for localized sediment removal activities. Temporary impacts on water quality and biological resources would primarily result from work in the creek or channel. As discussed previously, BMP measures implemented during maintenance will reduce these temporary impacts (Table 7-1).

Though the majority of impacts associated with this activity are temporary, the proper design and maintenance of both habitat restoration and adjacent landscape areas will contribute to beneficial impacts on wildlife habitat and water quality within the SMP plan area.

6.2.4.4 Trash and Debris Removal

Trash and debris removal is described in detail in Section 5.6.1. Few, if any, impacts are anticipated to occur as a result of this activity. In some cases, very minor vegetation removal may be required to access a project site. Similarly, some sediment may be briefly disturbed when debris is removed from within the active channel. Overall, these are minor activities conducted as part of stream maintenance that do not require permits, are generally beneficial in nature, and are mentioned here for reference and discussion purposes.

The removal of garbage and debris from SMP creeks and channels is considered an important program benefit. Shopping carts, furniture, electronic equipment, paint cans and other various household products are often found in the creeks and channels within the City's Planning Area. City maintenance crews keep watch for such illegal dumping and clear such trash and debris immediately upon observation or receiving reports from community members. These actions are beneficial for the protection of water quality and Beneficial Uses.

6.2.4.5 Access Road and Trail Maintenance

Maintenance projects in this category may include vegetation pruning or herbicide application on access roads; access road repairs, grading, and/or resurfacing; trail repairs and vegetation pruning on trails; maintenance of V-ditches; and maintenance of V-ditch culverts and outfalls. Beneficial Use impacts associated with access road and V-ditch maintenance activities potentially include temporary loss of vegetation due to pruning, mowing, herbicide use, or clearing for project access; hardening of creek or channel due to use of rock rip-rap to stabilize or support a culvert; temporary impacts on biological resources during maintenance; degradation of water quality during and following project construction; and degradation of water quality due to the application of herbicides, as summarized in Table 6-1.

The temporary impacts associated with vegetation management on access roads and trails will be the same as those described in Section 6.2.2, above. Likewise, potential impacts to water quality, particularly from use of herbicides, may result for the same reasons as described previously. However, the extent of such impacts is anticipated to be less for access road and trail maintenance because these activities occur outside the top-of-bank and creek or channel dewatering is not required.

Similar to bank stabilization, rock rip-rap may be used to stabilize V-ditch culverts and culvert outfalls. Installation of rip-rap above the top-of-bank would minimally impact (less than 0.1 acre annually) state-regulated biological resources or water quality. However, installation of rip-rap for V-ditch outfalls located below the OHWM will result in hardening of the creek or channel at the outfall location. This constitutes a permanent impact to both federal and state-regulated wetlands and/or waters requiring mitigation, as discussed below.

6.3 Summary of Program Impacts by Species

6.3.1 Focal Plants

San Joaquin spearscale (*Atriplex joaquiniana*), Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*), Palmate-bracted bird's-beak (*Cordylanthus palmatus*), and Livermore tarplant (*Deinandra bacigalupii*) individuals could be directly impacted (loss of plants) by vehicles accessing maintenance areas, vegetation management, bank stabilization, bridge maintenance, culvert repair and replacement, Habitat restoration and landscape maintenance, trash and debris removal, access road and trail maintenance, and other activities within suitable habitat for each species, particularly during individual growing and flowering seasons when these species are not dormant. Sediment removal, bank stabilization, and bridge maintenance activities could permanently remove suitable habitat for these species. Impacts to suitable habitat would be avoided to the maximum extent practicable.

All of the proposed maintenance activities have the potential to result in indirect effects, such as the introduction of invasive species, sediment deposition, changes in local hydroperiod, or changes in the composition of listed species habitats ultimately causing these habitats to support a reduced number of individual listed species or to become unsuitable habitat for listed species. However, given the proximity of urban and suburban areas to many of the plan area drainages, the potential contribution of maintenance activities to indirect effects on plants is not anticipated to be substantial.

6.3.2 Focal Wildlife

6.3.2.1 Longhorn Fairy Shrimp (*Branchinecta longiantenna*) and Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)

Longhorn and vernal pool fairy shrimp adults or cysts could be directly impacted (loss of individuals) due to use or maintenance of access roads (in areas where ruts or potholes create puddles), roadside ditches, or other infrastructure in the SMP Area north of Highway 580 along Arroyo Las Positas and Altamont Creek. Vehicle movement or maintenance activities could crush, remove (along with excavated dirt or sediment), or bury individuals that have blown into the SMP Area from surrounding areas of more suitable habitat. Temporary habitat effects may include changes to the micro topography of affected puddles, or increased suspended sediment in the water. These habitat effects would be temporary, as the habitat would regenerate within one year. The removal of sediment in channels could remove individuals if the species is present. These areas would likely revert to a mix of aquatic and wetland habitat after the silt removal and channel restoration. These species' habitat could be permanently altered through activities that deposit soil in or perforate (e.g., boring, trenching, excavating) the restricting layer of soil in areas of suitable habitat, ultimately resulting in such habitat no longer holding water or supporting wetland vegetation.

Maintenance activities also have the potential to result in indirect effects, such as the introduction of invasive species or changes in the composition of longhorn and vernal pool fairy shrimp habitat, ultimately causing suitable habitat to support a reduced number of individuals or to become unsuitable habitat for this species.

Impacts to longhorn and vernal pool fairy shrimp habitat would be avoided to the maximum extent practicable through implementation of avoidance and minimization BMPs (See Chapter 7).

6.3.2.2 Callippe Silverspot Butterfly (*Speyeria callippe callippe*)

Callippe silverspot butterfly pupae could be directly impacted (loss of Callippe silverspot butterflies) by vehicles accessing maintenance areas in suitable habitat (areas supporting Johnny Jump Up [*Viola pedunculata*]) during diapause, when individuals are inactive and most vulnerable. Similarly, the species' habitat could be temporarily altered by vehicles traveling through habitat during the Johnny Jump Up flowering period (February to April). Such temporary habitat effects may include destruction of portions of individual Johnny Jump Up plants that are above the soil. These habitat effects would be temporary, as the habitat would regenerate within one year. Impacts to suitable habitat would be avoided to the maximum extent practicable through implementation of avoidance and minimization BMPs (See Chapter 7).

All of the maintenance activities have the potential to result in indirect effects, such as the introduction of invasive species or changes in the composition of Callippe silverspot habitat ultimately causing suitable habitat to support a reduced number of individuals or to become unsuitable habitat for this species.

6.3.2.3 California Tiger Salamander (*Ambystoma californiense*)

California tiger salamander adults, subadults, and larvae could be directly impacted (loss of salamanders) or injured by vehicles accessing maintenance areas or ground-disturbing activities

during the wet or dry season. Vehicle movement through occupied upland habitat could crush burrows that may contain salamanders. The loss of some unoccupied burrows would be a temporary impact, since pocket gophers (*Thomomys* spp.) or California ground squirrels (*Otospermophilus beecheyi*) are expected to create new burrows by the following year. Similarly, the species' aquatic and upland habitat could be temporarily altered by vehicles traveling through vernal pool habitat and adjacent upland habitat during the wet season. Such temporary habitat effects may include changes to the micro topography of affected vernal pool bottoms, increased suspended sediment in the water, and/or the destruction of aquatic or terrestrial plants. These habitat effects would be temporary, as the habitat would regenerate within one year. The removal of sediment in channels would remove potential aestivation habitat and salamanders if the species is present. These areas would likely revert to a mix of aquatic and wetland habitat after the silt removal and channel restoration. Impacts to California tiger salamander habitat would be avoided to the maximum extent practicable through implementation of avoidance and minimization BMPs (See Chapter 7).

All of the maintenance activities have the potential to result in indirect effects, such as the introduction of invasive species, sediment deposition, changes in local hydroperiod, or changes in the composition of California tiger salamander habitat ultimately causing suitable habitat to support a reduced number of individuals or to become unsuitable habitat for this species.

6.3.2.4 California Red-legged Frog (*Rana draytonii*)

California red-legged frog adults, subadults, and larvae could be directly impacted (loss of frogs) or injured by vehicles accessing maintenance areas or ground-disturbing activities during the wet or dry season. The removal of sediment in channels would remove annual grassland, riverine wetland, and seasonal wetland swale habitat in and adjacent to stream channels. These areas would likely revert to a mix of aquatic and wetland habitat after the silt removal and channel restoration. Impacts to California red-legged frog habitat would be avoided to the maximum extent practicable through implementation of avoidance and minimization BMPs (See Chapter 7).

All of the proposed maintenance activities have the potential to result in indirect effects such as the introduction of invasive species, sediment deposition, changes in local hydroperiod, or changes in the composition of California red-legged frog habitat ultimately causing these habitats to support a reduced number of individuals or to become unsuitable habitat for this species.

6.3.2.5 Golden Eagle (*Aquila chrysaetos*)

Golden eagles could be directly impacted by disturbance (through noise, vibration, or presence) resulting from any activity that occurs too close to an active nest during the nesting season. Golden eagle could be indirectly affected by any alteration of foraging habitat that removes suitable foraging activities or reduces the prey base. Such an impact would generally be temporary given that disturbed vegetation would regenerate within one year. Additionally, sediment removal activities are expected to result in the conversion of upland habitat that golden eagle could forage over to wetland or seasonal wetland habitat that would no longer offer suitable foraging habitat. The abundance of suitable foraging habitat elsewhere in the region is expected to make the relative small loss of suitable foraging habitat resulting from SMP maintenance activities to be insignificant. Impacts to suitable habitat would be avoided to the maximum extent practicable through implementation of avoidance and minimization BMPs (See Chapter 7).

6.3.2.6 Tricolored Blackbird (*Agelaius tricolor*)

Tricolored blackbird could be directly impacted by disturbance (through noise, vibration, or presence) resulting from any activity that occurs too close to an active nest during the nesting season. Tricolored blackbird could be indirectly affected by the removal of suitable nesting vegetation, but this impact would generally be temporary given that disturbed nesting substrate would regenerate within one year. Additionally, sediment removal activities are expected to result in the conversion of upland habitat to wetland or seasonal wetland habitat that would make available an increased amount of nesting habitat. Impacts to suitable habitat would be avoided to the maximum extent practicable through implementation of avoidance and minimization BMPs (See Chapter 7).

6.3.2.7 Western Burrowing Owl (*Athene cunicularia hypugea*)

Western burrowing owl could be directly impacted by disturbance (through noise, vibration, or presence) resulting from any activity that occurs too close to an active nest during the nesting season. The species could also be directly impacted through off-road vehicle travel or any ground-disturbing activity at any time of the year, as these activities could crush occupied burrows or individuals. Western burrowing owl could be indirectly affected by the removal of foraging habitat or suitable unoccupied burrows. Additionally, sediment removal activities are expected to result in the conversion of upland habitat, that western burrowing owl could forage over and reside in, to wetland or seasonal wetland habitat resulting in a reduced amount of nesting habitat. Impacts to suitable habitat would be avoided to the maximum extent practicable through implementation of avoidance and minimization BMPs (See Chapter 7).

6.3.2.8 American Badger (*Taxidea taxus*)

American badger could be directly impacted by disturbance (through noise, vibration, or presence) resulting from any activity that occurs too close to an occupied den. The species could also be directly impacted through off-road vehicle travel or any ground-disturbing activity at any time of the year, as these activities could crush occupied dens or individuals. American badger could be indirectly affected by the removal of foraging habitat (destruction of rodent burrows) or suitable unoccupied dens. However, because badgers live in relatively open grassland areas, ample foraging habitat would likely remain in the vicinity outside of the SMP Area. Impacts to suitable habitat would be avoided to the maximum extent practicable through implementation of avoidance and minimization BMPs (See Chapter 7).

6.1.1.1 San Joaquin Kit Fox (*Vulpes macrotis mutica*)

San Joaquin kit fox could be directly impacted by disturbance (through noise, vibration, or presence) resulting from any activity that occurs too close to an occupied den. The species could also be directly impacted through off-road vehicle travel or any ground-disturbing activity at any time of the year, as these activities could crush occupied dens or individuals. San Joaquin kit fox could be indirectly affected by the removal of foraging habitat (destruction of rodent burrows) or suitable unoccupied dens. However, because kit fox live in relatively open grassland areas, ample foraging habitat would likely remain in the vicinity outside of the SMP Area. Impacts to suitable habitat would be avoided to the maximum extent practicable through implementation of avoidance and minimization BMPs (See Chapter 7).

6.4 SMP Activity Quantified Impact Estimates

Estimated SMP activity impacts are quantified in Tables 6-2 through 6-24. Tables 6-2 through 6-13 quantify estimated maintenance activity impacts by drainage and individual reach. Tables 6-14 through 6-23 quantify estimated maintenance activity impacts by focal species. Table 6-24 summarizes estimated maintenance activity impacts by reach.

Table 6-1. Potential Impacts of SMP Activities on Beneficial Uses

SMP Maintenance Activity	GWR		COLD		MIGR		RARE	
	Adverse	**Beneficial**	**Adverse**	**Beneficial**	**Adverse**	**Beneficial**	**Adverse**	**Beneficial**
Sediment Removal	Groundwater infiltration could be interrupted due to dewatering. (Temporary)	Improved infiltration after removal of fine sediments. (Permanent)	Dewatering and sediment removal would temporarily impact cold water habitat in the dewatered area. (Temporary)	Removal of sediment and creation of low-flow channels will improve flow and water quality conditions, which will improve cold water habitat. (Permanent)	Reaches that support migratory habitat may be temporarily dewatered during the dry season. (Temporary)	Sediment removal and creation of low-flow channels will improve flow and water quality conditions, which will improve migratory habitat. (Permanent)	Dewatering and construction activities would temporarily impact habitat for rare and listed species in and around the work site. (Temporary)	Sediment removal and creation of low-flow channels will improve flow and water quality conditions, which will benefit habitat for rare and listed species. (Permanent)
Bank Stabilization	Groundwater infiltration could be interrupted due to dewatering. (Temporary)	Reduced release of fine sediments which could impair groundwater recharge. (Permanent)	Bank stabilization activities, and dewatering, where necessary, would temporarily impact cold water habitat in the work area. (Temporary)	Bank stabilization will remove sediment inputs to the channel which will improve cold water habitat. (Permanent)	Bank stabilization activities and dewatering would temporarily impact migratory habitat in the work area. (Temporary)	Bank stabilization will remove sediment inputs to the channel which will improve migratory habitat. (Permanent)	Bank stabilization activities, and dewatering, where necessary, would temporarily impact habitat for rare and listed species in the work area. (Temporary)	Bank stabilization will remove sediment inputs to the channel and enhance the riparian corridor, which will benefit habitat for rare and listed species. (Permanent)
Vegetation Management	None	Improved infiltration after removal of dense, in-channel vegetation (e.g., cattails). (Permanent)	Vegetation removal may temporarily reduce canopy cover, which could result in higher water temperatures. (Temporary)	Revegetation activities will encourage riparian canopy development and improve cold-water conditions over time through such mechanisms as water temperature moderation. (Permanent)	Vegetation removal could temporarily reduce canopy cover, impacting migratory habitat. (Temporary)	Revegetation activities will encourage riparian canopy development and improve cold-water conditions over time (Permanent)	Vegetation removal could temporarily reduce canopy cover, impacting habitat for rare and listed species. (Temporary)	Vegetation management and riparian corridor enhancement will benefit habitat for rare and listed species. (Permanent)
Other Activities: Access Roads, V-ditch Maintenance, Culvert Replacement, Debris Removal	None	None	Culvert replacement and dewatering would temporarily impact cold water habitat in the dewatered area. (Temporary)	Maintenance will ensure culverts are free of debris so flows can move freely through the system, reducing the number and/or size of slack water pools with elevated temperatures. (Permanent)	Culvert replacement and dewatering would temporarily impact migration habitat in the dewatered area. (Temporary)	Maintenance will ensure culverts are free of debris which will allow for improved flows and aquatic species can move freely through the system. (Permanent)	If culvert replacement requires site dewatering, temporary impacts on rare and listed species could result. (Temporary)	Culvert and debris clearing activities will benefit habitat for rare and listed species. (Permanent)
SMP Maintenance Activity	**SPWN**		**WARM**		**WILD**		**REC2**	
	Adverse	**Beneficial**	**Adverse**	**Beneficial**	**Adverse**	**Beneficial**	**Adverse**	**Beneficial**
Sediment Removal	Reaches that support spawning habitat could be temporarily dewatered during the dry season. (Temporary)	Improved flow and water quality conditions will benefit spawning habitat where present throughout the watershed. (Permanent)	Dewatering and sediment removal would temporarily impact warm water habitat in the dewatered area. (Temporary)	Removal of sediment and creation of low-flow channels will improve flow and water quality conditions, which will improve warm water habitat. (Permanent)	Dewatering and sediment removal would temporarily impact wildlife habitat in the dewatered area. (Temporary)	Removal of sediment and creation of low-flow channels will improve flow and water quality conditions, which will benefit a wide array of native fish and wildlife. (Permanent)	Sediment removal activities would temporarily suspend recreational access to trails along channels, and would degrade the aesthetic quality of the channels in the short term. (Temporary)	Sediment management activities will improve riparian condition over time, improving the aesthetics of the channel for recreational users. (Permanent)

Bank Stabilization	Bank stabilization activities, and dewatering, where necessary, could temporarily impact spawning habitat in the work area. (Temporary)	Improved water quality conditions will benefit spawning habitat where present throughout the watershed. (Permanent)	Bank stabilization activities, and dewatering, where necessary, would temporarily impact warm water habitat in the work area. (Temporary)	Bank stabilization will reduce sediment inputs to the channel and enhance the riparian corridor, which will improve warm water habitat. (Permanent)	Bank stabilization activities, and dewatering, where necessary, would temporarily impact wildlife habitat in the work area. (Temporary)	Bank stabilization will remove sediment inputs to the channel and enhance the riparian corridor, which will benefit a wide array of native fish and wildlife. (Permanent)	Bank stabilization activities could temporarily suspend recreational access to channels, and newly stabilized areas may appear somewhat unnatural in the short term. (Temporary)	Bank stabilization will ultimately improve riparian condition, also improving the aesthetics of the channel for recreational users. (Permanent)
Vegetation Management	Vegetation removal could temporarily reduce canopy cover, impacting spawning habitat. (Temporary)	Improved riparian quality will benefit spawning habitat where present throughout the watershed. (Permanent)	Vegetation removal could temporarily reduce canopy cover, impacting warm water habitat. (Temporary)	Vegetation management will improve flow and water quality conditions. In addition, revegetation activities will encourage riparian canopy development and improve habitat conditions over time through such mechanisms as water temperature moderation. (Permanent)	Vegetation removal could temporarily reduce canopy cover, impacting wildlife habitat. (Temporary)	Vegetation management and riparian corridor enhancement will benefit a wide array of native fish and wildlife. (Permanent)	Vegetation removal activities could temporarily suspend recreational access to channels, and may degrade the aesthetic quality of the channels in the short term. (Temporary)	Vegetation management and riparian canopy development will improve riparian condition over time, also improving the aesthetics of the channel for recreational users. (Permanent)
Other Activities: Access Roads V-ditch Maintenance Culvert Replacement Debris Removal	If culvert replacement requires site dewatering, temporary impacts on spawning habitat could result. (Temporary)	Culvert and debris clearing activities will benefit spawning habitat where present throughout the watershed. (Permanent)	If culvert replacement requires site dewatering, temporary impacts on warm water habitat could result. (Temporary)	Maintenance will ensure culverts are free of debris so flows and aquatic species can move freely through the system. (Permanent)	If culvert replacement requires site dewatering, temporary impacts on wildlife habitat could result. (Temporary)	Maintenance will ensure culverts are free of debris which will allow for improved flows which will benefit a wide array of native fish and wildlife. (Permanent)	Temporary closure of public trails during maintenance activities. (Temporary)	Maintenance would improve creek and trail aesthetics and public safety. (Permanent)

Definitions from *Water Quality Control Plan for the San Francisco Bay Basin (Region 2)* (December 31, 2013):

GWR = Groundwater Recharge. Defined as, "Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting saltwater intrusion into freshwater aquifers."

COLD = Cold Freshwater Habitat. Defined as, "Uses of water that support cold water ecosystems, including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates."

MIGR = Fish Migration. Defined as, "Uses of water that support habitats necessary for migration, acclimatization between fresh water and salt water, and protection of aquatic organisms that are temporary inhabitants of waters within the region."

RARE = Preservation of Rare and Endangered Species. Defined as, "Uses of waters that support habitats necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened, or endangered."

SPWN = Fish Spawning. Defined as, "Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish."

WARM = Warm Freshwater Habitat. Defined as, "Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates."

WILD = Wildlife Habitat. Defined as, "Uses of waters that support wildlife habitats, including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl."

REC2 = Noncontact Water Recreation. Defined as, "Uses of water for recreational activities involving proximity to water, but not normally involving contact with water where water ingestion is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities."

Notes:

A channel that has no assigned Beneficial Uses is assumed to have the same Beneficial Uses as the body of water to which it is a tributary.

The following Beneficial Uses are listed in the *Water Quality Control Plan for the San Francisco Bay Basin (Region 2)* (December 31, 2013) but are not present at, or are not designated for, the sites potentially affected by SMP activities.

AGR = Agricultural Supply
ASBS = Areas of Special Biological Significance
COMM = Commercial and Sport Fishing
EST = Estuarine Habitat
FRSH = Freshwater Replenishment
IND = Industrial Service Supply
MAR = Marine Habitat
MUN = Municipal and Domestic Supply
NAV = Navigation
PROC = Industrial Process Supply
REC1 = Water Contact Recreation
SHELL = Shellfish Harvesting

Table 6-2. Altamont Creek Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																	
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
AC-1	BS-1	0.06																	0.06
	BS-2	0.09																	0.09
	VM-1	0.76	0.05																0.81
AC-2	BM-1	0.05	0.01									0.21					0.00		0.27
	BS-3											0.00					0.06		0.06
	BS-4											0.05					0.03		0.08
	VM-2											0.40							0.40
	VM-3																0.29		0.29
AC-3	BM-2																0.17		0.17
	TDR-1																0.02		0.02
	TDR-2																0.02		0.02
	TDR-3																0.02		0.02
AC-4	TDR-4									0.38							0.18		0.56
	TDR-5									0.44							0.12		0.56
	VM-4									0.38							0.18		0.56
	VM-5									0.45							0.12		0.57
AC-5	ARTM-1			0.11															0.11
	BM-3																0.34		0.34
	BS-5		0.03														0.03		0.06
	BS-6	0.01	0.04														0.01		0.06
	BS-7	0.02	0.04														0.00		0.06
	BS-8	0.01	0.04														0.00		0.05
	BS-9		0.04	0.01													0.00		0.05
	TDR-6	0.01	0.19														0.25		0.45
	TDR-7		0.40	0.89													0.47		1.76
	VM-6	0.06	0.06																0.12
	VM-7	0.02	0.06														0.04		0.12
	VM-8	0.03	0.09														0.05		0.17
	VM-9		0.58	0.66													0.30		1.54
	VM-10		0.13	0.04															0.17
AC-6	ARTM-2		0.04	0.05													0.00		0.09
	BS-10		0.05	0.01															0.06
	TDR-8		0.39	0.60													0.02		1.01

Table 6-2. Altamont Creek Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																	
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
AC-7	BM-4			0.15													0.02		0.17
	BS-11			0.11															0.11
	BS-12			0.11															0.11
	BS-13			0.11															0.11
	BS-14			0.23															0.23
	BS-15			0.23															0.23
	VM-11		0.45	0.62													0.30		1.37
Total		**1.12**	**2.69**	**3.93**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.65**	**0.00**	**0.66**	**0.00**	**0.00**	**0.00**	**0.00**	**3.05**	**0.00**	**13.10**

Maintenance Activity Abbreviations: ARTM = Access Road and Trail Maintenance; BM = Bridge Maintenance; BS = Bank Stabilization; CRR = Culvert Repair/Replacement; SDO = Storm Drain Outlet Maintenance; SM = Sediment Management; TDR = Trash and Debris Removal; VM = Vegetation Management.

Table 6-3. Altamont Creek Tributary Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest / Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
ACT-1	BS-1																	0.06		0.06
	VM-1										0.07							0.04		0.11
	VM-2																	0.92		0.92
ACT-2	BM-1																	0.26		0.26
	BM-2		0.01										0.15							0.16
	VM-3	0.07																0.01		0.08
	VM-4	0.37	0.01																	0.38
Total		**0.44**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.07**	**0.00**	**0.15**	**0.00**	**0.00**	**0.00**	**0.00**	**1.29**	**0.00**	**1.97**

Maintenance Activity Abbreviations: ARTM = Access Road and Trail Maintenance; BM = Bridge Maintenance; BS = Bank Stabilization; CRR = Culvert Repair/Replacement; SDO = Storm Drain Outlet Maintenance; SM = Sediment Management; TDR = Trash and Debris Removal; VM = Vegetation Management.

Table 6-4. Arroyo Del Valle Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest/ Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
ADV-1	Access																0.01			0.01
	BM-1																	0.17		0.17
	BM-2						0.08											0.01		0.09
	BS-1						0.24										0.01			0.25
	BS-1						0.11										0.06			0.17
	SDO-3																0.02			0.02
	SDO-4						0.02													0.02
	VM-1						0.10										0.05	0.02		0.17
	VM-2						0.07			0.00							0.06	0.01		0.14
	VM-3						0.23													0.23
ADV-2	BM-2											0.09						0.01		0.10
	BM-3											0.04								0.04
	BM-4											0.04								0.04
	BM-5											0.09								0.09
	BM-6											0.04								0.04
	BS-3											0.06								0.06
	BS-4											0.06								0.06
	BS-5											0.06								0.06
	BS-6											0.06								0.06
	BS-7											0.06								0.06
	SDO-1											0.02								0.02
	SDO-2											0.02								0.02
	SM-1											0.06								0.06
	Staging Area ADV-2											0.01								0.01
	VM-10											0.03								0.03
	VM-4											0.03								0.03
	VM-5											0.03								0.03
	VM-6											0.03								0.03
	VM-7											0.03								0.03
	VM-8											0.05								0.05
ADV-3	Access											0.02								0.02
	BM-5																			0.00
	BM-7											0.17								0.17
	BS-8											0.06								0.06
	BS-9											0.11								0.11
	Staging Area ADV-3											0.02								0.02
	Staging Area ADV-4											0.01								0.01
	VM-11											0.03								0.03

Table 6-4. Arroyo Del Valle Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest/ Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
	VM-9											0.05								0.05
ADV-4	BM-8											0.09								0.09
	SM-2											0.14								0.14
	Staging Area ADV-5											0.01								0.01
ADV-5	Access											0.07								0.07
	BM-10											0.04								0.04
	BM-11											0.04								0.04
	BM-12											0.03								0.03
	BM-9											0.04								0.04
	BS-10											0.06								0.06
	BS-11											0.06								0.06
	BS12											0.06								0.06
	BS-13											0.06								0.06
	BS-14											0.06								0.06
	BS-15											0.06								0.06
	BS-16											0.06								0.06
	BS-17											0.06								0.06
	BS-18											0.12								0.12
	SM-3											0.09								0.09
	Staging Area ADV-5											0.01								0.01
	VM-12											0.03								0.03
	VM-13											0.03								0.03
	VM-14											0.03								0.03
	VM-15											0.03								0.03
	VM-16											0.14								0.14
	VM-17											0.03								0.03
	VM-18											0.03								0.03
	VM-19											0.14								0.14
	VM-20											0.03								0.03
ADV-6	BM-12											0.00								0.00
	BM-13					0.01						0.03								0.04
	BS-18											0.00								0.00
	BS-19					0.12						0.01								0.13
	BS-20											0.06								0.06
	BS-21											0.06								0.06
	BS-22					0.05														0.05
	VM-21					0.02						0.01								0.03
	VM-22					0.05						0.38								0.43
	VM-23					0.01						0.02								0.03

Table 6-4. Arroyo Del Valle Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest/ Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
	VM-24											0.03								0.03
ADV-7	BM-14					0.04														0.04
	BM-15					0.01														0.01
	BM-16					0.01														0.01
	BM-17			0.01	0.03															0.04
	BS-22					0.01														0.01
	BS-23					0.06														0.06
	BS-24				0.04	0.01														0.05
	VM-22					0.00														0.00
	VM-25					0.03														0.03
	VM-26					0.03														0.03
	VM-27					0.48														0.48
	VM-28				0.02															0.02
ADV-8	BM-17			0.01																0.01
	BM-18				0.01															0.01
	BS-24				0.01															0.01
	BS-25			0.01	0.05															0.06
	VM-28				0.01															0.01
	VM-29			0.01	0.02															0.03
ADV-10	BM-24					0.04														0.04
	BS-34			0.02		0.04														0.06
	BS-35					0.06														0.06
	VM-40					0.03														0.03
	VM-41					0.03														0.03
ADV-11	BM-20					0.04														0.04
	BM-22			0.02		0.02														0.04
	BM-23			0.01		0.02														0.03
	BS-28					0.06														0.06
	BS-29					0.06														0.06
	BS-32			0.03		0.03														0.06
	BS-33			0.03		0.02														0.05
	VM-32					0.03														0.03
	VM-33					0.03														0.03
	VM-36			0.02		0.02														0.04
	VM-37			0.02		0.02														0.04
	VM-38			0.02		0.02														0.04
	VM-39			0.06		0.02			0.38											0.46
ADV-12	BM-21					0.04														0.04
	BS-30					0.06														0.06
	BS-31					0.06														0.06

Table 6-4. Arroyo Del Valle Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																	
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest/ Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
	VM-34					0.03														0.03
	VM-35					0.03														0.03
ADV-14	BM-19					0.04														0.04
	BS-26					0.06														0.06
	BS-27					0.06														0.06
	VM-30					0.03														0.03
	VM-31					0.03														0.03
ADV-15	BM-25			0.04																0.04
	BS-36			0.06																0.06
	BS-37	0.02		0.04																0.06
	VM-42			0.03																0.03
	VM-43			0.03																0.03
Total		**0.02**	**0.00**	**0.47**	**0.19**	**1.96**	**0.85**	**0.00**	**0.38**	**0.00**	**0.00**	**3.63**	**0.00**	**0.00**	**0.00**	**0.00**	**0.21**	**0.22**	**0.00**	**7.93**

Maintenance Activity Abbreviations: ARTM = Access Road and Trail Maintenance; BM = Bridge Maintenance; BS = Bank Stabilization; CRR = Culvert Repair/Replacement; SDO = Storm Drain Outlet Maintenance; SM = Sediment Management; TDR = Trash and Debris Removal; VM = Vegetation Management.

Table 6-5. Arroyo Las Positas Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest/ Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
ALP-1	BM-1									0.25						0.06				0.31
	BM-2					0.37									0.19	0.14				0.70
	BS-1									0.23										0.23
	VM-1			0.08		2.93	0.19								0.14	0.07				3.41
ALP-2	SM-1					2.39									0.06					2.45
	VM-2					5.83									0.20	0.00				6.03
ALP-3	BM-3					0.12												0.22		0.34
	SM-2										13.33							0.69		14.02
	VM-3										0.15							0.03		0.18
ALP-4	BM-4					0.14								0.02				0.18		0.34
	SM-3					1.20								0.24						1.44
	VM-4					2.13								0.76						2.89
ALP-5	BM-5																	0.83		0.83
	BM-6	0.01		0.18																0.19
	SM-4			0.73																0.73
	VM-5			15.73														0.01		15.74
ALP-6	BS-2					0.11														0.11
	BS-3					0.11														0.11
	BS-4					0.11														0.11
	BS-5			0.57																0.57
ALP-7	BM-8			0.09														0.38		0.47
	BS-6			0.22		0.13														0.35
	BS-7			0.40		0.09														0.49
	TDR-1					0.45														0.45
ALP-8	BM-9																	0.62		0.62
	BS-8	0.07	1.05	0.03							0.01		0.05							1.21
ALP-9	BM-10	0.05	0.35										0.07							0.47
ALP-10	VM-6														0.18			0.02		0.20
ALP-11	BM-11	0.11						0.05							0.01			0.00		0.17
	BS-9	0.07	0.16																	0.23
	SM-5							0.46												0.46
	VM-7							0.46												0.46
	TDR-2							0.46												0.46

Table 6-5. Arroyo Las Positas Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest/ Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
ALP-12	BM-12							0.01										0.25		0.26
	SM-6							0.23										0.00		0.23
	TDR-3							0.68							0.00			0.00		0.69
	VM-8							0.68							0.00			0.01		0.69
ALP-13	BM-13																	0.17		0.17
	SM-7							0.52										0.00		0.52
	TDR-4							0.52										0.00		0.52
	VM-9							0.52										0.00		0.52
ALP-14	BM-14							0.05												0.05
	SM-8							0.21												0.21
	VM-10							0.21												0.21
ALP-15	BM-15							0.06												0.06
	CRR-1							0.00												0.00
	TDR-5							0.11										0.10		0.21
ALP-16	BM-16																	0.35		0.35
	TDR-6										0.43						0.00	0.00		0.43
	VM-11										0.43						0.00	0.00		0.43
Total		**0.31**	**1.56**	**18.03**	**0.00**	**16.11**	**0.19**	**5.23**	**0.00**	**0.48**	**14.35**	**0.00**	**0.12**	**1.02**	**0.78**	**0.27**	**0.00**	**3.87**	**0.00**	**62.33**

Maintenance Activity Abbreviations: ARTM = Access Road and Trail Maintenance; BM = Bridge Maintenance; BS = Bank Stabilization; CRR = Culvert Repair/Replacement; SDO = Storm Drain Outlet Maintenance; SM = Sediment Management; TDR = Trash and Debris Removal; VM = Vegetation Management.

Table 6-6. Arroyo Las Positas Tributary Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest/ Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
ALPT-1																				0.00
ALPT-2																				0.00
ALPT-3	BM-1			0.52																0.52
	SM-1			0.52																0.52
Total		**0.00**	**0.00**	**1.04**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.04**

Maintenance Activity Abbreviations: ARTM = Access Road and Trail Maintenance; BM = Bridge Maintenance; BS = Bank Stabilization; CRR = Culvert Repair/Replacement; SDO = Storm Drain Outlet Maintenance; SM = Sediment Management; TDR = Trash and Debris Removal; VM = Vegetation Management.

Table 6-7. Arroyo Mocho Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest / Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
AM-1	BM-1									0.02						0.01		0.20		0.23
	BM-2					0.09												0.02		0.11
	BM-3					0.00														0.00
	SDO-1															0.02				0.02
	SDO-11					0.02														0.02
	SDO-12					0.01												0.01		0.02
	SDO-13					0.02														0.02
	SDO-14					0.02														0.02
	SDO-2									0.02										0.02
	SDO-3									0.02										0.02
	SDO-4									0.02										0.02
	VM-1					1.42														1.42
AM-2	BM-3					0.09												0.03		0.12
	SDO-15					0.02														0.02
	SDO-16					0.01												0.01		0.02
	SDO-17					0.02														0.02
	SDO-18					0.02														0.02
	SDO-19					0.02														0.02
	VM-2					5.77														5.77
AM-3	SDO-10																			0.00
	SDO-5									0.02										0.02
	SDO-6									0.02										0.02
	SDO-7									0.02										0.02
	SDO-8									0.02										0.02
	SDO-9									0.02										0.02
AM-4	BM-4					0.17														0.17
	BM-5					0.00														0.00
	CRR-1					0.10												0.02		0.12
	SDO-20					0.02														0.02
	SDO-21					0.02														0.02
	SDO-22																	0.02		0.02
	SDO-23					0.01				0.01										0.02
	SDO-24					0.02														0.02
	SDO-25					0.00														0.00
	TDR-1					0.71												0.01		0.72

Table 6-7. Arroyo Mocho Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest / Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
	VM-3					1.50														1.50
	VM-4					0.12				0.50										0.62
AM-5	ARTM-1					0.64												0.06		0.70
	BM-5					0.00												0.26		0.26
	SDO-25																	0.01		0.01
	SDO-26					0.01												0.00		0.01
	SDO-27					0.02														0.02
	SDO-28					0.02														0.02
	SDO-29					0.02														0.02
	VM-5					3.58									0.03			0.09		3.70
AM-6	BM-6					0.01												0.33		0.34
	SDO-30														0.01					0.01
	SDO-31					0.02														0.02
	SDO-32					0.02														0.02
	SDO-33																	0.02		0.02
	SM-1					0.23									0.01			0.81		1.05
AM-7	ARTM-2/TDR-2																			0.00
	BM-7					0.30												0.07		0.37
	BM-8					0.01														0.01
	SDO-34					0.02														0.02
	SDO-35																		0.02	0.02
	SDO-36					0.02														0.02
	SDO-37					0.02														0.02
	SDO-38					0.01													0.01	0.02
	SDO-39																		0.02	0.02
	SDO-40					0.02														0.02
	SDO-41					0.02														0.02
	Staging Area AM-7					0.00													0.01	0.01
	VM-6					1.02									0.00					1.02
AM-8	BM-8					0.03									0.01					0.04
	SDO-42					0.02														0.02
	SDO-43					0.02														0.02
	SDO-44														0.02					0.02

Table 6-7. Arroyo Mocho Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest / Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
	SDO-45			0.02																0.02
	SDO-46														0.02					0.02
	SM-2					0.02														0.02
	SM-3					0.71														0.71
	VM-6					0.01														0.01
	VM-7					1.66									0.05			0.05		1.76
AM-9	BM-9					0.04												0.32		0.36
	CRR-3						0.00													0.00
AM-4	CRR-2					0.01														0.01
Total		**0.00**	**0.00**	**0.02**	**0.00**	**18.74**	**0.00**	**0.00**	**0.00**	**0.69**	**0.00**	**0.00**	**0.00**	**0.00**	**0.15**	**0.03**	**0.00**	**2.34**	**0.06**	**22.03**

Maintenance Activity Abbreviations: ARTM = Access Road and Trail Maintenance; BM = Bridge Maintenance; BS = Bank Stabilization; CRR = Culvert Repair/Replacement; SDO = Storm Drain Outlet Maintenance; SM = Sediment Management; TDR = Trash and Debris Removal; VM = Vegetation Management.

Table 6-8. Arroyo Seco Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest/ Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
AS-1	BS-1			0.45																0.45
AS-2	BM-1			0.05		0.002												0.93		0.98
	SM-1					0.93												0.68		1.61
	VM-1					0.99												0.01		1.00
AS-3	BM-2					0.005				0.18								0.05		0.24
AS-4	BM-3			0.01						0.26								0.17		0.44
	BM-4			0.02						0.17								0.04		0.23
	BM-5			0.03						0.42								0.23		0.68
	BM-6									0.19								0.04		0.23
AS-5	BM-7									0.02								0.16		0.18
AS-6	BM-8																	0.31		0.31
AS-7	BM-9					0.01												0.27		0.28
AS-8	BM-10																	0.35		0.35
AS-9	BM-11										0.1					0.01		0.001		0.11
AS-10	BM-12					0.01										0.01		0.16		0.18
AS-11	BM-13					0.09												0.02		0.11
	BM-14					0.07														0.07
	BM-15					0.17												0.01		0.18
AS-12	BM-16					0.14												0.01		0.15
AS-13	BM-17			0.05		0.11										0.07				0.23
AS-14	BM-18					0.18														0.18
Total		**0.00**	**0.00**	**0.61**	**0.00**	**2.71**	**0.00**	**0.00**	**0.00**	**1.24**	**0.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.09**	**0.00**	**3.44**	**0.00**	**8.19**

Maintenance Activity Abbreviations: ARTM = Access Road and Trail Maintenance; BM = Bridge Maintenance; BS = Bank Stabilization; CRR = Culvert Repair/Replacement; SDO = Storm Drain Outlet Maintenance; SM = Sediment Management; TDR = Trash and Debris Removal; VM = Vegetation Management.

Table 6-9. Collier Canyon Creek Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest / Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
CCC-1	BS-1										0.19							0.06		0.25
CCC-2	BM-1																	0.26		0.26
CCC-3	SM-1														0.49			0.03		0.52
CCC-4	VM-1																	0.40		0.40
CCC-5	BM-2																	0.69		0.69
	VM-2																	0.17		0.17
CCC-6	BM-3																	0.17		0.17
	BS-2			0.07														0.05		0.12
CCC-7	BS-3			0.30																0.30
	BS-4					0.17														0.17
Total		**0.00**	**0.00**	**0.37**	**0.00**	**0.17**	**0.00**	**0.00**	**0.00**	**0.00**	**0.19**	**0.00**	**0.00**	**0.00**	**0.49**	**0.00**	**0.00**	**1.83**	**0.00**	**3.05**

Maintenance Activity Abbreviations: ARTM = Access Road and Trail Maintenance; BM = Bridge Maintenance; BS = Bank Stabilization; CRR = Culvert Repair/Replacement; SDO = Storm Drain Outlet Maintenance; SM = Sediment Management; TDR = Trash and Debris Removal; VM = Vegetation Management.

Table 6-10. Cottonwood Creek Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest / Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
CC-1																				0.00
CC-2	BS-1			0.11		0.01														0.12
	BS-2			0.15		0.00														0.15
	CRR-1			0.01																0.01
	SM-1			0.01																0.01
	VM-1			0.09		0.07					0.05									0.21
Total		**0.00**	**0.00**	**0.36**	**0.00**	**0.08**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.49**

Maintenance Activity Abbreviations: ARTM = Access Road and Trail Maintenance; BM = Bridge Maintenance; BS = Bank Stabilization; CRR = Culvert Repair/Replacement; SDO = Storm Drain Outlet Maintenance; SM = Sediment Management; TDR = Trash and Debris Removal; VM = Vegetation Management.

Table 6-11. Granada Channel Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest / Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
GC-1	BM-1																	0.02		0.02
	BM-2																	0.01		0.01
	TDR-1																	0.08		0.08
	CRR-1									0.00								0.06		0.06
GC-2																				0.00
Total		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.17**	**0.00**	**0.17**

Maintenance Activity Abbreviations: ARTM = Access Road and Trail Maintenance; BM = Bridge Maintenance; BS = Bank Stabilization; CRR = Culvert Repair/Replacement; SDO = Storm Drain Outlet Maintenance; SM = Sediment Management; TDR = Trash and Debris Removal; VM = Vegetation Management.

Table 6-12. Realigned Arroyo Las Positas Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest / Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
RALP-1																				0.00
RALP-2	BM-1																	0.34		0.34
RALP-3	BM-2			0.02												0.01		0.49		0.52
	BM-3																	0.35		0.35
RALP-4																				0.00
RALP-5	CRR-1			0.01																0.01
RALP-6	CRR-2			0.01																0.01
Total		**0.00**	**0.00**	**0.04**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**1.18**	**0.00**	**1.23**

Maintenance Activity Abbreviations: ARTM = Access Road and Trail Maintenance; BM = Bridge Maintenance; BS = Bank Stabilization; CRR = Culvert Repair/Replacement; SDO = Storm Drain Outlet Maintenance; SM = Sediment Management; TDR = Trash and Debris Removal; VM = Vegetation Management.

Table 6-13. Isolated Reach Maintenance Activity Impacts by Land Cover Type

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest / Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course/ Urban Park	Ruderal	Rural Residential	Urban/ Suburban	Vineyard	Total
Bear Creek Basins																				
	VM-1	0.01	0.01	0.16					0.06		0.01	0.07						0.02		0.34
	VM-2			0.25																0.25
	VM-3			0.11																0.11
	BS-1	0.02	0.01	0.15					0.04		0.01		0.09					0.04		0.36
	BS-2			0.25														0.00		0.25
	BS-3			0.13																0.13
	SDO-1								0.01				0.01							0.02
	SDO-2			0.01														0.01		0.02
	SDO-3			0.02																0.02
	SDO-4			0.02																0.02
Total		**0.03**	**0.02**	**1.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.11**	**0.00**	**0.02**	**0.07**	**0.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.07**	**0.00**	**1.52**
Ravenswood Drainage Swales																				
	VM-1																0.14			0.14
	VM-2																0.11	0.11		0.22
Total		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.25**	**0.11**	**0.00**	**0.36**

Maintenance Activity Abbreviations: ARTM = Access Road and Trail Maintenance; BM = Bridge Maintenance; BS = Bank Stabilization; CRR = Culvert Repair/Replacement; SDO = Storm Drain Outlet Maintenance; SM = Sediment Management; TDR = Trash and Debris Removal; VM = Vegetation Management.

Table 6-14. Fairy Shrimp Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)			
		Alkali Meadow and Scalds	Alkali Wetland	Seasonal Wetland	Total
Altamont Creek					
AC-2	BM-1	0.05	0.01	---	0.06
AC-4	TDR-4	---	---	0.38	0.38
	TDR-5	---	---	0.45	0.45
	VM-4	---	---	0.38	0.38
	VM-5	---	---	0.45	0.45
AC-5	BS-5	---	0.03	---	0.03
	BS-6	0.01	0.04	---	0.05
	BS-7	0.02	0.04	---	0.06
	BS-8	0.01	0.04	---	0.05
	BS-9	---	0.04	0.01	0.05
	TDR-6	0.01	0.19	---	0.20
	TDR-7	---	0.40	---	0.40
	VM-6	0.06	0.06	---	0.12
	VM-7	0.02	0.06	---	0.08
	VM-8	0.03	0.09	---	0.12
	VM-9	---	0.58	---	0.58
	VM-10	---	0.13	---	0.13
AC-6	ARTM-2	---	0.04	---	0.04
	BS-10	---	0.05	---	0.05
	TDR-8	---	0.39	---	0.39
	VM-11	---	0.45	---	0.45
	Subtotal	*0.21*	*2.64*	*1.67*	*4.52*
Altamont Creek Tributary					
ACT-2	BM-2	---	0.01	---	0.01
	VM-3	0.07	---	---	0.07
	VM-4	0.37	0.01	---	0.38
	Subtotal	*0.44*	*0.02*	*0.00*	*0.46*
Arroyo Del Valle					
ADV-15	BS-37	0.02	---	---	0.02
	Subtotal	*0.02*	*0.00*	*0.00*	*0.02*
Arroyo Las Positas					
ALP-8	BS-8	0.07	1.05	0.01	1.13
ALP-16	TDR-6	---	---	---	0.00
	VM-11	---	---	0.43	0.43
	Subtotal	*0.07*	*1.05*	*0.44*	*1.56*
Total		**0.74**	**3.71**	**2.11**	**6.56**

Table 6-15. Callippe Silverspot Butterfly Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)	
		California Annual Grassland	Total
Altamont Creek			
AC-5	ARTM-1	0.11	0.11
	BS-9	0.01	0.01
	TDR-7	0.89	0.89
	VM-9	0.66	0.66
	VM-10	0.04	0.04
AC-6	ARTM-2	0.05	0.05
	BS-10	0.01	0.01
	TDR-8	0.60	0.60
AC-7	BM-4	0.15	0.15
	BS-11	0.11	0.11
	BS-12	0.11	0.11
	BS-13	0.11	0.11
	BS-14	0.23	0.23
	BS-15	0.23	0.23
	VM-11	0.62	0.62
	Subtotal	*3.93*	*3.93*
Arroyo Del Valle			
ADV-7	BM-17	0.01	0.01
ADV-8	BM-17	0.01	0.01
	BS-25	0.01	0.01
	VM-29	0.01	0.01
ADV-10	BM-34	0.02	0.02
	BM-22	0.02	0.02
	BM-23	0.01	0.01
ADV-11	BS-32	0.03	0.03
	BS-33	0.03	0.03
	VM-36	0.02	0.02
	VM-37	0.02	0.02
	VM-38	0.02	0.02
	VM-39	0.06	0.06
ADV-15	BM-25	0.04	0.04
	BS-23	0.06	0.06
	BS-37	0.04	0.04
	VM-42	0.03	0.03
	VM-43	0.03	0.03
	Subtotal	*0.47*	*0.47*
Arroyo Las Positas			
ALP-1	VM-1	0.08	0.08
ALP-5	BM-6	0.18	0.18
	SM-4	0.73	0.73
	VM-5	15.73	15.73

Table 6-15. Callippe Silverspot Butterfly Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)	
		California Annual Grassland	Total
ALP-6	BS-5	0.57	0.57
ALP-7	BM-8	0.09	0.09
	BS-6	0.22	0.22
	BS-7	0.40	0.40
ALP-8	BS-8	0.03	0.03
	Subtotal	*18.03*	*18.03*
Arroyo Las Positas Tributary			
ALPT-3	BM-1	0.52	0.52
	SM-1	0.52	0.52
	Subtotal	*1.04*	*1.04*
Total		**23.47**	**23.47**

Table 6-16. California Tiger Salamander Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)					
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Pond	Seasonal Wetland	Total
Altamont Creek							
AC-1	BS-1	0.06					0.06
	BS-2	0.09					0.09
	VM-1	0.76	0.05				0.81
AC-2	BM-1	0.05	0.01				0.06
AC-4	TDR-4					0.38	0.38
	TDR-5					0.44	0.44
	VM-4					0.38	0.38
	VM-5					0.45	0.45
AC-5	ARTM-1			0.11			0.11
	BS-5		0.03				0.03
	BS-6	0.01	0.04				0.05
	BS-7	0.02	0.04				0.06
	BS-8	0.01	0.04				0.05
	BS-9		0.04	0.01			0.05
	TDR-6	0.01	0.19				0.20
	TDR-7		0.40	0.89			1.29
	VM-6	0.06	0.06				0.12
	VM-7	0.02	0.06				0.08
	VM-8	0.03	0.09				0.12
	VM-9		0.58	0.66			1.24
	VM-10		0.13	0.04			0.17
AC-6	ARTM-2		0.04	0.05			0.09
	BS-10		0.05	0.01			0.06
	TDR-8		0.39	0.60			0.99
AC-7	BM-4			0.15			0.15
	BS-11			0.11			0.11
	BS-12			0.11			0.11
	BS-13			0.11			0.11
	BS-14			0.23			0.23
	BS-15			0.23			0.23
	VM-11		0.45	0.62			1.07
	Subtotal	*1.12*	*2.69*	*3.93*	*0.00*	*1.65*	*9.39*
Altamont Creek Tributary							
ACT-1	VM-1					0.07	0.07
ACT-2	BM-2		0.01				0.01
	VM-3	0.07					0.07
	VM-4	0.37	0.01				0.38
	Subtotal	*0.44*	*0.02*	*0.00*	*0.00*	*0.07*	*0.53*
Arroyo Del Valle							
ADV-7	BM-17			0.01			0.01
ADV-8	BM-17			0.01			0.01
	BS-25			0.01			0.01

Table 6-16. California Tiger Salamander Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)					
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Pond	Seasonal Wetland	Total
	VM-29			0.01			0.01
ADV-10	BM-34			0.02			0.02
	BM-22			0.02			0.02
	BM-23			0.01			0.01
ADV-11	BS-32			0.03			0.03
	BS-33			0.03			0.03
	VM-36			0.02			0.02
	VM-37			0.02			0.02
	VM-38			0.02			0.02
	VM-39			0.06	0.38		0.44
ADV-15	BM-25			0.04			0.04
	BS-23			0.06			0.06
	BS-37	0.02		0.04			0.06
	VM-42			0.03			0.03
	VM-43			0.03			0.03
	Subtotal	*0.02*	*0.00*	*0.47*	*0.38*	*0.00*	*0.87*
Arroyo Las Positas							
ALP-1	VM-1			0.08			0.08
ALP-3	SM-2					13.33	13.33
	VM-3					0.15	0.15
ALP-5	BM-6	0.01		0.18			0.19
	SM-4			0.73			0.73
	VM-5			15.73			15.73
ALP-6	BS-5			0.57			0.57
ALP-7	BM-8			0.09			0.09
	BS-6			0.22			0.22
	BS-7			0.40			0.40
ALP-8	BS-8	0.07	1.05	0.03		0.01	1.16
ALP-9	BM-10	0.05	0.35				0.40
ALP-11	BM-11	0.11					0.11
	BS-9	0.07	0.16				0.23
ALP-16	TDR-6					0.43	0.43
	VM-11					0.43	0.43
	Subtotal	*0.31*	*1.56*	*18.03*	*0.00*	*14.35*	*34.25*
Arroyo Las Positas Tributary							
ALPT-3	BM-1			0.52			0.52
	SM-1			0.52			0.52
	Subtotal	*0.00*	*0.00*	*1.04*	*0.00*	*0.00*	*1.04*
Collier Canyon Creek							
CCC-6	BS-2			0.07			0.07
CCC-7	BS-3			0.30			0.30
	Subtotal	*0.00*	*0.00*	*0.37*	*0.00*	*0.00*	*0.37*
Total		**1.89**	**4.27**	**23.84**	**0.38**	**16.07**	**46.45**

Table 6-17. California Red-Legged Frog Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)										Total
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Woodland	
Altamont Creek												
AC-1	BS-1	0.06										0.06
	BS-2	0.09										0.09
	VM-1	0.76	0.05									0.81
AC-2	BM-1	0.05	0.01									0.06
AC-4	TDR-4									0.38		0.38
	TDR-5									0.44		0.44
	VM-4									0.38		0.38
	VM-5									0.45		0.45
AC-5	ARTM-1			0.11								0.11
	BS-5		0.03									0.03
	BS-6	0.01	0.04									0.05
	BS-7	0.02	0.04									0.06
	BS-8	0.01	0.04									0.05
	BS-9		0.04	0.01								0.05
	TDR-6	0.01	0.19									0.20
	TDR-7		0.40	0.89								1.29
	VM-6	0.06	0.06									0.12
	VM-7	0.02	0.06									0.08
	VM-8	0.03	0.09									0.12
	VM-9		0.58	0.66								1.24
	VM-10		0.13	0.04								0.17
AC-6	ARTM-2		0.04	0.05								0.09
	BS-10		0.05	0.01								0.06
	TDR-8		0.39	0.60								0.99
AC-7	BM-4			0.15								0.15
	BS-11			0.11								0.11
	BS-12			0.11								0.11
	BS-13			0.11								0.11
	BS-14			0.23								0.23
	BS-15			0.23								0.23
	VM-11		0.45	0.62								1.07
	Subtotal	*1.12*	*2.69*	*3.93*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.65*	*0.00*	*9.39*
Altamont Creek Tributary												
ACT-1	VM-1									0.07		0.07
ACT-2	BM-2		0.01									0.01
	VM-3	0.07										0.07
	VM-4	0.37	0.01									0.38
	Subtotal	*0.44*	*0.02*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.07*	*0.00*	*0.53*
Arroyo Del Valle												
ADV-1	BS-1					0.24						0.24
	BS-2					0.11						0.11
	VM-1					0.10						0.10
	VM-2					0.07			0.00			0.07
	VM-3					0.23						0.23
ADV-2	BM-2					0.08					0.09	0.17
	BM-3										0.09	0.09
	BS-3										0.34	0.34
ADV-3	BS-4										0.11	0.11
ADV-4	BS-5										0.17	0.17
	BS-6										0.09	0.09
ADV-5	BS-7										0.06	0.06
	BS-8										0.06	0.06
ADV-6	BM-12										0.00	0.00
	BM-13				0.01						0.03	0.04
	BS-18										0.00	0.00
	BS-19				0.12						0.01	0.13
	BS-20										0.06	0.06

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)										Total
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Woodland	
	BS-21										0.06	0.06
	BS-22				0.05							0.05
	VM-21				0.02						0.01	0.03
	VM-22				0.05						0.38	0.43
	VM-23				0.01						0.02	0.03
	VM-24										0.03	0.03
ADV-7	BM-14				0.04							0.04
	BM-15				0.01							0.01
	BM-16				0.01							0.01
	BM-17			0.01								0.01
	BS-22				0.01							0.01
	BS-23				0.06							0.06
	BS-24				0.01							0.01
	VM-22				0.00							0.00
	VM-25				0.03							0.03
	VM-26				0.03							0.03
	VM-27				0.48							0.48
ADV-8	BM-17			0.01								0.01
	BS-25			0.01								0.01
	VM-29			0.01								0.01
ADV-10	BM-24				0.04							0.04
	BS-34			0.02	0.04							0.06
	BS-35				0.06							0.06
	VM-40				0.03							0.03
	VM-41				0.03							0.03
ADV-11	BM-20				0.04							0.04
	BM-22			0.02	0.02							0.04
	BM-23			0.01	0.02							0.03
	BS-28				0.06							0.06
	BS-29				0.06							0.06
	BS-32			0.03	0.03							0.06
	BS-33			0.03	0.02							0.05
	VM-32				0.03							0.03
	VM-33				0.03							0.03
	VM-36			0.02	0.02							0.04
	VM-37			0.02	0.02							0.04
	VM-38			0.02	0.02							0.04
	VM-39			0.06	0.02			0.38				0.46
ADV-12	BM-21				0.04							0.04
	BS-30				0.06							0.06
	BS-31				0.06							0.06
	VM-34				0.03							0.03
	VM-35				0.03							0.03
ADV-14	BM-19				0.04							0.04
	BS-26				0.06							0.06
	BS-27				0.06							0.06
	VM-30				0.03							0.03
	VM-31				0.03							0.03
ADV-15	BM-25			0.04								0.04
	BS-36			0.06								0.06
	BS-37	0.02		0.04								0.06
	VM-42			0.03								0.03
	VM-43			0.03								0.03
	Subtotal	*0.02*	*0.00*	*0.47*	*1.96*	*0.83*	*0.00*	*0.38*	*0.00*	*0.00*	*1.61*	*5.28*
Arroyo Las Positas												
ALP-1	BM-1								0.25			0.25
	BM-2				0.37							0.37
	BS-1								0.23			0.23

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)										Total
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Woodland	
	VM-1			0.08	2.93	0.19						3.20
ALP-2	SM-1				2.39							2.39
	VM-2				5.83							5.83
ALP-3	BM-3				0.12							0.12
	SM-2									13.33		13.33
	VM-3									0.15		0.15
ALP-4	BM-4				0.14							0.14
	SM-3				1.20							1.20
	VM-4				2.13							2.13
ALP-5	BM-6	0.01		0.18								0.19
	SM-4			0.73								0.73
	VM-5			15.73								15.73
ALP-6	BS-2				0.11							0.11
	BS-3				0.11							0.11
	BS-4				0.11							0.11
	BS-5			0.57								0.57
ALP-7	BM-8			0.09								0.09
	BS-6			0.22	0.13							0.35
	BS-7			0.40	0.09							0.49
	TDR-1				0.45							0.45
ALP-8	BS-8	0.07	1.05	0.03						0.01		1.16
ALP-9	BM-10	0.05	0.35									0.40
ALP-11	BM-11	0.11					0.05					0.16
	BS-9	0.07	0.16									0.23
	SM-5						0.46					0.46
	VM-7						0.46					0.46
	TDR-2						0.46					0.46
ALP-12	BM-12						0.01					0.01
	SM-6						0.23					0.23
	TDR-3						0.68					0.68
	VM-8						0.68					0.68
ALP-13	SM-7						0.52					0.52
	TDR-4						0.52					0.52
	VM-9						0.52					0.52
ALP-14	BM-14						0.05					0.05
	SM-8						0.21					0.21
	VM-10						0.21					0.21
ALP-15	BM-15						0.06					0.06
	CRR-1						0.00					0.00
	TDR-5						0.11					0.11
ALP-16	TDR-6									0.43		0.43
	VM-11									0.43		0.43
	Subtotal	*0.31*	*1.56*	*18.03*	*16.11*	*0.19*	*5.23*	*0.00*	*0.48*	*14.35*	*0.00*	*56.26*
Arroyo Las Positas Tributary												
ALPT-3	BM-1			0.52								0.52
	SM-1			0.52								0.52
	Subtotal	*0.00*	*0.00*	*1.04*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.04*
Arroyo Mocho												
AM-1	BM-1								0.02			0.02
	BM-2				0.09							0.09
	VM-1				1.42							1.42
AM-2	BM-3				0.09							0.09
	CRR-1				0.10							0.10
	VM-2				5.77							5.77
AM-4	BM-4				0.17							0.17
	TDR-1				0.71							0.71
	VM-3				1.50							1.50
	VM-4				0.12				0.50			0.62

Table 6-17. California Red-Legged Frog Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)										Total
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Woodland	
AM-5	ARTM-1				0.64							0.64
	BM-5				0.00							0.00
	VM-5				3.58							3.58
AM-6	BM-6				0.01							0.01
	SM-1				0.23							0.23
AM-7	BM-7				0.30							0.30
	VM-6				1.03							1.03
AM-8	VM-7				1.66							1.66
AM-9	BM-8				0.04							0.04
AM-10	CRR-2					0.00						0.00
	Subtotal	*0.00*	*0.00*	*0.00*	*17.46*	*0.00*	*0.00*	*0.00*	*0.52*	*0.00*	*0.00*	*17.98*
Arroyo Seco												
AS-1	BS-1			0.45								0.45
AS-2	BM-1			0.05	0.00							0.05
	SM-1				0.93							0.93
	VM-1				0.99							0.99
AS-3	BM-2				0.01				0.18			0.19
AS-4	BM-3			0.01					0.26			0.27
	BM-4			0.02					0.17			0.19
	BM-5			0.03					0.42			0.45
	BM-6								0.19			0.19
AS-5	BM-7								0.02			0.02
AS-7	BM-9				0.01							0.01
AS-9	BM-11									0.10		0.10
AS-10	BM-12				0.01							0.01
AS-11	BM-13				0.09							0.09
	BM-14				0.07							0.07
	BM-15				0.17							0.17
AS-12	BM-16				0.14							0.14
AS-13	BM-17			0.05	0.11							0.16
AS-14	BM-18				0.18							0.18
	Subtotal	*0.00*	*0.00*	*0.61*	*2.71*	*0.00*	*0.00*	*0.00*	*1.24*	*0.10*	*0.00*	*4.66*
Collier Canyon Creek												
CCC-1	BS-1									0.19		0.19
CCC-2	BM-1											0.00
CCC-3	SM-1											0.00
CCC-4	VM-1											0.00
CCC-5	BM-2											0.00
	VM-2											0.00
CCC-6	BM-3											0.00
	BS-2			0.07								0.07
CCC-7	BS-3			0.30								0.30
	BS-4				0.17							0.17
	Subtotal	*0.00*	*0.00*	*0.37*	*0.17*	*0.00*	*0.00*	*0.00*	*0.00*	*0.19*	*0.00*	*0.73*
Cottonwood Creek												
CC-1												0.00
CC-2	BS-1			0.11	0.01							0.12
	BS-2			0.15	0.00							0.15
	CRR-1			0.01								0.01
	SM-1			0.01								0.01
	VM-1			0.09	0.07					0.05		0.21
	Subtotal	*0.00*	*0.00*	*0.36*	*0.08*	*0.00*	*0.00*	*0.00*	*0.00*	*0.05*	*0.00*	*0.49*
Realigned Arroyo Las Positas												
RALP-1												0.00
RALP-2	BM-1											0.00
RALP-3	BM-2			0.02								0.02
	BM-3											0.00
RALP-4												0.00

Table 6-17. California Red-Legged Frog Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)										Total
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Woodland	
RALP-5	CRR-1			0.01								0.01
RALP-6	CRR-2			0.01								0.01
	Subtotal	*0.00*	*0.00*	*0.04*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.04*
Total		**1.89**	**4.27**	**24.85**	**38.49**	**1.02**	**5.23**	**0.38**	**2.24**	**16.41**	**1.61**	**96.40**

Table 6-18. Golden Eagle Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)						
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Seasonal Wetland	Valley Sink Scrub	Cropland	Total
Altamont Creek								
AC-1	BS-1	0.06						0.06
	BS-2	0.09						0.09
	VM-1	0.76	0.05					0.81
AC-2	BM-1	0.05	0.01			0.21		0.27
	BS-3					0.00		0.00
	BS-4					0.05		0.05
	VM-2					0.40		0.40
AC-4	TDR-4				0.38			0.38
	TDR-5				0.44			0.44
	VM-4				0.38			0.38
	VM-5				0.45			0.45
AC-5	ARTM-1			0.11				0.11
	BS-5		0.03					0.03
	BS-6	0.01	0.04					0.05
	BS-7	0.02	0.04					0.06
	BS-8	0.01	0.04					0.05
	BS-9		0.04	0.01				0.05
	TDR-6	0.01	0.19					0.20
	TDR-7		0.40	0.89				1.29
	VM-6	0.06	0.06					0.12
	VM-7	0.02	0.06					0.08
	VM-8	0.03	0.09					0.12
	VM-9		0.58	0.66				1.24
	VM-10		0.13	0.04				0.17
AC-6	ARTM-2		0.04	0.05				0.09
	BS-10		0.05	0.01				0.06
	TDR-8		0.39	0.60				0.99
AC-7	BM-4			0.15				0.15
	BS-11			0.11				0.11
	BS-12			0.11				0.11
	BS-13			0.11				0.11
	BS-14			0.23				0.23
	BS-15			0.23				0.23
	VM-11		0.45	0.62				1.07
	Subtotal	*1.12*	*2.69*	*3.93*	*1.65*	*0.66*	*0.00*	*10.05*
Arroyo Del Valle								
ADV-7	BM-17			0.01				0.01
ADV-8	BM-17			0.01				0.01
	BS-25			0.01				0.01
	VM-29			0.01				0.01
ADV-10	BS-34			0.02				0.02
ADV-11	BM-22			0.02				0.02

Table 6-18. Golden Eagle Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)						
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Seasonal Wetland	Valley Sink Scrub	Cropland	Total
	BM-23			0.01				0.01
	BS-32			0.03				0.03
	BS-33			0.03				0.03
	VM-36			0.02				0.02
	VM-37			0.02				0.02
	VM-38			0.02				0.02
	VM-39			0.06				0.06
ADV-15	BM-25			0.04				0.04
	BS-36			0.06				0.06
	BS-37	0.02		0.04				0.06
	VM-42			0.03				0.03
	VM-43			0.03				0.03
	Subtotal	*0.02*	*0.00*	*0.47*	*0.00*	*0.00*	*0.00*	*0.49*
Arroyo Las Positas								
ALP-1	VM-1			0.08				0.08
ALP-3	SM-2				13.33			13.33
	VM-2				0.15			0.15
ALP-4	BM-4						0.02	0.02
	SM-3						0.24	0.24
	VM-4						0.76	0.76
ALP-5	BM-6	0.01		0.18				0.19
	SM-4			0.73				0.73
	VM-5			15.73				15.73
ALP-6	BS-5			0.57				0.57
ALP-7	BM-8			0.09				0.09
	BS-6			0.22				0.22
	BS-7			0.40				0.40
ALP-8	BS-8	0.07	1.05	0.03	0.01	0.05		1.21
ALP-9	BM-10	0.05	0.35			0.07		0.47
ALP-11	BM-11	0.11						0.11
	BS-9	0.07	0.16					0.23
ALP-16	TDR-6				0.43			0.43
	VM-11				0.43			0.43
	Subtotal	*0.31*	*1.56*	*18.03*	*14.35*	*0.12*	*1.02*	*35.39*
Total		**1.45**	**4.25**	**22.43**	**16.00**	**0.78**	**1.02**	**45.93**

Table 6-19. Tricolored Blackbird Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)			
		Mixed Willow Riparian Scrub	Perennial Marsh	Riverine Stream	Total
Arroyo Las Positas					
ADV-1	BM-2	0.08			0.08
	BS-1	0.24			0.24
	BS-1	0.11			0.11
	SDO-4	0.02			0.02
	VM-1	0.10			0.10
	VM-2	0.07		0.001	0.07
	VM-3	0.23			0.23
	Subtotal	*0.85*	*0.00*	*0.001*	*0.85*
Arroyo Las Positas					
ALP-1	BM-1			0.25	0.25
	BS-1			0.23	0.23
	VM-1	0.19			0.19
ALP-11	BM-11		0.05		0.05
	SM-5		0.46		0.46
	VM-7		0.46		0.46
	TDR-2		0.46		0.46
ALP-12	BM-12		0.01		0.01
	SM-6		0.23		0.23
	TDR-3		0.68		0.68
	VM-8		0.68		0.68
ALP-13	SM-7		0.52		0.52
	TDR-4		0.52		0.52
	VM-9		0.52		0.52
ALP-14	BM-14		0.05		0.05
	SM-8		0.21		0.21
	VM-10		0.21		0.21
ALP-15	BM-15		0.06		0.06
	CRR-1		0.00		0.00
	TDR-5		0.11		0.11
	Subtotal	*0.19*	*5.23*	*0.48*	*5.90*
Arroyo Mocho					
AM-1	BM-1			0.02	0.02
AM-4	VM-4			0.50	0.50
AM-10	CRR-1	0.002			0.002
	Subtotal	*0.00*	*0.00*	*0.52*	*0.52*
Total		**1.04**	**5.23**	**1.00**	**7.28**

Table 6-20. Western Burrowing Owl Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)			
		Alkali Meadows and Scalds	California Annual Grassland	Valley Sink Scrub	Total
Altamont Creek					
AC-1	BS-1	0.06			0.06
	BS-2	0.09			0.09
	VM-1	0.76			0.76
AC-2	BM-1	0.05		0.21	0.26
	BS-3			0.00	0.00
	BS-4			0.05	0.05
	VM-2			0.40	0.40
	VM-3			0.21	0.21
AC-5	ARTM-1		0.11		0.11
	BS-6	0.01			0.01
	BS-7	0.02			0.02
	BS-8	0.01			0.01
	BS-9		0.01		0.01
	TDR-6	0.01			0.01
	TDR-7		0.89		0.89
	VM-6	0.06			0.06
	VM-7	0.02			0.02
	VM-8	0.03			0.03
	VM-9		0.66		0.66
	VM-10		0.04		0.04
AC-6	ARTM-2		0.05		0.05
	BS-10		0.01		0.01
	TDR-8		0.60		0.60
AC-7	BM-4		0.15		0.15
	BS-11		0.11		0.11
	BS-12		0.11		0.11
	BS-13		0.11		0.11
	BS-14		0.23		0.23
	BS-15		0.23		0.23
	VM-11		0.62		0.62
	Subtotal	*1.12*	*3.93*	*0.87*	*5.92*
Altamont Creek Tributary					
ACT-2	BM-2			0.15	0.15
	VM-3	0.07			0.07
	VM-4	0.37			0.37
	Subtotal	*0.44*	*0.00*	*0.15*	*0.59*
Arroyo Del Valle					
ADV-7	BM-17		0.01		0.01
ADV-8	BM-17		0.01		0.01
	BS-25		0.01		0.01
	VM-29		0.01		0.01
ADV-10	BM-34		0.02		0.02
	BM-22		0.02		0.02

Table 6-20. Western Burrowing Owl Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)			
		Alkali Meadows and Scalds	California Annual Grassland	Valley Sink Scrub	Total
	BM-23		0.01		0.01
ADV-11	BS-32		0.03		0.03
	BS-33		0.03		0.03
	VM-36		0.02		0.02
	VM-37		0.02		0.02
	VM-38		0.02		0.02
	VM-39		0.06		0.06
ADV-15	BM-25		0.04		0.04
	BS-23		0.06		0.06
	BS-37	0.02	0.04		0.06
	VM-42		0.03		0.03
	VM-43		0.03		0.03
	Subtotal	*0.02*	*0.47*	*0.00*	*0.49*
Arroyo Las Positas					
ALP-1	VM-1		0.08		0.08
ALP-5	BM-6	0.01	0.18		0.19
	SM-4		0.73		0.73
	VM-5		15.73		15.73
ALP-6	BS-5		0.57		0.57
ALP-7	BM-8		0.09		0.09
	BS-6		0.22		0.22
	BS-7		0.40		0.40
ALP-8	BS-8	0.07	0.03	0.05	0.15
ALP-9	BM-10	0.05		0.07	0.12
ALP-11	BM-11	0.11			0.11
	BS-9	0.07			0.07
ALP-12	VM-8		0.68		0.68
	Subtotal	*0.31*	*18.71*	*0.12*	*19.14*
Arroyo Las Positas Tributary					
ALPT-3	BM-1		0.52		0.52
	SM-1		0.52		0.52
	Subtotal	*0.00*	*1.04*	*0.00*	*1.04*
Arroyo Seco					
AS-1	BS-1		0.45		0.45
AS-2	BM-1		0.05		0.05
AS-4	BM-3		0.01		0.01
	BM-4		0.02		0.02
	BM-5		0.03		0.03
AS-13	BM-17		0.05		0.05
	Subtotal	*0.00*	*0.61*	*0.00*	*0.61*
Collier Canyon Creek					
CCC-6	BS-2		0.07		0.07
CCC-7	BS-3		0.30		0.30

Table 6-20. Western Burrowing Owl Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)			
		Alkali Meadows and Scalds	California Annual Grassland	Valley Sink Scrub	Total
	Subtotal	*0.00*	*0.37*	*0.00*	*0.37*
Cottonwood Creek					
CC-2	BS-1		0.11		0.11
	BS-2		0.15		0.15
	CRR-1		0.01		0.01
	SM-1		0.01		0.01
	VM-1		0.09		0.09
	Subtotal	*0.00*	*0.36*	*0.00*	*0.36*
Realigned Arroyo Las Positas					
RALP-3	BM-2		0.02		0.02
RALP-5	CRR-1		0.01		0.01
RALP-6	CRR-2		0.01		0.01
	Subtotal	*0.00*	*0.04*	*0.00*	*0.04*
Total		**1.89**	**25.53**	**1.14**	**28.56**

Table 6-21. American Badger Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)							
		Alkali Meadows and Scalds	California Annual Grassland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Ruderal	Rural Residential	Total
Altamont Creek									
AC-1	BS-1	0.06							0.06
	BS-2	0.09							0.09
	VM-1	0.76							0.76
AC-2	BM-1	0.05			0.21				0.26
	BS-3				0.00				0.00
	BS-4				0.05				0.05
	VM-2				0.40				0.40
	VM-3				0.21				0.21
AC-5	ARTM-1		0.11						0.11
	BS-6	0.01							0.01
	BS-7	0.02							0.02
	BS-8	0.01							0.01
	BS-9		0.01						0.01
	TDR-6	0.01							0.01
	TDR-7		0.89						0.89
	VM-6	0.06							0.06
	VM-7	0.02							0.02
	VM-8	0.03							0.03
	VM-9		0.66						0.66
	VM-10		0.04						0.04
AC-6	ARTM-2		0.05						0.05
	BS-10		0.01						0.01
	TDR-8		0.60						0.60
AC-7	BM-4		0.15						0.15
	BS-11		0.11						0.11
	BS-12		0.11						0.11
	BS-13		0.11						0.11
	BS-14		0.23						0.23
	BS-15		0.23						0.23
	VM-11		0.62						0.62
	Subtotal	*1.13*	*3.95*	*0.00*	*0.88*	*0.00*	*0.00*	*0.00*	*5.95*
Altamont Creek Tributary									
ACT-2	BM-2				0.15				0.15
	VM-3	0.07							0.07
	VM-4	0.37							0.37
	Subtotal	*0.44*	*0.00*	*0.00*	*0.15*	*0.00*	*0.00*	*0.00*	*0.59*
Arroyo Del Valle									
ADV-1	Access							0.01	0.01
	BS-1							0.01	0.01
	BS-1							0.06	0.06
	SDO-3							0.02	0.02
	VM-1							0.05	0.05
	VM-2							0.06	0.06
ADV-2	BM-2			0.09					0.09
	BM-3			0.04					0.04
	BM-4			0.04					0.04
	BM-5			0.09					0.09
	BM-6			0.04					0.04
	BS-3			0.06					0.06
	BS-4			0.06					0.06
	BS-5			0.06					0.06
	BS-6			0.06					0.06
	BS-7			0.06					0.06
	SDO-1			0.02					0.02
	SDO-2			0.02					0.02
	SM-1			0.06					0.06

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)							
		Alkali Meadows and Scalds	California Annual Grassland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Ruderal	Rural Residential	Total
	Staging Area			0.01					0.01
	VM-10			0.03					0.03
	VM-4			0.03					0.03
	VM-5			0.03					0.03
	VM-6			0.03					0.03
	VM-7			0.03					0.03
	VM-8			0.05					0.05
ADV-3	Access			0.02					0.02
	BM-7			0.17					0.17
	BS-8			0.06					0.06
	BS-9			0.11					0.11
	Staging Area			0.02					0.02
	Staging Area			0.01					0.01
	VM-11			0.03					0.03
	VM-9			0.05					0.05
ADV-4	BM-8			0.09					0.09
	SM-2			0.14					0.14
	Staging Area			0.01					0.01
ADV-5	Access			0.07					0.07
	BM-10			0.04					0.04
	BM-11			0.04					0.04
	BM-12			0.03					0.03
	BM-9			0.04					0.04
	BS-10			0.06					0.06
	BS-11			0.06					0.06
	BS12			0.06					0.06
	BS-13			0.06					0.06
	BS-14			0.06					0.06
	BS-15			0.06					0.06
	BS-16			0.06					0.06
	BS-17			0.06					0.06
	BS-18			0.12					0.12
	SM-3			0.09					0.09
	Staging Area			0.01					0.01
	VM-12			0.03					0.03
	VM-13			0.03					0.03
	VM-14			0.03					0.03
	VM-15			0.03					0.03
	VM-16			0.14					0.14
	VM-17			0.03					0.03
	VM-18			0.03					0.03
	VM-19			0.14					0.14
	VM-20			0.03					0.03
ADV-6	BM-12			0.00					0.00
	BM-13			0.03					0.03
	BS-18			0.00					0.00
	BS-19			0.01					0.01
	BS-20			0.06					0.06
	BS-21			0.06					0.06
	VM-21			0.01					0.01
	VM-22			0.38					0.38
	VM-23			0.02					0.02
	VM-24			0.03					0.03
ADV-7	BM-17		0.01						0.01
ADV-8	BM-17		0.01						0.01
	BM-25		0.01						0.01
	VM-29		0.01						0.01

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)							
		Alkali Meadows and Scalds	California Annual Grassland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Ruderal	Rural Residential	Total
ADV-10	BS-34		0.02						0.02
ADV-11	BM-22		0.02						0.02
	BM-33		0.01						0.01
	BS-32		0.03						0.03
	BS-33		0.03						0.03
	VM-36		0.02						0.02
	VM-37		0.02						0.02
	VM-38		0.02						0.02
	VM-39		0.06						0.06
ADV-15	BM-25		0.04						0.04
	BS-36		0.06						0.06
	BS-37	0.02	0.04						0.06
	VM-42		0.03						0.03
	VM-43		0.03						0.03
	Subtotal	*0.02*	*0.49*	*3.63*	*0.00*	*0.00*	*0.00*	*0.21*	*4.35*
Arroyo Las Positas									
ALP-1	BM-1						0.06		0.06
	BM-2						0.14		0.14
	VM-1		0.08				0.07		0.15
ALP-4	BM-4					0.02	0.46		0.48
	SM-3					0.24			0.24
	VM-4					0.76			0.76
ALP-5	BM-6	0.01	0.18						0.19
	SM-4		0.73						0.73
	VM-5		15.73						15.73
ALP-6	BS-5		0.57						0.57
ALP-7	BM-8		0.09						0.09
	BS-6		0.22						0.22
	BS-7		0.40						0.40
ALP-8	BS-8	0.07	0.03		0.05				0.15
ALP-9	BM-10	0.05			0.07				0.12
ALP-11	BM-11	0.11							0.11
	BS-9	0.07							0.07
	Subtotal	*0.31*	*18.04*	*0.00*	*0.12*	*1.02*	*0.73*	*0.00*	*20.22*
Arroyo Las Positas Tributary									
ALPT-3	BM-1		0.52						0.52
	SM-1		0.52						0.52
	Subtotal	*0.00*	*1.04*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.04*
Arroyo Mocho									
AM-1	BM-1						0.01		0.01
	SDO-1						0.02		0.02
	Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.03*	*0.00*	*0.03*
Arroyo Seco									
AS-1	BS-1		0.45						0.45
AS-2	BM-1		0.05						0.05
AS-4	BM-3		0.01						0.01
	BM-4		0.02						0.02
	BM-5		0.03						0.03
AS-9	BM-11						0.01		0.01
AS-10	BM-12						0.01		0.01
AS-13	BM-17		0.05				0.07		0.12
	Subtotal	*0.00*	*0.62*	*0.00*	*0.00*	*0.00*	*0.09*	*0.00*	*0.71*
Cottonwood Creek									
CC-2	BS-1		0.11						0.11
	BS-2		0.15						0.15
	CRR-1		0.01						0.01
	SM-1		0.01						0.01

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)							
		Alkali Meadows and Scalds	**California Annual Grassland**	**Sycamore Alluvial Woodland**	**Valley Sink Scrub**	**Cropland**	**Ruderal**	**Rural Residential**	**Total**
	VM-1		0.09						0.09
	Subtotal	*0.00*	*0.36*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.36*
Realigned Arroyo Las Positas									
RALP-3	BM-2		0.02				0.01		0.03
RALP-5	CRR-1		0.01						0.01
RALP-6	CRR-2		0.01						0.01
	Subtotal	*0.00*	*0.04*	*0.00*	*0.00*	*0.00*	*0.01*	*0.00*	*0.05*
Total		**1.90**	**24.54**	**3.63**	**1.15**	**1.02**	**0.86**	**0.21**	**33.31**

Table 6-22. San Joaquin Kit Fox Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)			
		Alkali Meadows and Scalds	California Annual Grassland	Valley Sink Scrub	Total
Altamont Creek					
AC-1	BS-1	0.06			0.06
	BS-2	0.09			0.09
	VM-1	0.76			0.76
AC-2	BM-1	0.05		0.21	0.26
	BS-3			0.00	0.00
	BS-4			0.05	0.05
	VM-2			0.40	0.40
	VM-3			0.21	0.21
AC-5	ARTM-1		0.11		0.11
	BS-6	0.01			0.01
	BS-7	0.02			0.02
	BS-8	0.01			0.01
	BS-9		0.01		0.01
	TDR-6	0.01			0.01
	TDR-7		0.89		0.89
	VM-6	0.06			0.06
	VM-7	0.02			0.02
	VM-8	0.03			0.03
	VM-9		0.66		0.66
	VM-10		0.04		0.04
AC-6	ARTM-2		0.05		0.05
	BS-10		0.01		0.01
	TDR-8		0.60		0.60
AC-7	BM-4		0.15		0.15
	BS-11		0.11		0.11
	BS-12		0.11		0.11
	BS-13		0.11		0.11
	BS-14		0.23		0.23
	BS-15		0.23		0.23
	VM-11		0.62		0.62
	Subtotal	*1.13*	*3.95*	*0.88*	*5.95*
Altamont Creek Tributary					
ACT-2	BM-2			0.15	0.15
	VM-3	0.07			0.07
	VM-4	0.37			0.37
	Subtotal	*0.44*	*0.00*	*0.15*	*0.59*
Arroyo Las Positas					
ALP-1	VM-1		0.08		0.08
ALP-5	BM-6	0.01	0.18		0.19
	SM-4		0.73		0.73
	VM-5		15.73		15.73
ALP-6	BS-5		0.57		0.57

Table 6-22. San Joaquin Kit Fox Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)			
		Alkali Meadows and Scalds	California Annual Grassland	Valley Sink Scrub	Total
ALP-7	BM-8		0.09		0.09
	BS-6		0.22		0.22
	BS-7		0.40		0.40
ALP-8	BS-8	0.07	0.03	0.05	0.15
ALP-9	BM-10	0.05		0.07	0.12
ALP-11	BM-11	0.11			0.11
	BS-9	0.07			0.07
ALP-12	VM-8		0.68		0.68
	Subtotal	*0.31*	*18.72*	*0.12*	*19.15*
Arroyo Las Positas Tributary					
ALPT-3	BM-1		0.52		0.52
	SM-1		0.52		0.52
	Subtotal	*0.00*	*1.04*	*0.00*	*1.04*
Arroyo Seco					
AS-1	BS-1		0.45		0.45
AS-2	BM-1		0.05		0.05
AS-4	BM-3		0.01		0.01
	BM-4		0.02		0.02
	BM-5		0.03		0.03
AS-13	BM-17		0.05		0.05
	Subtotal	*0.00*	*0.62*	*0.00*	*0.62*
Cottonwood Creek					
CC-2	BS-1		0.11		0.11
	BS-2		0.15		0.15
	CRR-1		0.01		0.01
	SM-1		0.01		0.01
	VM-1		0.09		0.09
	Subtotal	*0.00*	*0.36*	*0.00*	*0.36*
Realigned Arroyo Las Positas					
RALP-3	BM-2		0.02		0.02
RALP-5	CRR-1		0.01		0.01
RALP-6	CRR-2		0.01		0.01
	Subtotal	*0.00*	*0.04*	*0.00*	*0.04*
Total		**0.75**	**20.78**	**0.27**	**21.80**

Table 6-23. Plant Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)						
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Seasonal Wetland	Riverine Stream	Valley Sink Scrub	Total
Altamont Creek								
AC-1	BS-1	0.06						0.06
	BS-2	0.09						0.09
	VM-1	0.76	0.05					0.81
AC-2	BM-1	0.05	0.01				0.21	0.27
	BS-3						0.01	0.01
	BS-4						0.05	0.05
	VM-2						0.40	0.40
	VM-3							0.00
	SDO-1						0.02	0.02
	SDO-2						0.02	0.02
	SDO-4						0.02	0.02
	Staging Area						0.31	0.31
AC-4	TDR-4							0.00
	TDR-5							0.00
	VM-4				0.38			0.38
	VM-5				0.45			0.45
AC-5	ARTM-1							0.00
	BM-3							0.00
	BS-5							0.00
	BS-6							0.00
	BS-7							0.00
	BS-8							0.00
	BS-9							0.00
	TDR-6							0.00
	TDR-7							0.00
	VM-6							0.00
	VM-7							0.00
	VM-8							0.00
	VM-9							0.00
	VM-10							0.00
AC-6	ARTM-2							0.00
	BS-10							0.00
	TDR-8							0.00
	VM-11							0.00
AC-7	BM-4			0.15				0.15
	BS-11			0.11				0.11
	BS-12			0.11				0.11
	BS-13			0.11				0.11
	BS-14			0.23				0.23
	BS-15			0.23				0.23
	VM-12							0.00
	Subtotal	*0.96*	*0.06*	*0.94*	*0.83*	*0.00*	*1.04*	*3.83*
Altamont Creek Tributary								
ACT-1	BS-1							0.00

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)						
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Seasonal Wetland	Riverine Stream	Valley Sink Scrub	Total
	VM-1				0.07			0.07
	VM-2							0.00
ACT-2	BM-1							0.00
	BM-2		0.01					0.01
	VM-3	0.07						0.07
	VM-4	0.37	0.01					0.38
	Subtotal	*0.44*	*0.02*	*0.00*	*0.07*	*0.00*	*0.00*	*0.53*
Arroyo Del Valle								
ADV-2	VM-2					0.00		0.00
ADV-2	BM-2							0.00
	BM-3							0.00
	BS-3							0.00
ADV-3	BS-4							0.00
ADV-4	BS-5							0.00
	BS-6							0.00
ADV-5	BS-7							0.00
ADV-1	VM-2					0.00		0.00
ADV-2	BM-2							0.00
	BM-3							0.00
	BS-3							0.00
ADV-3	BS-4							0.00
ADV-4	BS-5							0.00
	BS-6							0.00
ADV-5	BS-7							0.00
	BS-8							0.00
ADV-7	BM-17			0.01				0.01
ADV-8	BM-17			0.01				0.01
	BS-25			0.01				0.01
	VM-29			0.01				0.01
ADV-10	BM-34			0.02				0.02
	BM-22			0.02				0.02
	BM-23			0.01				0.01
ADV-11	BS-32			0.03				0.03
	BS-33			0.03				0.03
	VM-36			0.02				0.02
	VM-37			0.02				0.02
	VM-38			0.02				0.02
	VM-39			0.06				0.06
ADV-15	BM-25			0.04				0.04
	BS-23			0.06				0.06
	BS-37	0.02		0.04				0.06
	VM-42			0.03				0.03
	VM-43			0.03				0.03
	Subtotal	*0.02*	*0.00*	*0.47*	*0.00*	*0.00*	*0.00*	*0.49*
Arroyo Las Positas								

Table 6-23. Plant Maintenance Activity Impacts

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)						
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Seasonal Wetland	Riverine Stream	Valley Sink Scrub	Total
ALP-1	BM-1					0.25		0.25
	BM-2							0.00
	BS-1					0.23		0.23
	VM-1			0.08				0.08
ALP-5	BM-5							0.00
	BM-6	0.01		0.18				0.19
	SM-4			0.73				0.73
	VM-5			15.73				15.73
ALP-7	BM-8			0.09				0.09
	BS-6			0.22				0.22
	BS-7			0.40				0.40
	TDR-2							0.00
ALP-8	BM-9							0.00
	BM-7						0.07	0.07
	BS-8	0.07	1.05	0.03	0.01		0.05	1.21
	SDO-27						0.01	0.01
	Staging Area						0.01	0.01
ALP-9	BM-10	0.05	0.35					0.40
ALP-10	ARTM-1							0.00
	VM-6							0.00
ALP-11	BM-11	0.11						0.11
	BS-9	0.07	0.16					0.23
	SM-5							0.00
	VM-7							0.00
ALP-12	BM-12							0.00
	SM-6							0.00
	TDR-3							0.00
	VM-8							0.00
ALP-13	BM-13							0.00
	SM-7							0.00
	TDR-4							0.00
	VM-9							0.00
ALP-14	BM-14							0.00
	SM-8							0.00
	VM-10							0.00
ALP-15	BM-15							0.00
	CRR-1							0.00
	TDR-5							0.00
ALP-16	BM-16							0.00
	TDR-6							0.00
	VM-11				0.43			0.43
	Subtotal	*0.31*	*1.56*	*17.46*	*0.44*	*0.48*	*0.14*	*20.39*
Arroyo Las Positas Tributary								
ALPT-1								0.00
ALPT-2								0.00

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)						
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Seasonal Wetland	Riverine Stream	Valley Sink Scrub	Total
ALPT-3	BM-1			0.52				0.52
	SM-1			0.52				0.52
	Subtotal	*0.00*	*0.00*	*1.04*	*0.00*	*0.00*	*0.00*	*1.04*
Arroyo Mocho								
AM-6	BM-7							0.00
	SM-1							0.00
AM-7	ARTM-2							0.00
	BM-8							0.00
AM-8	ARTM-3							0.00
	VM-6							0.00
AM-10	CRR-1							0.00
	Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Arroyo Seco								
AS-1	BS-1			0.45				0.45
AS-4	BM-3			0.01		0.26		0.27
	BM-4			0.02		0.17		0.19
	BM-5			0.03		0.42		0.45
	BM-6					0.19		0.19
AS-8	BM-10							0.00
AS-11	BM-13							0.00
	BM-14							0.00
	BM-15							0.00
AS-12	BM-16							0.00
AS-13	BM-17			0.05				0.05
AS-14	BM-18							0.00
	Subtotal	*0.00*	*0.00*	*0.56*	*0.00*	*1.04*	*0.00*	*1.60*
Collier Canyon Creek								
CCC-3	SM-1							0.00
CCC-6	BM-3							0.00
	BS-2			0.07				0.07
CCC-7	BS-3			0.30				0.30
	BS-4							0.00
	Subtotal	*0.00*	*0.00*	*0.37*	*0.00*	*0.00*	*0.00*	*0.37*
Cottonwood Creek								
CC-1								0.00
	Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Realigned Arroyo Las Positas								
RALP-1								0.00
RALP-4								0.00
RALP-5	CRR-1			0.01				0.01
RALP-6	CRR-2			0.01				0.01
	Subtotal	*0.00*	*0.00*	*0.02*	*0.00*	*0.00*	*0.00*	*0.02*
Basins								
	BS-1						0.09	0.09
	SDO-1						0.04	0.04

Reach Name	Maintenance Activity	Land Cover Type Impacts (acres)						
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Seasonal Wetland	Riverine Stream	Valley Sink Scrub	Total
	VM-1						0.07	0.07
	Subtotal	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.20*	*0.20*
Total		**1.73**	**1.64**	**20.86**	**1.34**	**1.52**	**1.38**	**28.47**

Table 6-24: Summary of Maintenance Activity Impacts By Creek or Channel

Creek or Channel Name	Activity Type	Land Cover Type (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest / Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course / Urban Park	Ruderal	Rural Residential	Urban - Suburban	Vineyard	Grand Total
Altamont Creek		***1.12***	***2.69***	***3.93***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***1.65***	***0.00***	***0.66***	***0.00***	***0.00***	***0.00***	***0.00***	***3.05***	***0.00***	***13.10***
	ARTM	-	0.04	0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	-	0.20
	BM	0.05	0.01	0.15	-	-	-	-	-	-	-	-	0.21	-	-	-	-	0.53	-	0.95
	BS	0.19	0.24	0.81	-	-	-	-	-	-	-	-	0.05	-	-	-	-	0.13	-	1.43
	SDO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00
	TDR	0.01	0.98	1.49	-	-	-	-	-	-	0.82	-	-	-	-	-	-	1.10	-	4.40
	VM	0.87	1.42	1.32	-	-	-	-	-	-	0.83	-	0.40	-	-	-	-	1.28	-	6.12
Altamont Creek		***0.44***	***0.02***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.07***	***0.00***	***0.15***	***0.00***	***0.00***	***0.00***	***0.00***	***1.29***	***0.00***	***1.97***
Tributary	BM	-	0.01	-	-	-	-	-	-	-	-	-	0.15	-	-	-	-	0.26	-	0.42
	BS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06	-	0.06
	VM	0.44	0.01	-	-	-	-	-	-	-	0.07	-	-	-	-	-	-	0.97	-	1.49
Arroyo Del		***0.02***	***0.00***	***0.47***	***0.19***	***1.96***	***0.85***	***0.00***	***0.38***	***0.00***	***0.00***	***3.63***	***0.00***	***0.00***	***0.00***	***0.00***	***0.21***	***0.22***	***0.00***	***7.93***
Valle	Acess	-	-	-	-	-	-	-	-	-	-	0.09	-	-	-	-	0.01	-	-	0.10
	BM	-	-	0.09	0.04	0.26	0.08	-	-	-	-	0.74	-	-	-	-	-	0.19	-	1.40
	BS	0.02	-	0.19	0.10	0.76	0.35	-	-	-	-	1.20	-	-	-	-	0.07	-	-	2.69
	SDO	-	-	-	-	-	0.02	-	-	-	-	0.04	-	-	-	-	0.02	-	-	0.08
	SM	-	-	-	-	-	-	-	-	-	-	0.29	-	-	-	-	-	-	-	0.29
	Staging Are	-	-	-	-	-	-	-	-	-	-	0.06	-	-	-	-	-	-	-	0.06
	VM	-	-	0.19	0.05	0.94	0.40	-	0.38	0.00	-	1.21	-	-	-	-	0.11	0.03	-	3.31
Arroyo Las		***0.31***	***1.56***	***18.03***	***0.00***	***16.11***	***0.19***	***5.23***	***0.00***	***0.48***	***14.35***	***0.00***	***0.12***	***1.02***	***0.78***	***0.27***	***0.00***	***3.87***	***0.00***	***62.33***
Positas	BM	0.17	0.35	0.27	-	0.63	-	0.17	-	0.25	-	-	0.07	0.02	0.20	0.20	-	3.00	-	5.33
	BS	0.14	1.21	1.22	-	0.55	-	-	-	0.23	0.01	-	0.05	-	-	-	-	-	-	3.41
	CRR	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	-	-	-	0.00
	SDO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00
	SM	-	-	0.73	-	3.59	-	1.42	-	-	13.33	-	-	0.24	0.06	-	-	0.70	-	20.07
	TDR	-	-	-	-	0.45	-	1.77	-	-	0.43	-	-	-	0.00	-	0.00	0.11	-	2.76
	VM	-	-	15.81	-	10.89	0.19	1.87	-	-	0.58	-	-	0.76	0.52	0.07	0.00	0.07	-	30.76
Arroyo Las		***0.00***	***0.00***	***1.04***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***1.04***
Positas	BM			0.52																0.52
Tributary	SM			0.52																0.52
Arroyo Mocho		***0.00***	***0.00***	***0.02***	***0.00***	***18.74***	***0.00***	***0.00***	***0.00***	***0.69***	***0.00***	***0.00***	***0.00***	***0.00***	***0.15***	***0.03***	***0.00***	***2.34***	***0.06***	***22.03***
	ARTM	-	-	-	-	0.64	-	-	-	-	-	-	-	-	-	-	-	0.06	-	0.70
	BM	-	-	-	-	0.74	-	-	-	0.02	-	-	-	-	0.01	0.01	-	1.23	-	2.01
	CRR	-	-	-	-	0.11	0.00	-	-	-	-	-	-	-	-	-	-	0.02	-	0.13
	SDO	-	-	0.02	-	0.49	-	-	-	0.17	-	-	-	-	0.05	0.02	-	0.07	0.05	0.88
	SM	-	-	-	-	0.96	-	-	-	-	-	-	-	-	0.01	-	-	0.81	-	1.78
	Staging Are	-	-	-	-	0.00	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01
	TDR	-	-	-	-	0.71	-	-	-	-	-	-	-	-	-	-	-	0.01	-	0.72
	VM	-	-	-	-	15.08	-	-	-	0.50	-	-	-	-	0.08	-	-	0.14	-	15.80
Arroyo Seco		***0.00***	***0.00***	***0.61***	***0.00***	***0.00***	***2.72***	***0.00***	***0.00***	***0.00***	***1.28***	***0.10***	***0.00***	***0.00***	***0.00***	***0.00***	***0.09***	***0.00***	***3.46***	***8.26***
	BM			0.16			0.79				1.24	0.10					0.09		2.75	5.13

Creek or Channel Name	Activity Type	Land Cover Type (acres)																		
		Alkali Meadow and Scalds	Alkali Wetland	California Annual Grassland	Mixed Evergreen Forest / Oak Woodland	Mixed Riparian Forest and Woodland	Mixed Willow Riparian Scrub	Perennial Freshwater Marsh	Pond	Riverine Stream	Seasonal Wetland	Sycamore Alluvial Woodland	Valley Sink Scrub	Cropland	Golf Course / Urban Park	Ruderal	Rural Residential	Urban - Suburban	Vineyard	Grand Total
	BS			0.45																0.45
	SDO						0.01				0.04								0.02	0.07
	SM						0.93												0.68	1.61
	VM						0.99												0.01	1.00
Collier Canyon		***0.00***	***0.00***	***0.37***	***0.00***	***0.17***	***0.00***	***0.00***	***0.00***	***0.00***	***0.19***	***0.00***	***0.00***	***0.00***	***0.49***	***0.00***	***0.00***	***1.83***	***0.00***	***3.05***
Creek	BS	-	-	0.37	-	0.17	-	-	-	-	0.19	-	-	-	-	-	-	0.11	-	0.84
	BM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.12	-	1.12
	SM	-	-	-	-	-	-	-	-	-	-	-	-	-	0.49	-	-	0.03	-	0.52
	VM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.57	-	0.57
Cottonwood		***0.00***	***0.00***	***0.37***	***0.00***	***0.08***	***0.00***	***0.00***	***0.00***	***0.00***	***0.05***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.50***
Creek	BS			0.26		0.01														0.27
	CRR			0.01																0.01
	SM			0.01																0.01
	VM			0.09		0.07					0.05									0.21
Granada		***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.17***	***0.00***	***0.17***
Channel	BM																	0.03		0.03
	CRR									0.00								0.06		0.06
	TDR																	0.08		0.08
Realigned		***0.00***	***0.00***	***0.04***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.01***	***0.00***	***1.18***	***0.00***	***1.23***
Arroyo Las	BM			0.02												0.01		1.18		1.21
Positas	CRR			0.02																0.02
Bear Creek		***0.03***	***0.02***	***1.10***	***0.00***	***0.00***	***0.00***	***0.00***	***0.11***	***0.00***	***0.02***	***0.07***	***0.10***	***0.00***	***0.00***	***0.00***	***0.00***	***0.07***	***0.00***	***1.52***
Basins	BS	0.02	0.01	0.53	-	-	-	-	0.04	-	0.01	-	0.09	-	-	-	-	0.04	-	0.74
	SDO	-	-	0.05	-	-	-	-	0.01	-	-	-	0.01	-	-	-	-	0.01	-	0.08
	VM	0.01	0.01	0.52	-	-	-	-	0.06	-	0.01	0.07	-	-	-	-	-	0.02	-	0.70
Ravenswood		***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.25***	***0.11***	***0.00***	***0.00***	***0.36***
Drainage	VM															0.25	0.11			0.36
All Creeks/																				
Channels	Access	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.10
Combined	ARTM	0.00	0.04	0.16	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.90
	BM	0.22	0.37	1.21	0.04	1.63	0.87	0.17	0.00	0.27	1.24	0.84	0.43	0.02	0.21	0.22	0.09	7.54	2.75	18.11
	BS	0.37	1.46	3.83	0.10	1.49	0.35	0.00	0.04	0.23	0.21	1.20	0.19	0.00	0.00	0.00	0.07	0.35	0.00	9.89
	CRR	0.00	0.00	0.03	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.23
	SDO	0.00	0.00	0.07	0.00	0.49	0.03	0.00	0.01	0.17	0.04	0.04	0.01	0.00	0.05	0.02	0.02	0.08	0.07	1.11
	SM	0.00	0.00	1.26	0.00	4.55	0.93	1.42	0.00	0.00	13.33	0.29	0.00	0.24	0.56	0.00	0.00	1.54	0.68	24.80
	Staging Are	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.07
	TDR	0.01	0.98	1.49	0.00	1.16	0.00	1.77	0.00	0.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.00	7.96
	VM	1.32	1.44	17.93	0.05	26.98	1.58	1.87	0.44	0.50	1.54	1.28	0.40	0.76	0.61	0.32	0.22	3.08	0.01	60.33
Grand Total		**1.92**	**4.29**	**25.98**	**0.19**	**37.06**	**3.76**	**5.23**	**0.49**	**1.17**	**17.61**	**3.80**	**1.03**	**1.02**	**1.42**	**0.56**	**0.41**	**14.03**	**3.52**	**123.49**

Chapter 7
Impact Reduction and Minimization

7.1 Introduction

This chapter presents the SMP's impact reduction and minimization measures and BMPs. These measures were identified and developed to protect the natural resources and the Beneficial Uses of the creeks and channels within the SMP Area. The measures identified and described in this chapter are to be applied to the program maintenance activities of Chapter 5. Taken together, the pre-maintenance planning measures described in Chapter 4 and the maintenance activity based measures described in this chapter provide a comprehensive approach to avoiding and minimizing program impacts. Chapter 8, *Program Mitigation*, will address the mitigation of residual impacts that are not adequately avoided or minimized through the approaches described in Chapters 4 through 7.

This chapter is organized around three essential tables: Tables 7-1, 7-2, and 7-3, located at the end of the chapter. Table 7-1 presents program-wide BMPs according to the following topics:

- General impact avoidance and minimization
- Air quality
- Biological resources (including species-specific measures)
- Cultural resources
- Construction and seismicity
- Hazardous materials safety
- Vegetation management
- Water quality and creek/channel protection
- Good neighbor policies

Table 7-2 indicates which BMPs from Table 7-1 are applicable to the program activities described in Chapter 5. For example, BMPs for creek and channel dewatering (BMP BR-4 in Table 7-1) apply to sediment removal and bank stabilization activities, but not to tree removal or mowing activities.

Many of the BMPs in Table 7-1 aim to avoid or reduce impacts to sensitive wildlife and plant species and their supporting habitats. Table 7-3 lists all of the creek and channel reaches in the SMP Area, and indicates the potential for federal or state listed species based on prior CNDDB or other survey records (or the presence of suitable habitat for the listed species).

In sum, these three tables describe what the avoidance and minimization practices are (Table 7-1), which BMPs apply to which program activities (Table 7-2), and what is the status of federally or state listed species in the program reaches (Table 7-3). The SMP Manager will use these three tables iteratively throughout program operations to identify the appropriate protective measures based on the nature of the planned maintenance activity, and the resources found in the reach where the activity will occur.

7.2 Program-wide Best Management Practices

The following text sections provide a summary of the avoidance and minimization measures and BMPs for the resource topics listed above and presented in Table 7-1. For each resource topic, the key environmental concerns are described and the objectives of the protective measures are presented. If relevant, additional information on the regulatory context or specific regulatory requirements for the measures is provided. Table 7-1 should be referenced for specific details.

7.2.1 General Avoidance and Minimization Measures

Creek and channel maintenance activities occurring during the rainy season can result in potential environment impacts, particularly to aquatic habitats. Potential impacts could include erosion from stockpiled sediments or pollutants from work equipment entering the creek. To prevent such wet season impacts, all SMP maintenance activities shall occur during the dry season when rain and flows are minimized. BMP GEN-1, *Work Window*, defines the period of seasonal work activity for the SMP from May 1st to October 31st. In years that are dry, the City may request work be authorized by the regulatory agencies to begin earlier than May 1st and extend past October 31st (usually not longer than an extra two weeks on either end) subject to agency approval. Maintenance activities will be limited to between 7:00 a.m. and 8:00 p.m. Routine maintenance activities in residential areas will not occur on Saturdays, Sundays, or City observed state holidays except during emergencies, or with advance notification of surrounding residents (weekend or holiday work would be limited to between 9:00 a.m. and 3:00 p.m.). Additionally, the staging and stockpiling of maintenance equipment and materials will be restricted, monitored, and maintained to prevent transport of wash water containing sediment or hazardous chemicals to storm drains, creeks, or surrounding properties.

In accordance with the Maintenance Principles presented in Chapter 4, BMPs were also developed to ensure that maintenance activities would be conducted to protect and enhance existing habitat-supporting characteristics of the stream system. When heavy equipment must access sensitive areas of the creek, such as the creek bed and banks, measures will be taken to avoid harm to trees and compaction of soil and the area will be stabilized and restored after maintenance is complete. Details of these measures are provided in Table 7-1.

The impact avoidance and minimization measures provided in Table 7-1 are based on conditions required in a typical SWPPP. These conditions are required for construction activities conducted under the statewide NPDES Construction General Permit. SWMPs are required by current municipal NPDES permits in the County for operations activities. SMP maintenance activities are not directly required to comply with conditions of NPDES stormwater permits; however, implementation of SMP maintenance activities would be consistent with requirements of the permits and management plans.

7.2.2 Air Quality Protection

All activities conducted under this SMP will comply with pertinent requirements of federal, state, and local environmental laws and regulations for air quality, including, but not limited to, the federal Clean Air Act and state and local air pollution ordinances. Any activity that entails earthwork and/or construction must implement dust control measures, as required by the Bay Area Air Quality Management District (BAAQMD). The BAAQMD's *Basic Construction Mitigation Measures* (Bay Area

Air Quality Management District 2012) and *Additional Construction Mitigation Measures* (Bay Area Air Quality Management District 2012) will be implemented for all stream maintenance activities (BMPs AQ-1 and AQ-2).

7.2.3 Biological Resources Protection

A large number of maintenance activities would be conducted in areas which are natural or semi-natural, and therefore these activities could directly disturb biological resources. The primary maintenance activities of the SMP are sediment and vegetation removal from creeks and channels that provide habitat for a variety of species, including focal species which are protected under federal and state regulations. Implementation of ground-disturbing maintenance during the dry season, as prescribed by BMP GEN-1, *Work Window*, will assist in minimizing impacts to aquatic biological resources. As shown in Table 7-1, additional measures were developed to minimize disturbance to biological resources including the training of maintenance personnel to identify and protect focal species and proper implementation of dewatering activities.

Activities conducted under this SMP will comply with applicable federal, state, and local laws and policies that protect biological resources, including but not limited to the ESA, MBTA, CESA, CEQA, and the CFGC. Compliance with these regulations will be met through the programmatic permitting for the SMP and the SMP IS/MND. This includes compliance with terms and conditions of the USFWS BO issued for the SMP for federally protected species, and a Consistency Determination or Section 2081 Incidental Take Permit from CDFW.

As introduced in Chapter 1 and further discussed in Chapter 4, the SMP Manual was developed to include a fundamental appreciation for biological resources within the flood control creeks and channels within the SMP Area. The SMP maintenance approach considers the ecological health of the creeks and channels and the link between maintenance and the opportunities to improve or enhance habitats. To support this connection, programmatic BMPs were developed, as were activity-specific BMPs. Table 7-1 identifies specific BMPs that are intended to support and ensure compliance, as well as support the ecological health of maintained creeks and channels.

Table 7-2 identifies which BMPs should be implemented according to SMP activity type. Table 7-3 identifies the fish, wildlife, and plant species of the SMP Area and shows in which SMP maintenance reaches these species may occur. Based on possible occurrence of species as shown in Table 7-3, the species-specific BMPs identified in Table 7-1 will be applied when conducting maintenance activities in those reaches.

7.2.4 Cultural Resources Protection

Historic properties do occur along stretches of the creeks and channels in the SMP Area. Activities that require disturbance or compaction of native soils could disturb or damage buried resources, if any are present. Consequently, ground-disturbing activities conducted under this SMP must comply with federal, state, and local laws and policies protecting cultural resources and human remains, including but not limited to the NHPA, Native American Graves Protection and Repatriation Act, and the PA. The City will also ensure compliance with laws regarding the treatment of Native American remains. Pursuant to Section 5097 of the PRC, Native American burials are under the jurisdiction of the Native American Heritage Commission (NAHC) and the treatment of any native remains will be coordinated with this agency.

Compliance with these regulations will be met through the programmatic permitting for the SMP. Background records searches and NAHC consultation outreach have been conducted in support of future cultural resource inventories associated with annual maintenance activities, which identifies known cultural resources in the SMP Area. The status of sensitive cultural resources for the planned project sites or reaches will be confirmed by the program manager prior to any work occurring.

Although the cultural resources inventory will provide the City with information on known cultural resources, it is possible that undiscovered cultural or paleontological resource may be present in the SMP Area. Therefore, Tables 7-1 and 7-2 identify programmatic BMPs that will be applied to ground-disturbing activities undertaken through implementation of the SMP to identify potential resources that are currently unknown. Additionally, because some of the maintenance sites may not have been surveyed or disturbed for over five years, and new discoveries may have surfaced during that time, a BMP is included to conduct a cultural resources assessment of those sites. The assessment will include a records search, Native American consultation, a pedestrian survey, and preparation of a report to document the results.

7.2.5 Hazardous Materials Safety

Maintenance activities conducted as part of the SMP will require mechanical equipment that uses fuel and lubricants and possibly the application of herbicides and pesticides that are hazardous to people and the environment if misused. If such fuels, lubricants, or other chemicals were accidently spilled, potential contamination of the SMP Area's water and soil could result. BMPs in Table 7-1 include detailed procedures to ensure all equipment is properly maintained and handled to minimize the risk of environmental contamination. Procedures to respond to accidental spills or discovery of previously unknown contamination will be implemented as part of a Spill Prevention and Response Plan. This plan is also a requirement of the NPDES Construction General Permit mentioned previously. BMP VEG-2, *Use of Herbicides*, will ensure the use and handling of herbicides for maintenance activities is consistent with federal, state, and local regulations.

Historic and current soil and groundwater contamination from industrial and commercial activities (gas stations, dry cleaners, and national labs) in close proximity to maintenance sites may be contributing pollutants to the sediments or water in the creeks and channels. Disturbance of existing known contamination, including groundwater plumes, during maintenance could disrupt cleanup efforts or exacerbate pollution issues. As such, a database search for existing contamination within 1,500 feet of the work site will be conducted as part of the annual work plan assessment. In areas with a recorded contamination history, a Phase II environmental study will be completed. The City will work with staff from the San Francisco Bay RWQCB's Cleanup and Investigations unit to determine if and how maintenance activities can proceed should such circumstances exist.

As creeks are common locations for illegal dumping of trash containing hazardous waste, such as tires, oil filters, paint cans, and electronic devices, project activities could encounter hazardous waste. Creeks and channels also receive runoff from streets and urbanized areas which carry non-point source contaminants like oil and paint that are poured down storm drains. Thus, indirect contamination of creeks occurs when contaminants are transported through the storm drain network and deposited directly to streams. Presence of these contaminants can sometimes be observed as an oily sheen, a discoloration of the soil, or an unnatural chemical odor. If presence of potential contaminants is observed at the site, BMP Haz-6 will be implemented.

Soil testing will be conducted in all sediment removal and bank stabilization projects. Should soils be encountered that contain concentrations of listed substances that exceed hazardous waste levels, the contaminated area will be treated as if a hazardous spill occurred (i.e., the Spill Prevention and Response Plan will be implemented) and all measures to ensure compliance with federal, state, and local regulations will be taken. In addition, any observed contamination as evidenced by chemical-like odors, oily sheens, or irregularly colored sediment will be immediately reported to the local fire department's hazardous materials team and the San Francisco Bay RWQCB staff person in the Cleanups and Investigations Unit.

Maintenance activities will be conducted during the dry season, a period when the threat of wildland fire is the highest. Equipment used for maintenance activities use flammable fuels and lubricants. Thus, Table 7-1 includes a BMP to reduce the risk of fire ignition during maintenance activities.

7.2.6 Vegetation Management

Vegetation management activities will involve removal, pruning, and relocation of trees and shrubs by hand or with the use of machinery. Herbicides, pesticides, and weed barrier fabrics will be used to control invasive plant species. Maintenance activities also include planting and revegetation of the work site. Table 7-1 includes specific BMPs to avoid or minimize potential impacts from vegetation management activities. Vegetation management BMPs support preservation of as much existing vegetation as is possible, particularly for native species, and fostering a balance between habitat and flood conveyance. To prevent unintended damage to existing vegetation, setback areas will be flagged and hand pruning and clearing will be implemented, as opposed to use of machinery. BMP VEG-3, *Use of Herbicides and Pesticides*, will ensure the use and handling of herbicides for maintenance activities is consistent with federal, state, and local regulations. BMP VEG-4, *Use of Grazing Animals*, will ensure that grazing activity does not result in channel degradation. BMP VEG-5 will ensure that work sites are properly replanted and monitored for successful revegetation.

7.2.7 Water Quality and Creek/Channel Protection

The combination of the General Impact Avoidance Measures and the Biological Resource Protection, Hazardous Materials Safety, Sediment Management, and Vegetation Management BMPs discussed above and in Table 7-1 will adequately protect against degradation of water quality during and after maintenance activities. Additional BMPs included in Table 7-1 prescribes dechlorination of water prior to discharge into creeks and channels, and proper use of erosion controls for exposed soils after maintenance work is complete. Implementation of the BMPs in Table 7-1 will comply with federal, state, and local regulations to protect water quality, including the requirements of NPDES stormwater discharge permits and management plans. Table 7-1 also includes a BMP to guide in-channel grading activities such that post sediment removal creek and channel grades are geomorphically appropriate, that in-channel bed forms such as meanders, bars, and benches are preserved, and that sudden or sharp transitions in bed elevations do not occur.

7.2.8 Good Neighbor Policies

The duration of maintenance activities at a particular project site or reach will vary from a less than a day to a week. Many of the work sites are located in residential areas or in close proximity to business, schools, and libraries. To reduce potential inconvenience to the public and protect their

safety during maintenance activities, the Good Neighbor BMPs were developed to keep the work site clean, reduce loud noises, ensure vehicle and pedestrian access, and reduce unpleasant odors.

To avoid adverse effects on creekside views from neighboring homes and businesses, SMP activities will implement work site "housekeeping" measures to keep the site neat, clean, and orderly during and after maintenance. To minimize the effects of noise on neighboring homes and businesses, sound control devices will be actively used on all power equipment.

Most maintenance activities will occur on access roads adjacent to creeks and channels that are not open to public vehicular use. Therefore, SMP maintenance activities would have very little potential to disrupt traffic circulation except in situations when it is necessary to close travel lanes temporarily (e.g., to remove debris from a bridge or culvert), or where maintenance vehicles are traveling to and from the maintenance sites (e.g., fill hauling).

Depending on the creek or channel location and reach conditions, sediment removed as part of maintenance activities may be rich in decaying organic matter which generates gases such as reduced sulfur compounds that are unpleasant. Where feasible, to prevent impacts of nuisance odors on nearby residences, stockpiled sediment removed from creeks and channels will be promptly removed or placed as far away as possible from residential areas and odor sensitive land uses.

In efforts to keep the public informed about stream maintenance work (why it is necessary, when it occurs, and what a neighborhood can expect when crews arrive to conduct maintenance work) the City will post and update information about the SMP and maintenance activities on their website, as stated in BMP GN-2, *Public Outreach*. Each spring, once maintenance sites have been selected for the annual work season, a newspaper notice will be published with information on the maintenance sites, approximate work dates, and contact information. This information will also be posted on the City's website. Signs will be posted in the neighborhood to notify the public two weeks in advance of maintenance schedules, trail closures, and road/land closures as necessary. As discussed under BMP GN-2, *Public Outreach*, signage used at work sites will provide contact information for lodging comments and/or complaints regarding the activities.

Table 7-1. Stream Maintenance Program Best Management Practices

BMP ID	Name	BMP
General Impact Avoidance and Minimization		
GEN-1	Maintenance Work Window	1. All ground-disturbing maintenance activities occurring in the creek or channel (i.e., from top-of-bank to top-of-bank) will take place during the low-flow period, between May 1 and October 31. Extensions of this period require the advance approval of the USACE, SFBRWQCB, CDFW, and/or USFWS (as appropriate) on a project-by-project basis. 2. Once the first significant rainfall occurs, all in-channel equipment and/or diversion structures shall be removed. Exposed soils in upland areas will be stabilized via hydroseeding or with erosion control fabric/blankets. Significant rainfall is defined as 0.5 inch of rain in a 24-hour period. 3. Work on the upper banks of creeks or channels (e.g., vegetation, road, and v-ditch maintenance) may be conducted year round. Ground disturbing activities will only be conducted during periods of dry weather. 4. With the exception of emergencies, construction work will be limited to between 7:00 a.m. and 8:00 p.m. Routine maintenance activities conducted by the City in residential areas will not occur on Saturdays, Sundays, or City observed state holidays except during emergencies, or with advance notification of surrounding residents (weekend or holiday work would be limited to between 9:00 a.m. and 3:00 p.m.).
GEN-2	Staging and Stockpiling of Materials	1. Staging will occur on access roads, surface streets, or other disturbed areas that are already compacted and only support ruderal vegetation to the extent feasible. Similarly, to the extent practical, 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. Staging areas for equipment, personnel, vehicle parking, and material storage shall be sited as far as possible from major roadways. 2. Stockpiling of material will occur on disturbed, barren, or ruderal surfaces that do not support habitat for focal species. 3. All maintenance-related items including equipment, stockpiled material, temporary erosion control treatments, and trash will be removed within 72 hours of project completion. All residual soils and/or materials will be cleared from the project site. 4. As necessary, to prevent sediment-laden water from being released back into waters of the State 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. If appropriate, and only within the active project area where the sediment is being loaded into the trucks, trucks may drain excess water by slightly tilting the loads and allowing the water to drain out through the applied filter. 5. 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 or where they will cover aquatic or riparian vegetation. 6. No runoff from the staging areas may be allowed to enter waters of the State, including the creek channel or storm drains, without being subjected to adequate filtration (e.g., vegetated buffer, hay wattles or bales, silt screens). The discharge of decant water from any onsite temporary sediment stockpile or storage areas, to

BMP ID	Name	BMP
		waters of the State, including surface waters or surface water drainage courses, outside of the active project site, is prohibited. 7. During dry season, no stockpiled soils shall remain exposed and unworked for more than 30 days. During wet season, no stockpiled soils shall be surrounded by properly installed and maintained silt fencing or other means of erosion control. When there is the reasonable possibility of precipitation, stockpiled soils shall additionally be covered. 8. All spoils will be disposed of in an approved location. Sediments that are found to contain contaminants in excess of hazardous materials disposal criteria will be stockpiled separately on heavy plastic pending disposal at an appropriate hazardous materials disposal location. 9. Pipes, culverts and similar materials greater than four inches in diameter, will be stored so as to prevent focal wildlife species from using these as temporary refuges, and these materials will be inspected each morning for the presence of animals prior to being moved.
GEN-3	Creek and Channel Access	1. Access points to creeks and channels for the purposes of stream maintenance will be minimized according to need. Access points should avoid large mature trees, native vegetation, or other significant habitat features as much as possible. Temporary access points shall be sited and constructed to minimize tree removal. Vernal pools will be avoided. 2. In considering creek and channel access routes, slopes of greater than 20 percent shall be avoided if possible. Any sloped access points will be examined for evidence of instability and either revegetated or filled with compacted soil, seeded, and stabilized with erosion control fabric as necessary to prevent future erosion. 3. Personnel will use the appropriate equipment for the job that minimizes disturbance to and compaction of the creek or channel bottom. Appropriately-tired vehicles, either tracked or wheeled, will be used depending on the site and maintenance activity. 4. Vehicles and equipment will be parked on pavement, existing roads, and previously disturbed areas to the extent practicable.
Air Quality Protection		
AQ-1	Basic Construction Air Quality Measures (based on BAAQMD Air Quality Guidelines)	1. Water all exposed surfaces in active maintenance areas (e.g., parking and staging areas, soil piles, graded areas, and unpaved access roads) as necessary to reduce dust emissions. In dry areas, this may be twice daily or more, while in already wet areas, no watering may be needed. 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 sweepers is prohibited. 4. All vehicle speeds on unpaved roads shall be limited to 15 mph. 5. 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.

BMP ID	Name	BMP
		6. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator.
AQ-2	Additional Construction Air Quality Measures (based on BAAQMD Air Quality Guidelines)	1. All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph. 2. Vegetative ground cover (e.g., fast-germinating native grass seed) shall be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established. 3. The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time shall be limited. Activities shall be phased to reduce the amount of disturbed surfaces at any one time. 4. Gravel bags or other erosion control measures shall be installed to prevent silt runoff to public roadways from sites with a slope greater than one percent. 5. Minimize the idling time of diesel powered construction equipment to two minutes. 6. All construction equipment, diesel trucks, and generators shall be equipped with Best Available Control Technology for emission reductions of NOx and PM.
Biological Resources Protection		
General Measures		
BR-1	Area of Disturbance	1. Activities will avoid damage to or loss of native vegetation to the maximum extent feasible. 2. To the extent feasible, vernal pool habitats will not be impacted. If vernal pools, clay flats, alkaline pools, ephemeral stock tanks, or sandstone pools, or roadside ditches are present and will be avoided, a qualified biologist will stake or flag an exclusion zone prior to construction activities. The exclusion zone will be fenced with orange construction zone and erosion control fencing (to be installed by construction crew). The exclusion zone will encompass the maximum practicable distance from the worksite and at least 250 feet from the aquatic feature wet or dry. The hydrology feeding into exclusion zones shall not be modified or changed. 3. If potential dens are present, their disturbance and destruction will be avoided. 4. Prior to ground disturbing activities in sensitive habitats, project construction boundaries and access areas will be flagged or temporarily fenced during construction to reduce the potential for vehicles and equipment to stray into adjacent habitats. 5. Soil disturbance shall not exceed the minimum area necessary to complete the operations as described. 6. Trenches will be backfilled as soon as possible. Open trenches will be searched each day prior to construction to ensure no focal species are trapped. Earthen escape ramps will be installed at intervals prescribed by a qualified biologist. 7. In locations where the removal of sediment and associated vegetative cover is required to reestablish a low flow channel, the area of disturbance shall be limited to no more than one half the width of the creek or channel in any given year to the extent feasible in order to maintain adequate foraging and cover habitat for special-status species.

BMP ID	Name	BMP
BR-2	Pre-Maintenance Educational Training	1. At the beginning of each maintenance season and before conducting stream maintenance activities, all personnel will participate in an educational training session conducted by a qualified biologist[1] or an appropriately experienced and/or trained staff. Training will include review of environmental laws and avoidance and minimization BMPs that must be followed by all personnel to reduce or avoid effects on focal species during SMP activities. This training will include instruction on how to identify bird nests, recognize special-status species that may occur in the work areas, and the appropriate protocol if any nests or listed species are found during project implementation. 2. Personnel who miss the first training session or are hired later in the season must participate in a make-up session before conducting maintenance activities. 3. Contracts with contractors, construction management firms, and subcontractors will obligate all contractors to comply with these requirements and BMPs.
BR-3	Biotechnical Bank Stabilization	1. If hydraulic conditions allow, the natural bank will be retained or a biotechnical repair technique will be used rather than, or along with, a hardscape repair. 2. When erosion control matting is required, plastic mono-filament netting or similar material containing netting shall not be used at the project. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.
BR-4	Impact Avoidance and Minimization During Dewatering	1. All dewatering activities conducted in creeks and channels bearing state- or federally-listed species shall comply with the terms and conditions of the Biological Opinion issued by the USFWS and the 2081 Incidental Take Permit issued by CDFW for the SMP. 2. Prior to dewatering, the best means to bypass flow through the work area will be determined to minimize disturbance to the creek or channel and avoid direct mortality of fish and other aquatic vertebrates. The area to be dewatered will encompass the minimum area necessary to perform the maintenance activity. The period of dewatering will extend for the minimum amount of time needed to perform the maintenance activity. Where feasible and appropriate, dewatering will occur via gravity driven systems. Where feasible and appropriate, diversion structures shall be installed on concrete sections of the creek or channel, such as concrete box culverts often used at road crossings. 3. A species relocation plan (BMP BR-5) shall be implemented as a reasonable best effort to ensure that native fish and other native aquatic vertebrates and macroinvertebrates are not stranded. 4. In-stream cofferdams shall only be built from materials such as gravel bags, clean gravel, or rubber bladders which will cause little or no siltation or turbidity. Visqueen shall be placed over gravel bags to minimize water seepage into the maintenance areas. The visqueen shall be firmly anchored to the creek or channel bed to

[1] A biologist (including those specializing in botany, wildlife, and fisheries) is determined to be qualified through a combination of academic training and professional experience in biological sciences and related resource management activities. Resumes will be submitted to CDFW and USFWS for approval prior to commencement of biological surveys, as stated in CDFW and USFWS permit conditions.

BMP ID	Name	BMP
		minimize water seepage. If necessary, the footing of the dam shall be keyed into the creek or channel bed at an appropriate depth to capture the majority of subsurface flow needed to dewater the creek or channel bed. 5. When use of gravity fed dewatering is not feasible and 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 creek or channel. 6. Downstream flows adequate to prevent fish or vertebrate stranding will be maintained at all times during dewatering activities. Bypass pipe diameter will be sized to accommodate, at a minimum, twice the summer baseflow. 7. Diverted and stored water will be protected from maintenance activity-related pollutants, such as soils or equipment lubricants or fuels. 8. If necessary, discharged water will pass over some form of energy dissipater to keep erosion of the downstream creek or channel to a minimum. Silt bags will be equipped to the end of discharge hoses and pipes to remove sediment from discharged water. 9. For full creek or channel dewatering, filtration devices or settling basins will be provided as necessary to ensure that the turbidity of discharged water is not visibly more turbid than in the creek or channel upstream of the maintenance site. If increases in turbidity are observed, additional measures shall be implemented such as a larger settling basin or additional filtration. If increases in turbidity persist, turbidity measurements will be taken on a regular (i.e., at least daily) basis up- and downstream of the cofferdam enclosure. Data recorded will be compared against Regional Water Quality Control Board Basin Plan water quality standards. In general, turbidity in discharged water should be no more than 110 percent of receiving water turbidity, if receiving water turbidity is greater than 50 NTU, and no greater than 5 NTU above receiving water turbidity, if receiving water turbidity is less than 50 NTU. If Basin Plan standards are being exceeded, additional measures shall be installed and monitored to ensure Basin Plan standards are met. 10. When maintenance is completed, the flow diversion structure shall be removed as soon as possible. Impounded water will be released at a reduced velocity to minimize erosion, turbidity, or harm to fish or amphibians downstream. Cofferdams will be removed so surface elevations of water impounded above the cofferdam will not be reduced at a rate greater than one inch per hour. 11. The area disturbed by flow bypass mechanisms will be restored at the completion of the project. This may include, but is not limited to, recontouring the area and planting of riparian vegetation as appropriate.
BR-5	Amphibian Species Relocation	1. Prior to and during dewatering activities, tadpoles, and other vertebrates will be excluded from the work area by blocking the creek or channel above and below the work area with fine-meshed net or screens. The bottom of the screens will be completely secured to the creek or channel bed. Screens will be checked periodically and cleaned of debris to permit free flow of water. 2. During dewatering, a qualified biologist will direct and monitor activities as necessary to net and rescue any amphibians that may have become stranded throughout the dewatering process.

BMP ID	Name	BMP
		3. Prior to capturing amphibians, the most appropriate release location(s) will be identified and used. The following issues will be considered when selecting release site(s): • proximity to the project area; • similar water temperature as capture location; • presence of other same species so that relocation of new individuals will not upset the existing prey/predation function; and • low potential for relocated individual to transport disease. 4. In areas where aquatic vertebrates are abundant, to increase survival rates and ensure captured vertebrates are not held overly long, capture will be periodically ceased, and release will occur at predetermined locations.
BR-6	On-Call Biologist	1. A qualified biologist will be on-call and available to visit a project site at any point during maintenance activities in the event a special-status species is encountered.
Species-Related Measures		
BR-7	Focal Species Plants	1. For projects located in areas where focal plant species (i.e., San Joaquin spearscale, Congdon's tarplant, palmate-bracted bird's-beak, and Livermore tarplant) have been identified as potentially occurring (see SMP Manual Table 7-3), a qualified botanist will conduct appropriately timed focused botanical surveys of the project site for these species prior to the initiation of project activities. If these species are observed in or near the project site, the City will follow the measures below as well as any additional measures contained in the forthcoming Biological Opinion issued by the USFWS for the SMP. A qualified botanist will also assess habitat suitability for the potential occurrence of special status plant species at any newly identified sediment disposal sites or previously unidentified staging areas prior to project activities in these areas. 2. If discovered, focal plant populations identified during the field surveys and with potential to be impacted will be enumerated, photographed and conspicuously flagged to maximize avoidance, as well as to determine the total number of individuals affected. If feasible, the project shall be redesigned or modified to avoid direct and indirect impacts on special-status plant species. 3. Subject to the review and approval of CDFW and USFWS for listed species, focal plant species near the project site will be protected from temporary disturbance by installing environmentally sensitive area protective fencing (orange construction barrier fencing) around focal plant species populations. Protective fencing will be installed under the direction of the botanist as necessary to protect the plant and its habitat; where feasible, the environmentally sensitive area fencing will be installed at an appropriate distance approved by CDFW and USFWS depending on the species. At a minimum, fencing will be installed at least 50 ft. from the edge of the population. Where focal plant populations are located in wetlands, silt fencing will also be installed. The location of the fencing will be shown on the maintenance design drawings and marked in the field with stakes and flagging. The design specifications will contain clear language that prohibits maintenance-related activities, vehicle operation, material and equipment storage, and other surface disturbing activities within the fenced environmentally sensitive area.

BMP ID	Name	BMP
		4. Vegetation management activities in sensitive plant areas will be conducted under the guidance of the botanist. These activities should be timed following the blooming periods of potentially occurring listed species, after the month of June. 5. If impacts to focal plant species are unavoidable, then the City shall coordinate with the appropriate resource agencies and local experts to determine whether transplantation of special-status plant species is feasible. If the agencies concur that it is a feasible mitigation measure, the botanist shall develop and implement a transplantation plan in coordination with the appropriate agencies. As part of the plan, the City, in conjunction with a qualified restoration ecologist and CDFW and/or USFWS, shall identify a suitable on- or off-site location for mitigation and appropriate methods for seed collection, propagation, relocation, maintenance and monitoring. If the impacted species are annuals, it is expected that the current seed crop from the individuals to be lost will be collected as well as immediate soils making up the dormant seed bed) and then sown on appropriate habitat located on the mitigation site. If the species is a perennial, it is expected that both the seed and the plants themselves will be salvaged and relocated to the mitigation site. For Congdon's tarplant and Livermore tarplant, seed from the populations that will be impacted may be collected and propagated at a native plant nursery, prior to planting to increase the potential for establishment and survival. For San Joaquin spearscale and palmate-bracted bird's-beak, then enhancement of occupied habitat and/or expansion adjacent to occupied habitat will occur to compensate for project-related impacts. Compensation will occur at the appropriate ratio under EACCS. Annual monitoring of the mitigation site shall be conducted for 5 years to assess vegetative density, population size, natural recruitment, and plant health and vigor. Monitoring results may trigger management actions such as collection and sowing of additional seed, tillage/disturbance within existing populations to induce establishment, installation of container plants, and control of exotic invasive vegetation such as yellow star thistle to ensure successful plant establishment and survival. The site shall be evaluated at the end of the 5-year monitoring period to determine whether the mitigation has met the success criteria identified in the rare plant relocation, management, and protection plan. If success criteria have not been achieved, remedial actions shall be implemented following review and approval by CDFW and the USFWS. 6. If appropriately timed focused botanical surveys cannot be conducted in areas identified as suitable for listed plants prior to vegetation management activities, then the City shall assume presence of the plant species in question and coordinate with the appropriate resource agencies and local experts to develop appropriate mitigation for the impact.
BR-8	Nesting Migratory Bird and Raptor Pre-maintenance Surveys	1. To the extent feasible, maintenance activities, including tree trimming, will take place outside the migratory bird and raptor nesting period (February 15 through August 15 for most birds). During the nesting bird season, work sites that are less densely vegetated will be prioritized, to facilitate pre-maintenance surveys and decrease the likelihood of disturbing undiscovered nests. 2. If maintenance activities must be scheduled to occur during the nesting season, a qualified wildlife biologist, familiar with the species and habitats in the Planning Area, will be retained to conduct pre-maintenance surveys for raptors and nesting birds within suitable nesting habitat within 300 feet of SMP activities. The surveys should be conducted within one week before initiation of maintenance activities within those habitats.

BMP ID	Name	BMP
		If no active nests are detected during surveys, activities may proceed. Vegetation removal activities will be conducted under the guidance of a biologist. If active nests are detected then measure 3 would be implemented. 3. If active nests are identified within the SMP area, non-disturbance buffers shall be established at a distance sufficient to minimize disturbance based on the nest location, topography, cover and species' tolerance to disturbance. Buffer size shall be determined in cooperation with CDFW. If active nests are found within 300 feet of the project area, a qualified biologist shall be on site as necessary to monitor the nests for signs of nest disturbance. If it is determined that maintenance activity is resulting in nest disturbance, work shall cease immediately and CDFW and the USFWS Migratory Bird Program shall be contacted. Buffers will be developed through consultation with CDFW. Buffers will remain in place until biologists determine that the young have successfully fledged or nests have been otherwise abandoned.
BR-9	California Red-legged Frog Avoidance and Impact Minimization Measures for Ground-Disturbing Activities	1. For ground-disturbing maintenance activities occurring in areas where California red-legged frog (CRLF) has been identified as potentially occurring (see SMP Manual Table 7-3), a qualified biologist will conduct pre-maintenance surveys to assess habitat within the proposed maintenance area. 2. If suitable breeding or foraging habitat is present then focused surveys using the USFWS CRLF survey protocol will be completed or CRLF presence will be assumed. The USFWS will be contacted and any site-specific recommendations will be implemented. 3. If CRLF are present or assumed present, a qualified biologist or an appropriately experienced and/or trained staff will inspect the area daily before the start of work and will be present during maintenance activities in suitable habitat. A qualified biologist will be on-call during implementation of maintenance activities. If appropriate, the City will install exclusionary fencing. 4. In the event that a CRLF is encountered within the maintenance area, a qualified biologist approved by USFWS under the specific project level biological opinion appending to the SMP Programmatic Biological Opinion will move the frog to a safe location outside of the project area. Actions taken to move CRLF will be consistent with applicable USFWS and CDFW regulations and permits. The biologist will have the authority to stop work if a CRLF is encountered until such a time as the frog may be moved to an area outside of the project area fencing. 5. If dewatering of a creek is required, dipnet and seine surveys for CRLF tadpoles will be completed prior to initiation of dewatering. Captured tadpoles will be moved to a safe location elsewhere in the creek. 6. In locations where the removal of sediment and associated vegetative cover is required to reestablish a low flow channel, the area of disturbance shall be limited to no more than one half the width of the creek or channel in any given year to the extent feasible in order to maintain adequate foraging and cover habitat for CRLF. 7. Work will be avoided within suitable habitat from October 15 (or the first measurable fall rain of 1" or greater) to May 1. 8. The USFWS Sacramento Field Office will be contacted within 24 hours of any CRLF observations.
BR-10	California Red-legged Frog Avoidance and Impact Minimization	1. For vegetation maintenance activities occurring in areas where CRLF frog has been identified as potentially occurring (see SMP Manual Table 7-3), a qualified biologist will conduct pre-maintenance surveys of aquatic

BMP ID	Name	BMP
	Measures for Vegetation Management	habitats and identify potential CRLF breeding and foraging areas. These areas will be flagged and avoided by maintenance crews. 2. In areas where CRLF could potentially occur, field crews conducting hand trimming of vegetation will access creek or channel banks by foot only and will avoid entering open water. Vehicles will be restricted to existing access roads. 3. In work sites where potential CRLF breeding and foraging areas were identified during the pre-maintenance survey, a qualified biologist approved by USFWS under the specific project level biological opinion appending to the SMP Programmatic Biological Opinion will be on-call during project activity in suitable habitat. In the event that CRLF is encountered, staff will contact the qualified biologist. The biologist will have the authority to stop work if a CRLF (or any of its life stages) is encountered until such a time as the frog may be moved to an area away from the project site. 4. Work will be avoided within suitable habitat from October 15 (or the first measurable fall rain of 1" or greater) to May 1. 5. The USFWS Sacramento Field Office will be contacted within 48 hours of any CRLF observations.
BR-11	California Tiger Salamander Avoidance and Impact Minimization Measures for Sediment and Debris Removal	1. For sediment and debris removal maintenance activities occurring in areas where California tiger salamander (CTS) has been identified as potentially occurring (see SMP Manual Table 7-3), a qualified biologist will conduct pre-maintenance surveys of upland habitats and identify areas with small mammal burrows. Areas with an abundance of small mammal burrows will be flagged and avoided by maintenance crews. 2. When possible, maintenance activities will be restricted to the creek or channel bed and avoid disturbance to adjacent upland habitat. 3. Sediment and debris removal activities shall minimize removal of upland vegetation and soil compaction. 4. In locations where the removal of sediment and associated vegetative cover is required to reestablish a low flow channel, the area of disturbance shall be limited to no more than one half the width of the creek or channel in any given year to the extent feasible in order to maintain adequate foraging and cover habitat for CTS. 5. If upland banks must be traversed by heavy equipment to access a creek or channel bed, the route will be located where no small mammal burrows are present and will be delineated by temporary fencing to minimize upland habitat disturbance. 6. If burrows or other suitable aestivation habitat are present where sediment or debris removal activities are proposed, a qualified biologist approved by USFWS under the specific project level biological opinion appending to the SMP Programmatic Biological Opinion and approved by CDFW under the SMP CESA incidental take permit will be on-call during project activity in proximity to upland CTS habitat. In the event that CTS is encountered, staff will contact the qualified biologist. The biologist will have the authority to stop work if CTS is encountered until such a time as the animal is moved to an area away from the project site. 7. Maintenance activities located in proximity to upland CTS habitat will be scheduled to avoid the CTS migration season (October 15 – June 30). If work must be completed during the migration season, barrier fencing will be installed to exclude CTS from maintenance areas.

BMP ID	Name	BMP
		8. In the event that a CTS is encountered within the maintenance area, a qualified biologist approved by USFWS under the specific project level biological opinion appending to the SMP Programmatic Biological Opinion and approved by CDFW under the SMP CESA incidental take permit will move the salamander to a safe location with suitable underground refugia (e.g., open burrow of appropriate depth) outside of the maintenance area. Actions taken to move CTS will be consistent with applicable USFWS and CDFW regulations. 9. The USFWS Sacramento Field Office and CDFW will be contacted within 24 hours of any CTS observations.
BR-12	California Tiger Salamander Avoidance and Impact Minimization Measures for Vegetation Management	1. For vegetation management activities occurring in areas where CTS has been identified as potentially occurring (see SMP Manual Table 7-3), a qualified biologist will conduct pre-maintenance surveys of upland habitats and identify areas with small mammal burrows. Areas with an abundance of small mammal burrows will be flagged and avoided by maintenance crews. 2. Based on surveys, if CTS is identified as potentially present, then access across upland creek or channel banks and adjacent upland habitats will be by foot only. Vehicles will be restricted to existing access roads. 3. A qualified biologist approved by USFWS under the specific project level biological opinion appending to the SMP Biological Opinion and approved by CDFW under the SMP CESA incidental take permit will be on-call during project activity in proximity to upland CTS habitat. In the event that CTS is encountered, staff will contact the qualified biologist. The biologist will have the authority to stop work if CTS is encountered until such a time as the animal is moved to an area away from the project site. 4. In the event that a CTS is encountered within the maintenance area, a qualified biologist approved by USFWS under the specific project level biological opinion appending the SMP Programmatic Biological Opinion and approved by CDFW under the SMP CESA incidental take permit will move the salamander to a safe location with suitable underground refugia (e.g., open burrow of appropriate depth) outside of the fenced maintenance area. Actions taken to move CTS will be consistent with applicable USFWS and CDFW regulations and permits. 5. The USFWS Sacramento Field Office and CDFW will be contacted within 24 hours of any CTS observations.
BR-13	California Tiger Salamander Avoidance and Impact Minimization Measures for Bank Stabilization	1. For bank stabilization activities occurring in areas where CTS has been identified as potentially occurring (see SMP Manual Table 7-3), a qualified biologist will conduct pre-maintenance surveys of upland habitats and identify areas with burrows and/or other suitable aestivation habitat. 2. If burrows or other suitable aestivation habitat are present where bank stabilization activities are proposed, a qualified biologist approved by USFWS under the specific project level biological opinion appending the SMP Programmatic Biological Opinion and approved by CDFW under the SMP CESA incidental take permit will be on-call during project activity in proximity to upland CTS habitat. In the event that CTS is encountered, staff will contact the qualified biologist. The biologist will have the authority to stop work if CTS is encountered until such a time as the animal is moved to an area away from the project site. 3. Maintenance activities located in proximity to upland CTS habitat will be scheduled to avoid the CTS migration season (October 15 – June 30). If work must be completed during the migration season, barrier fencing will be installed to exclude CTS from maintenance areas.

BMP ID	Name	BMP
		4. In the event that a CTS is encountered within the maintenance area, a qualified biologist approved by USFWS under the specific project level biological opinion appending the SMP Programmatic Biological Opinion and approved by CDFW under the SMP CESA incidental take permit will move the salamander to a safe location with suitable underground refugia (e.g., open burrow of appropriate depth) outside of the fenced maintenance area. Actions taken to move CTS will be consistent with applicable USFWS and CDFW regulations and permits. 5. The USFWS Sacramento Field Office and CDFW will be contacted within 24 hours of any CTS observations.
BR-14	Western Pond Turtle Pre-maintenance Surveys for Ground-Disturbing Activities	1. For projects located in areas where western pond turtle has the potential to occur, a qualified biologist will conduct pre-maintenance surveys to assess habitat within the proposed maintenance area. 2. If suitable in-stream habitat for the western pond turtle is present in the maintenance area, a qualified biologist or an appropriately experienced and/or trained staff will inspect the maintenance area daily before the start of work. In the event that a western pond turtle is encountered before or during the maintenance activity, a qualified biologist will move the turtle to a safe location outside of the work area. Actions taken to move western pond turtle will be consistent with applicable CDFW regulations and permits. 3. If dewatering of a creek segment is required, a qualified biologist will be present and will move turtles – if found – to a safe location in the creek. Actions taken to move western pond turtle will be consistent with applicable CDFW regulations and permits. 4. CDFW will be notified within 48 hours of any western pond turtle observations.
BR-15	Vernal Pool Fairy Shrimp and Longhorn Fairy Shrimp Avoidance and Impact Minimization Measures	1. A qualified biological monitor will be present if work is conducted outside of designated work corridors or off of existing access roads. 2. If vernal pools, clay flats, alkaline pools, ephemeral stock tanks, or sandstone pools, or roadside ditches are present, a qualified biologist will stake and flag an exclusion zone prior to construction activities. The exclusion zone will be fenced with orange construction zone and erosion control fencing (to be installed by construction crew). The exclusion zone will encompass the maximum practicable distance from the worksite and at least 250 feet from the aquatic feature wet or dry. 3. Work will be avoided after the first significant rain until June 1, or until pools remain dry for 72 hours. 4. No herbicide will be applied within 100 feet of exclusion zones, except when applied to cut stumps or frilled stems or injected into stems. No broadcast applications will be applied. 5. Avoid modifying or changing the hydrology of the habitat.
BR-16	Callippe Silverspot Butterfly Avoidance and Impact Minimization Measures	1. No herbicide will be applied within 100 feet of host plant populations. Spot application to cut stumps, frilled stems, or injected into stems are acceptable. No broadcast applications will be applied. 2. Cut trees that are removed in the vicinity of host plants will be hand carried rather than dragged to disposal areas. 3. Avoid or minimize the removal of host plant, Johnny jump-up (*Viola pedunculata*). 4. Avoid work in suitable habitat during the flight and mating season (mid-May to mid-July); establish a minimum 300-foot buffer around host plants.

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BR-17	Golden Eagle Avoidance and Impact Minimization Measures	1. If an active nest is identified near a proposed work area work will be conducted outside of the nesting season (February 1 to September 1). 2. If an active nest is identified near a proposed work area and work cannot be conducted outside of the nesting season, a no-activity zone will be established by a qualified biologist. The no-activity zone will be large enough to avoid nest abandonment and will at a minimum be 250-feet radius from the nest. 3. If an effective no-activity zone cannot be established in either case, an experienced golden eagle biologist will develop a site-specific plan (i.e., a plan that considers the type and extent of the proposed activity, the duration and timing of the activity, the sensitivity and habituation of the eagles, and the dissimilarity of the proposed activity with background activities) to avoid the potential to affect the reproductive success of the eagles.
BR-18	Tricolored Blackbird Avoidance and Impact Minimization Measures	1. If an active nest colony is identified near a proposed work area work will be conducted outside of the nesting season (February 1to September 1).
BR-19	Burrowing Owl Avoidance and Impact Minimization Measures	1. If an active nest is identified near a proposed work area work will be conducted outside of the nesting season (February 1to September 1). 2. If an active nest is identified near a proposed work area and work cannot be conducted outside of the nesting season, a no-activity zone will be established by a qualified biologist. The no-activity zone will be large enough to avoid nest abandonment and will at a minimum be 250-feet radius from the nest. 3. If burrowing owls are present at the site during the non-breeding period, a qualified biologist will establish a no-activity zone of at least 150 feet. 4. If an effective no-activity zone cannot be established in either case, an experienced burrowing owl biologist will develop a site-specific plan (i.e., a plan that considers the type and extent of the proposed activity, the duration and timing of the activity, the sensitivity and habituation of the owls, and the dissimilarity of the proposed activity with background activities) to minimize the potential to affect the reproductive success of the owls. 5. All burrowing owl surveys will be completed consistent with the CDFW Staff Report on Burrowing Owl Mitigation (2012).
BR-20	Den Avoidance for American Badger and San Joaquin Kit Fox	1. A qualified biologist will survey proposed work areas within suitable American badger and San Joaquin kit fox habitat in the species' ranges immediately prior to SMP activities that are planned to affect such dens or the immediate area. Dens will be scoped and confirmation that they are empty will be made prior to disturbance of the den. 2. San Joaquin kit fox exclusion zones will be implemented following USFWS procedures (U.S. Fish and Wildlife Service 1999) or the latest USFWS procedures available at the time. The radius of these zones will follow current standards or will be as follows: Potential Den—50 feet; Known Den—100 feet; Natal or Pupping Den—to be determined on a case-by-case basis in coordination with USFWS and CDFW. Such exclusions zones will also apply to potential and known American badger burrows.

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Cultural Resources Protection		
CR-1	Cultural Resources Investigation	1. For maintenance activities which require excavation into native soils, and for all new sediment disposal sites, a cultural resources investigation shall be conducted by a qualified professional archaeologist prior to performing the maintenance activity. The cultural resources investigation shall include the following elements: a. **Background Research and Native American Consultation.** An updated records search shall be conducted at locations planned for maintenance that have not had a records search completed within the previous five years. Sediment disposal sites shall only require an initial records search. Investigations should begin with a review of the data acquired for this document to determine whether the proposed activity will occur within a previously-known culturally-sensitive area. An addendum records search at the NWIC will also be necessary to determine if any cultural resources have been recorded since the creation of this document. The records search will identify resources within or near the project location and determine whether that location has been previously surveyed up to current standards. In conjunction with the background research, the appropriate Native American Tribes will be contacted to provide comments or concerns about a maintenance activity location. The NAHC will also be contacted for a Sacred Lands File Check. b. **Pedestrian Survey.** If an adequate survey has not been completed for a project location within a ten-year period from the date of scheduled maintenance, a pedestrian survey is required. Sediment disposal sites shall only require an initial pedestrian survey. All areas of exposed ground should be closely inspected for the presence of cultural materials. Areas of dense vegetation should be inspected as closely as possible and any exposed creek or channel banks should be carefully examined for the presence of buried cultural resources. Depending on the likelihood for encountering subsurface remains, based on an analysis of site distribution and geomorphology of the project location, a series of small, hand-auger borings may be excavated, with all sediments passed through ¼-inch screen, to assure that no subsurface archaeological materials are present. The auger borings would also provide an initial assessment of the surface integrity of the landform (e.g., is a substantial amount of imported or redeposit fill material present?) and provide additional information about the potential for buried archaeological material. If the limited subsurface testing does not reveal buried cultural material, there will be less likelihood that unexpected discoveries will delay activities. If an archaeological deposit is encountered, a preliminary assessment of site boundaries should be made in consultation with the appropriate affiliated tribe(s). Any archaeological material recovered in auger holes will be recorded, cataloged, and re-deposited. A map should be prepared depicting site boundaries in relation to the project area, and the site should be recorded on a standard archaeological site record (DPR 523 form). c. **Documentation.** If findings are negative, these results will be presented in the SMP annual notification package. If findings are positive, a positive Archaeological Survey Report (ASR)/Historic Property Survey Report (HPSR) will be prepared that includes appropriate background research, site records, and recommendations for additional work. Prior to finalization of such documentation, a copy will be provided

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		t othe appropriate affiliated tribe(s) for review and comment. The report will include results of background research, descriptions of field work, findings, appropriate maps and photos, and a record of Native American consultation. A cover letter will detail management recommendations, which could include archaeological and Native American monitoring, site avoidance, or test excavations to determine site significance. The report will be submitted to the City and the NWIC. All information regarding the site locations, Native American human remains, and associated funerary objects will be kept confidential and will not be made available for public disclosure. The final written report will be submitted within 3 months after work has been completed to the NWIC. d. **Management Requirements.** If a cultural resource is located within an area of maintenance activity the following steps shall be implemented. The following are examples of management requirements regarding the treatment of known or unknown cultural resources; other measures may be implemented instead, provided they are at least as protective of the cultural resource in question. e. **Archaeological and Native American Monitoring.** The City shall retain the services of a Native American monitor or Native American Monitors, depending on the site constraints, through agreements with the appropriate affiliated tribe(s), and a qualified archaeological consultant that has expertise in California prehistory to monitor ground-disturbing activities within 200 feet of known archaeological sites or in areas designated as having a high potential for encountering archaeological sites. If an intact archaeological deposit is encountered, all soil disturbing activities in the vicinity of the deposit should stop until the deposit is evaluated. The archaeological monitor shall immediately notify the City of the encountered archaeological deposit. The monitors shall, after making a reasonable effort to assess the identity, integrity, and significance of the encountered archaeological deposit, present the findings of this assessment to the City. During the course of the monitoring, the archaeologist may adjust the frequency—from continuous to intermittent—of the monitoring based on the conditions and professional judgment regarding the potential to impact resources. f. **Cultural Resources Monitoring Plan.** If monitoring is the preferred recommendation, a cultural resources monitoring plan shall be prepared by a qualified professional archaeologist. Prior to finalization of the plan, a copy will be provided to the appropriate affiliated tribe(s) for review and comment. The plan should address (but not be limited to) the following issues: o Training program for all construction involved in site disturbance and field workers; o Person(s) responsible for conducting monitoring activities, including Native American monitors; o How the monitoring shall be conducted and the required format; o Content of monitoring reports, including any necessary archaeological resurvey; o Person(s) responsible for overseeing and directing the monitors; o Schedule for submittal of monitoring reports and person(s) responsible for review and approval of monitoring reports; o Procedures and construction methods to avoid sensitive cultural resource areas;

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		○ Clear delineation and fencing of sensitive cultural resource areas requiring monitoring; ○ Physical monitoring boundaries (e.g., 200-foot radius of a known site); ○ Protocol for notifications and stop-work guidelines in case of encountering of cultural resources, as well as methods of dealing with the encountered resources (e.g., collection, identification, curation); ○ Methods to ensure security of cultural resources sites; ○ Protocol for notifying local authorities (i.e., Sheriff, Police) should site looting and other illegal activities occur during construction. If the City, in consultation with the monitors, determines that a significant archaeological resource is present and that the resource could be adversely affected by the proposed Project, the City shall: ○ Re-design the proposed project to avoid any adverse effect on the significant resource; or, ○ Implement an archaeological data recovery program (ADRP) (unless the archaeologist determines that the archaeological resource is of greater interpretive than research significance, and that interpretive use of the resource is feasible). The project archaeologist, the City, and appropriate affiliated tribe(s) shall meet and consult to determine the scope of the ADRP. The archaeologist will prepare a draft ADRP and submit it to the City for review and approval. Prior to finalization of the ADRP, a copy will be provided to the appropriate affiliated tribe(s) for review and comment. The ADRP will identify how the proposed data recovery program will preserve the significant information the archaeological resource is expected to contain. The ADRP will identify the scientific/historic research questions applicable to the expected resource, the data classes the resource is expected to possess, and how the expected data classes will address the applicable research questions. Data recovery, in general, shall be limited to the portions of the historic property that could be adversely affected by the proposed Project. Destructive data recovery methods shall not be applied to portions of the archaeological resources if nondestructive methods are practical.
CR-2	Previously Undiscovered Cultural Resources	1. **Inadvertent Discoveries.** If discovery is made of items of historical or archaeological interest, activity will immediately cease in the project location (within approximately 50-feet) of discovery. Prehistoric archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or tool-making debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; and stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered stone tools, such as hammerstones and pitted stones. Historic-period materials might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and/or ceramic refuse. After cessation of excavation the contractor shall immediately contact the City. Maintenance will not resume until authorization is received from the City. 2. In the event of unanticipated discovery of archaeological indicators during construction, the City will retain the services of a qualified professional archaeologist to evaluate, in consultation with the appropriate affiliated tribe(s), the significance of the items prior to resuming any activities that could impact the site.

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		3. In the case of an unanticipated archaeological discovery that is determined to be potentially eligible for listing in the National and/or California Register, and the site cannot be avoided, the City will implement an ADRP, prepared by a qualified archaeologist, as outlined under BMP CR-1. 4. **Discovery of Human Remains.** If potential human remains are encountered, the City shall halt work in the vicinity of the find and contact the county coroner in accordance with Public Resources Code Section 5097.98 and Health and Safety Code Section 7050.5. If the coroner determines the remains are Native American, the coroner will contact the NAHC. As provided in Public Resources Code Section 5097.98, the NAHC will identify the person or persons believed to be most likely descended from the deceased Native American. The Most Likely Descendent makes recommendations for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in Public Resources Code Section 5097.98.
CR-3	Previously Undiscovered Paleontological Resources	1. If fossil remains are encountered during maintenance, the maintenance activity will be stopped until a qualified professional paleontologist can assess the nature and importance of the find and recommend appropriate treatment. The City shall retain a consultant who meets the Society for Vertebrate Paleontology's criteria for a "qualified professional paleontologist" (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995). Treatment may include preparation and recovery of fossil materials so that they can be housed in an appropriate museum or university collection, and may also include preparation of a report for publication describing the finds. The City shall be responsible for ensuring that the recommendations of the paleontologist regarding treatment and reporting are implemented.
Hazardous Materials Safety		
HAZ-1	Spill Prevention and Response Plan	1. The City will develop a Spill Prevention and Response Plan prior to commencement of maintenance activities. The plan will summarize the measures required under BMPs HAZ-2 through HAZ-6. It will also require that: a. Equipment and materials for cleanup of spills be available on site and that spills and leaks will be cleaned up immediately and disposed of properly. b. Prior to entering the work site, all field personnel shall be appropriately trained in spill prevention, hazardous material control, and clean-up of accidental spills. c. Field personnel shall implement measures to ensure that hazardous materials are properly handled and the quality of water resources is protected by all reasonable means. d. Spill prevention kits shall always be in close proximity when using hazardous materials (e.g., crew trucks and other logical locations). All field personnel shall be advised of these locations and trained in their appropriate use. The City will routinely inspect the work site to verify that the Spill Prevention and Response Plan is properly implemented and maintained. The City will notify contractors immediately if there is a noncompliance issue and will require compliance. Absorbent materials will be used on small spills located on impervious surface rather than hosing down the spill; wash waters shall not discharge to the storm drainage system or surface waters. For small spills on

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		pervious surfaces such as soils, wet materials will be excavated and properly disposed rather than burying it. The absorbent materials will be collected and disposed of properly and promptly. As defined in 40 CFR 110, a federal reportable spill of petroleum products is the spilled quantity that: • violates applicable water quality standards; • causes a film or sheen on, or discoloration of, the water surface or adjoining shoreline; or • causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines. If a spill is reportable, the contractor's superintendent will notify the City, and the City will take action to contact the appropriate safety and cleanup crews to ensure that the Spill Prevention and Response Plan is followed. A written description of reportable releases must be submitted to the SFBRWQCB 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. The releases will be documented on a spill report form. 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 City or contractors will select and implement measures to control contamination, with a performance standard that surface and groundwater quality must be returned to baseline conditions. These measures will be subject to approval by the City, DTSC, and the SFBRWQCB.
HAZ-2	Equipment and Vehicle Maintenance	1. All vehicles and equipment will be kept clean. Excessive build-up of oil or grease will be avoided. 2. All equipment used in the creek or channel will be inspected for leaks each day prior to initiation of work. Action will be taken to prevent or repair leaks, if necessary. 3. Vehicle and equipment maintenance activities will be conducted off-site or in a designated, protected area away from the creek or channel where vehicle fluids and spills can be handled with reduced risk to water quality. 4. If maintenance must occur on-site, designated areas will not directly connect to the ground, surface waters, or the storm drainage system to prevent the run-on of stormwater and runoff of spills. The service area will be clearly designated with berms, gravel bags, or other barriers. 5. Secondary containment, such as a drain pan or drop cloth, 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 off-site. 6. Cracked batteries will be stored in a non-leaking secondary container and removed from the site. 7. Spill clean-up materials will be stockpiled where they are readily accessible. 8. Incoming vehicles and equipment will be checked for leaking oil and fluids (including delivery trucks, and employee and subcontractor vehicles). Leaking vehicles or equipment will not be allowed on-site.

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HAZ-3	Equipment and Vehicle Cleaning	1. Equipment will be cleaned of any sediment or vegetation before transferring and using in a different watershed to avoid spreading pathogens or exotic/invasive species between watersheds. 2. Vehicles and equipment will not be washed on-site. Vehicle and equipment washing will occur on an appropriate wash rack at the City maintenance center.
HAZ-4	Refueling	1. Vehicles or equipment will not be refueled within 100 feet of a wetland, creek, channel, or other waterway unless a bermed and lined refueling area is constructed. 2. For stationary equipment that must be fueled on-site, secondary containment, such as a drain pan or drop cloth, shall be provided in such a manner to prevent accidental spill of fuels to underlying soil, surface water, or the storm drainage system.
HAZ-5	On-Site Hazardous Materials Management	1. The products used and/or expected to be used and the end products that are produced and/or expected to be produced after their use will be inventoried. 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 or in a storage shed (completely enclosed), with appropriate secondary containment to prevent any spillage or leakage. 4. Quantities of equipment fuels and lubricants greater than 55 gallons shall be provided 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 shall not be allowed to enter receiving waters or the storm drainage system. 6. Sanitation facilities (e.g., portable toilets) will be surrounded by a berm, and a direct connection to the storm drainage system or receiving water will be avoided. 7. Sanitation facilities will be regularly cleaned and/or replaced, and inspected regularly for leaks and spills. 8. Waste disposal containers will be covered when they are not in use, and a direct connection to the storm drainage system or receiving water will be avoided. 9. All trash that is brought to a project site during maintenance activities (e.g., plastic water bottles, plastic lunch bags) will be removed from the site daily.
HAZ-6	Existing Hazardous Sites or Waste	1. The City will conduct a search for existing known contaminated sites on the State Water Resource Control Board's GeoTracker website (http://www.geotracker.waterboards.ca.gov) when new maintenance sites are identified. For any proposed maintenance sites located within 1,500 feet of any "open" sites where contamination has not been remediated, the City will contact the SFBRWQCB case manager listed in the database. The City will work with the case manager to ensure maintenance activities would not affect cleanup or monitoring activities or threaten the public or environment. 2. If hazardous materials, such as oil or paint cans, are encountered at the maintenance sites, the City will carefully remove and dispose of them according to the Spill Prevention and Response plan. City staff will wear proper

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		protective gear and store the waste in an appropriate hazardous waste container until it can be disposed at a hazardous waste facility.
HAZ-7	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 have appropriate fire suppression equipment available at the work site. 3. On days when the fire danger is high and a burn permit is required, flammable materials, including flammable vegetation slash, will be kept at least 10 feet away from any equipment that could produce a spark, fire, or flame. 4. On days when the fire danger is high and a burn permit is required, portable tools powered by gasoline-fueled internal combustion engines will not be used within 25 feet of any flammable materials unless at least one round-point shovel or fire extinguisher is within immediate reach of the work crew (no more 25 feet away from the work area).
HAZ-8	Testing and Disposal of Spoils	1. After selecting potential sediment disposal locations and prior to disposing of excavated sediment, the City will test the sediment to determine the suitability for disposal based on presence of contaminants. Criteria for sediment disposal at the selected locations will dictate the concentrations of contaminants such as metals, pesticides, organic compounds, total organic carbon, asbestos, total sulfides, ammonia, and toxicity which are acceptable at the disposal locations. As specified in the Sediment Sampling and Analysis Guidelines, samples will be compared against federal and state environmental screening levels (ESLs) for protection of human health, groundwater quality, and terrestrial receptors. 2. If hazardous levels of contaminants are present such that disposal at the preferred locations is not feasible, the material will be taken to a permitted hazardous waste facility.
Vegetation Management		
VEG-1	Removal of Existing Vegetation	1. Vegetation pruning and removal activities will be conducted under the guidance of a staff biologist or certified arborist. 2. Only vegetation that is noxious, invasive, hazardous, or could obstruct creek or channel flows will be removed. Herbaceous layers that provide erosion protection and habitat value will be left in place. Invasive plant species that inhibit the health and/or growth of native riparian trees will be targeted for removal. 3. Where a choice between species that may be removed to maintain flood conveyance is feasible, slower-growing species such as oaks (*Quercus* spp.) or Western sycamores (*Platanus racemosa*) that develop large canopies will be preferentially preserved, because these species take longer to establish, and provide essential nesting habitat for cavity nesters and food sources for a variety of resident and migratory animals and birds. Faster-growing species such as alders (*Alnus* spp.) and cottonwoods (*Populus* spp.) are the second priority for preservation; these single-trunked species offer the benefit of improved flood conveyance and reduced roughness by comparison with multi-trunked species.

BMP ID	Name	BMP
		4. Vegetation will be removed and/or pruned in such a manner that creek or channel roughness is reduced while allowing the maximum amount of vegetation to remain in place. Trees will be trimmed or pruned to reduce impedance of floodflows while allowing the canopy to develop. Specifics for each site will differ, but typical options include limbing up to remove lower branches that have potential to interfere with floodflows, and pruning into a "fan" roughly parallel to flow direction. In areas where extensive vegetation removal is desirable to maintain flood flow capacity, phasing of removal shall be considered so that some vegetation may remain in place to provide habitat to birds. 5. Vegetation management will emphasize the preservation of large mature trees that provide well developed overstory for bird habitat, canopy closure for creek and channel shading, and add vertical complexity to the riparian corridor. This includes species such as Western sycamore which shall be avoided whenever feasible. Vegetation management will be conducted in such a manner that maximizes shading over the active channel. Larger trees will be retained on both sides of north-south flowing streams and on the south side of east-west flowing streams. Where vegetation is removed from the active channel, removal will target nonnative species and removal of native species that are stiff and/or multi-trunked such as arroyo willow (*Salix lasiolepis*). Trees will never be topped as this encourages shrubby growth and weak branch attachments. 6. Large woody debris, stumps, or root wads that are fully or partially buried and do not present a flood hazard shall be allowed to remain in place to provide habitat and to maintain bank stability. 7. If vegetation requires removal for access to project site, non-native species and/or quick growing species shall be targeted first for removal. Removal of native, mature trees will be avoided whenever possible. 8. To the extent feasible, removed native vegetation shall be saved to replant after maintenance or plant in other nearby sites. This includes the reuse of mulch and willow sprigs where possible.
VEG-2	Invasive Plant Species Control Measures	1. Construction equipment shall arrive at the maintenance project site clean and free of soil, seed, and plant parts to reduce the likelihood of introducing new weed species. 2. Any imported fill material, soil amendments, gravel, etc., required for construction and/or restoration activities that would be placed within the upper 12 inches of the ground surface shall be free of vegetation and plant material. 3. Certified weed-free imported erosion-control materials shall be used. 4. Invasive species (such as pampas grass [*Cortaderia* spp.], giant reed [*Arundo donax*]), occurring within sediment or vegetation management locations shall be flagged for removal by a biologist familiar with the identification of such species. Invasive species shall then be removed consistent with the recommendations of the California Invasive Plant Council (Cal-IPC; http://www.cal-ipc.org). Invasive species, along with associated duff and topsoil shall be disposed of at the County landfill. These materials shall not be allowed to be integrated with other onsite topsoil materials intended for salvage and replacement. 5. Invasive species removal shall occur before weed species seed set whenever feasible. 6. Invasive species removed from the maintenance project site shall be handled in a manner to prevent spread of seed and shall be contained such that stray plant parts do not leave the site or contaminate adjacent areas.

BMP ID	Name	BMP
VEG-3	Use of Herbicides and Pesticides	1. All herbicide and pesticide use shall be consistent with all Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) label instructions and any use conditions issued by the Alameda County Agricultural Commissioner. 2. Herbicide use will be restricted to the minimum amount needed to ensure adequate control of vegetation. 3. Application of herbicides or pesticides to upland areas shall not be made within 72 hours of predicted rainfall. 4. Herbicides and pesticides will not be directly applied to waters of the U.S. 5. No herbicide will be applied within 100 feet of exclusion zones (see BR-1), except when applied to cut stumps or frilled stems or injected into stems. No broadcast applications will be applied. 6. Herbicides and pesticides, including AquaMaster© and Renovate©, will not be used within 60 feet of areas identified in the Court-Ordered Stipulated Injunction for the protection of California red-legged frogs. The City will review the details and exceptions in the court order and comply with the herbicide use buffers as appropriate.
VEG-4	Use of Grazing Animals	1. Grazing animals may include use of sheep, goats, or cows. Grazing animals will be restricted to adults (i.e., no young under 6 months to reduce the potential for introducing pathogens into the water source). 2. Grazing will be allowed only when the channel is dry. In instances where there is a perennial flow, grazing must be limited to sheep or goats and temporary electric fencing must be installed to keep animals out of the wetted channel. 3. Water will be provided for grazing animals from sources other than the wetted channel to reduce the pressure on the wetted area. 4. A shepherd will be present with the animals at all times.
VEG-5	Planting and Revegetation After Soil Disturbance	This BMP applies to revegetation activities not associated with mitigation actions. Mitigation actions will have project-specific requirements and success criteria. 1. Sites where maintenance activities result in exposed soil will be stabilized to prevent erosion and revegetated with native vegetation as soon as feasible after maintenance activities are complete. 2. Revegetation will occur at a ratio of at least 1½: 1 to account for initial mortality of plantings. 3. If soil moisture is deficient, new vegetation will be supplied with supplemental water until vegetation is firmly established. 4. To the extent possible, native grass seed will be used when seeding a project site. 5. Erosion control fabric, hydromulch, or other mechanism will be applied as appropriate to provide protection to seeds, hold them in place, and help retain moisture. To discourage the introduction and establishment of invasive plant species, seed mixtures/straw used within natural vegetation will be either rice straw or weed-free straw. 6. When erosion control matting is required, plastic mono-filament netting or similar material containing netting shall not be used at the project. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.

BMP ID	Name	BMP
		7. Revegetation shall be regularly monitored for survival for at five years or until 80% minimum survival/cover (80% revegetation coverage is relative to natural coverage of the associated habitat) is achieved. If invasive species colonize the area, action shall be taken to control their spread; options include hand and mechanical removal and replanting with native species.
Water Quality and Creek/Channel Protection		
WQ-1	Apply Erosion Control Fabric to or Hydroseeding of Exposed Soils	1. Upland soils exposed due to maintenance activities will be seeded and stabilized using erosion control fabric or hydroseeding. The creek or channel bed and other areas below ordinary high water mark are exempt from this BMP. 2. Erosion control fabric will consist of natural fibers that will biodegrade over time. Plastic mono-filament netting or similar material containing netting shall not be used at the project. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds. No plastic or other non-porous material will 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 not be impacted by the application. 3. The site will be properly prepared to make sure the fabric/mat has complete contact with the soil. Sites can be prepared by grading and shaping the installation area; removing all rocks, dirt clods, vegetation, etc.; preparing the seedbed by loosening the top 2- to 3-inches of soil; and applying soil amendments as directed by soil tests, the seeding plan, and manufacturer's recommendations. 4. The area will be seeded before installing the fabric. All areas disturbed during installation will be re-seeded. 5. Erosion control fabric will be anchored in place. Anchors can include U-shaped wire staples, metal geotextiles stake pins or triangular wooden stakes. 6. The manufacturer's installation recommendations will be followed. 7. Other erosion control measures shall be implemented as necessary to ensure that sediment or other contaminants do not reach surface water bodies for stockpiled or reused/disposed sediments.
WQ-2	Prevent Scour Downstream of Sediment Removal	1. After sediment removal, the creek or channel shall be graded so that the transition between the existing creek or channel both upstream and downstream is smooth and continuous between the maintained and non-maintained areas and does not present a "wall" of sediment or other blockage that could erode once flows are restored to the creek or channel.
WQ-3	In-Channel Grading	1. Where pre-maintenance creek or channel form exhibited desirable features, the creek or channel bed will be regraded to mimic the creek or channel form before work was conducted. 2. Where possible, grading may include creek or channel enhancements such as excavation of a low-flow channel, development of a meander, or riffle/pool configurations. No creek or channel grading will occur below the as-built design for the flood control creeks or channels. 3. Where in-stream gravel and gravel (or cobble) bars are encountered, sediment removal activities will aim to preserve the overall shape and form of the existing bar or gravel feature. Sediment removal activities will aim to retain the form of the gravel or cobble bar feature, while reducing bar elevations as necessary to accommodate flood conveyance capacity.

BMP ID	Name	BMP
		4. Significant earth moving-activities will not be conducted in riparian areas within 24 hours of predicted storms or after major storms (defined as 1-inch of rain or more).
WQ-4	Dechlorination Procedures for Discharges into Creeks and Channels	1. Bazooka (or equivalent) dechlorination equipment will be attached to potable water supplies used to perform maintenance activities in and around creeks and channels. 2. Chlorine residual will be sampled following attachment of the dechlorination equipment, and shall not exceed 0.05 mg/l. Chlorine residual levels shall be monitored 15 minutes after start-up and every half hour during the steady-state discharge of water from a dechlorinating device to verify proper performance during the entire period of discharge. 3. Use the minimum amount of water necessary to complete maintenance activities in and around creeks and channels. When feasible, use vacuum trucks to collect "flush" waters.
Good Neighbor Policies		
GN-1	Work Site Housekeeping	1. The City will maintain the work site in a neat and orderly condition, and will leave the site in a neat, clean, and orderly condition when work is complete. To the extent feasible, slash, sawdust, cuttings, etc. will be removed to clear the site of vegetation debris. Paved access roads will be swept and cleared of any residual vegetation or dirt resulting from the maintenance activity. 2. 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.
GN-2	Public Outreach	1. In efforts to keep the public informed about stream maintenance work, why it is necessary, when it occurs, and what a neighborhood can expect when crews arrive to conduct maintenance work, the City will post and update information about the SMP and maintenance activities on their website. 2. Each spring, once maintenance sites have been selected for the annual work season, information on the maintenance sites, approximate work dates, and contact information will be posted on the City's website.
GN-3	Noise Control	1. The City will ensure that power equipment (vehicles, heavy equipment, and hand equipment such as chainsaws) is equipped with original manufacturer's sound-control devices, or alternate sound control that is no less effective than those provided as original equipment. Equipment will be operated and maintained to meet applicable standards for construction noise generation. No equipment will be operated with an unmuffled exhaust.
GN-4	Traffic Flow, Pedestrians, and Safety Measures	1. To the extent feasible, 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 scheduled outside of peak traffic hours (7:00–10:00 a.m. and 3:00–6:00 p.m.) to the maximum extent practicable, and advance warning signage, a detour route, and flaggers will be provided in both directions. 2. 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.

BMP ID	Name	BMP
		3. Heavy equipment and haul traffic will be prohibited in residential areas, except when no other route to and from the site is available. 4. Access for driveways and private roads will be maintained to the extent feasible. If brief periods of maintenance would temporarily block access, property owners will be notified prior to maintenance activities.
GN-5	Odors	1. Sediment that is rich in decaying organic matter that could generate assorted malodorous gases such as reduced sulfur compounds shall be handled to minimize impacts on sensitive receptors such as nearby residents and businesses and their patrons. In general, such materials will be hauled off of the site at the time of excavation. Where it needs to be temporarily stockpiled, maintenance personnel shall stockpile potentially odorous sediments as far as possible from residential areas, businesses and their patrons, and other odor sensitive land uses.

Table 7-2. Best Management Practices by Activity

BMP	Name	Sediment Removal	Bank Stabilization	Vegetation Management						Other Activities				
				Willow Removal	Cattail Removal	Tree Pruning & Exotics Removal	Tree Removal	Top-of-Bank Maintenance	Herbicide Use	Bridge Maintenance	Culvert Repair/ Replacement	Habitat Restoration & Landscape Maint.	Trash & Debris Removal	Access Road & Trail Maintenance
General Impact Avoidance and Minimization														
GEN-1	Maintenance Work Window	X	X	X	X	X	X	X	X	X	X	X	X	X
GEN-2	Staging and Stockpiling of Materials	X	X	X	X	X	X	X	X	X	X	X	X	X
GEN-3	Creek and Channel Access	X	X	X	X	X	X	X	X	X	X		X	X
Air Quality Protection														
AQ-1	Basic Construction Air Quality Measures (based on BAAQMD Air Quality Guidelines)	X	X	X	X	X	X	X	X	X	X	X	X	X
AQ-2	Additional Construction Air Quality Measures (based on BAAQMD Air Quality Guidelines)	X	X	X	X	X	X	X	X	X	X	X	X	X
Biological Resources Protection														
BR-1	Area of Disturbance	X	X	X	X	X	X	X	X	X	X	X	X	X
BR-2	Pre-Maintenance Educational Training	X	X	X	X	X	X	X	X	X	X	X	X	X
BR-3	Biotechnical Bank Stabilization	X	X					X		X	X			
BR-4	Impact Avoidance and Minimization During Dewatering	X	X							X	X			
BR-5	Amphibian Species Relocation	X	X							X	X			

BMP	Name	Sediment Removal	Bank Stabilization	Vegetation Management						Other Activities				
				Willow Removal	Cattail Removal	Tree Pruning & Exotics Removal	Tree Removal	Top-of-Bank Maintenance	Herbicide Use	Bridge Maintenance	Culvert Repair/ Replacement	Habitat Restoration & Landscape Maint.	Trash & Debris Removal	Access Road & Trail Maintenance
BR-6	On-Call Biologist	X	X	X	X	X	X	X	X	X	X	X	X	X
BR-7	Focal Species Plants	X	X	X	X	X	X	X	X	X	X	X	X	X
BR-8	Nesting Migratory Bird and Raptor Pre-maintenance Surveys	X	X	X	X	X	X	X	X	X	X	X	X	X
BR-9	California Red-legged Frog Avoidance and Impact Minimization Measures for Ground-Disturbing Activities	X	X	X	X					X	X	X	X	X
BR-10	California Red-legged Frog Avoidance and Impact Minimization Measures for Vegetation Management			X	X	X	X	X	X					
BR-11	California Tiger Salamander Avoidance and Impact Minimization Measures for Sediment and Debris Removal	X		X	X					X	X		X	
BR-12	California Tiger Salamander Avoidance and Impact Minimization Measures for Vegetation Management			X	X	X	X	X	X					
BR-13	California Tiger Salamander Avoidance and Impact Minimization Measures for Bank Stabilization		X											

BMP	Name	Sediment Removal	Bank Stabilization	Vegetation Management						Other Activities				
				Willow Removal	Cattail Removal	Tree Pruning & Exotics Removal	Tree Removal	Top-of-Bank Maintenance	Herbicide Use	Bridge Maintenance	Culvert Repair/ Replacement	Habitat Restoration & Landscape Maint.	Trash & Debris Removal	Access Road & Trail Maintenance
BR-14	Western Pond Turtle Pre-maintenance Surveys for Ground-Disturbing Activities	X	X	X	X					X	X		X	
BR-15	Vernal Pool Fairy Shrimp and Longhorn Fairy Shrimp Avoidance and Impact Minimization Measures													X
BR-16	Callippe Silverspot Butterfly Avoidance and Impact Minimization Measures						X		X					
BR-17	Golden Eagle Avoidance and Impact Minimization Measures	X	X	X	X	X	X	X		X	X		X	X
BR-18	Tricolored Blackbird Avoidance and Impact Minimization Measures	X	X	X	X	X			X	X	X		X	X
BR-19	Burrowing Owl Avoidance and Impact Minimization Measures	X	X	X	X	X	X	X	X	X	X	X	X	X
BR-20	Den Avoidance for American Badger and San Joaquin Kit Fox		X				X	X			X	X		X
Cultural Resources Protection														
CR-1	Cultural Resources Investigation	X	X	X	X					X	X	X		
CR-2	Previously Undiscovered Cultural Resources	X	X	X	X	X	X	X		X	X	X	X	X

BMP	Name	Sediment Removal	Bank Stabilization	Vegetation Management						Other Activities				
				Willow Removal	Cattail Removal	Tree Pruning & Exotics Removal	Tree Removal	Top-of-Bank Maintenance	Herbicide Use	Bridge Maintenance	Culvert Repair/ Replacement	Habitat Restoration & Landscape Maint.	Trash & Debris Removal	Access Road & Trail Maintenance
CR-3	Previously Undiscovered Paleontological Resources	X	X	X	X	X	X	X		X	X	X	X	X
Hazardous Materials Safety														
HAZ-1	Spill Prevention and Response Plan	X	X	X	X	X	X	X	X	X	X	X	X	X
HAZ-2	Equipment and Vehicle Maintenance	X	X	X	X	X	X	X	X	X	X	X	X	X
HAZ-3	Equipment and Vehicle Cleaning	X	X	X	X	X	X	X	X	X	X	X	X	X
HAZ-4	Refueling	X	X	X	X	X	X	X	X	X	X	X	X	X
HAZ-5	On-Site Hazardous Materials Management	X	X	X	X	X	X	X	X	X	X	X	X	X
HAZ-6	Existing Hazardous Sites or Waste	X	X	X	X	X	X	X	X	X	X	X	X	X
HAZ-7	Fire Prevention	X	X	X	X	X	X	X	X	X	X	X	X	X
HAZ-8	Testing and Disposal of Spoils	X	X							X	X			
Vegetation Management														
VEG-1	Removal of Existing Vegetation	X	X	X	X	X	X	X	X	X	X	X	X	X
VEG-2	Invasive Plant Species Control Measures	X	X			X		X			X	X		X
VEG-3	Use of Herbicides and Pesticides								X					
VEG-4	Use of Grazing Animals				X	X		X				X		

BMP	Name	Sediment Removal	Bank Stabilization	Vegetation Management						Other Activities				
				Willow Removal	Cattail Removal	Tree Pruning & Exotics Removal	Tree Removal	Top-of-Bank Maintenance	Herbicide Use	Bridge Maintenance	Culvert Repair/ Replacement	Habitat Restoration & Landscape Maint.	Trash & Debris Removal	Access Road & Trail Maintenance
VEG-5	Planting and Revegetation After Soil Disturbance	X	X			X	X			X	X	X		
Water Quality and Creek/Channel Protection														
WQ-1	Apply Erosion Control Fabric to or Hydroseeding of Exposed Soils	X	X			X	X	X	X	X	X	X	X	X
WQ-2	Prevent Scour Downstream of Sediment Removal	X												
WQ-3	In-Channel Grading	X	X							X	X			
WQ-4	Dechlorination Procedures for Discharges into Creeks and Channels	X	X							X	X	X	X	X
Good Neighbor Policies														
GN-1	Work Site Housekeeping	X	X	X	X	X	X	X	X	X	X	X	X	X
GN-2	Public Outreach	X	X	X	X	X	X	X	X	X	X	X	X	X
GN-3	Noise Control	X	X	X	X	X	X	X	X	X	X	X	X	X
GN-4	Traffic Flow, Pedestrians, and Safety Measures	X	X	X	X	X	X	X	X	X	X	X	X	X
GN-5	Odors	X	X		X					X	X			

Table 7-3. Focal Species by SMP Reach

Creek or Channel Name	Reach	Longhorn & Vernal Pool Fairy Shrimp	Callippe Silverspot Butterfly	California Tiger Salamander	California Red-Legged Frog	Golden Eagle	Tricolored Blackbird	Western Burrowing Owl	American Badger	San Joaquin Kit Fox	Plants
Altamont Creek	AC-1	U	U	U	O*	U	P	U	U	U	P
	AC-2	P	U	O*	O*	P	U	O*	P	P	O*
	AC-3	U	U	U	O*	U	U	U	U	U	U
	AC-4	P	U	O*	O*	U	P	U	U	U	O*
	AC-5	P	U	O*	O*	U	U	O*	P	P	P
	AC-6	P	U	O*	O*	U	U	O*	U	P	O*
	AC-7	U	P	U	O*	P	U	O*	P	P	O*
Altamont Creek Tributary	ACT-1	U	U	U	O*	U	U	P	U	U	P
	ACT-2	P	U	O*	O*	U	U	O*	P	U	O*
Arroyo Del Valle	ADV-1	U	U	O*	O*	P	U	P	P	U	U
	ADV-2	U	U	O*	O*	O	U	P	P	U	P
	ADV-3	U	U	O*	O*	O	U	P	P	U	P
	ADV-4	U	U	O*	O*	O	U	P	P	U	P
	ADV-5	U	U	P/A-3	O*	O	U	P	P	U	P
	ADV-6	U	U	P/A-2	O*	O	U	U	U	U	P
	ADV-7	U	U	P/A-2	O*	P	U	U	U	U	P
	ADV-8	U	U	P/A-3	O*	O	U	U	U	U	P
	ADV-9	U	U	P/A-3	P	O	U	U	U	U	P
	ADV-10	P	P	O*	O*	P	P	P	P	U	P
	ADV-11	P	P	O*	O*	P	P	P	P	U	P

Creek or Channel Name	Reach	Longhorn & Vernal Pool Fairy Shrimp	Callippe Silverspot Butterfly	California Tiger Salamander	California Red-Legged Frog	Golden Eagle	Tricolored Blackbird	Western Burrowing Owl	American Badger	San Joaquin Kit Fox	Plants
	ADV-12	P	P	O*	O*	P	P	P	P	U	P
	ADV-13	P	P	O*	O*	P	P	P	P	U	P
	ADV-14	U	U	O*	O*	P	P	P	P	U	P
	ADV-15	U	P	P/A-2	P	P	U	P	P	U	P
Arroyo Las Positas	ALP-1	U	U	U	P	U	U	P	U	U	P
	ALP-2	U	U	U	P	U	U	P	U	P	U
	ALP-3	U	U	U	P	U	U	U	U	U	U
	ALP-4	U	U	U	P	U	P	U	U	U	U
	ALP-5	U	U	U	P	U	U	P	U	U	P
	ALP-6	U	U	P/A-4	P	U	U	P	U	U	U
	ALP-7	U	U	U	O*	P	P	P	P	P	P
	ALP-8	P	P	P/A-2	O*	U	P	P	P	P	P
	ALP-9	U	P	U	O*	U	P	O*	U	U	P
	ALP-10	U	U	U	P	U	P	U	U	U	P
	ALP-11	U	U	U	P	U	P	O*	U	U	P
	ALP-12	U	U	U	O*	U	P	O*	U	U	P
	ALP-13	U	U	U	P	U	P	O*	U	U	P
	ALP-14	U	U	U	P	U	P	U	U	U	P
	ALP-15	U	U	O*	O*	U	P	U	U	U	P
	ALP-16	P	U	O*	O*	U	U	P	U	U	P
Arroyo Las Positas	ALPT-1	P	P	P/A-4	P	U	U	P	P	P	P
	ALPT-2	P	P	P/A-3	P	U	U	P	P	P	P

Creek or Channel Name	Reach	Longhorn & Vernal Pool Fairy Shrimp	Callippe Silverspot Butterfly	California Tiger Salamander	California Red-Legged Frog	Golden Eagle	Tricolored Blackbird	Western Burrowing Owl	American Badger	San Joaquin Kit Fox	Plants
Tributary	ALPT-3	P	P	P/A-2	P	U	U	P	P	P	P
Arroyo Mocho	AM-1	U	U	U	P	U	U	U	U	U	U
	AM-2	U	U	U	P	U	U	U	U	U	U
	AM-3	U	U	U	U	U	U	U	U	U	U
	AM-4	U	U	U	P	U	U	U	U	U	U
	AM-5	U	U	H	P	U	U	U	U	U	U
	AM-6	U	U	H	P	U	U	U	U	U	P
	AM-7	U	U	H	P	U	U	U	U	U	P
	AM-8	U	U	U	P	U	U	U	U	U	P
	AM-9	U	U	U	P	U	P	U	U	U	U
	AM-10	U	U	H	P	U	P	U	U	U	P
Arroyo Seco	AS-1	U	U	U	P	U	U	P	P	U	P
	AS-2	U	U	U	U	U	U	U	U	U	U
	AS-3	U	U	U	U	U	U	U	U	U	U
	AS-4	U	U	U	U	U	U	U	U	U	P
	AS-5	U	U	U	U	U	U	U	U	U	U
	AS-6	U	U	U	U	U	U	U	U	U	U
	AS-7	U	U	U	U	U	U	U	U	U	U
	AS-8	U	U	U	U	U	U	U	U	U	P
	AS-9	U	U	U	U	U	U	U	U	U	U
	AS-10	U	U	U	U	U	U	U	U	U	U
	AS-11	U	U	U	P	U	U	U	U	U	P

Creek or Channel Name	Reach	Longhorn & Vernal Pool Fairy Shrimp	Callippe Silverspot Butterfly	California Tiger Salamander	California Red-Legged Frog	Golden Eagle	Tricolored Blackbird	Western Burrowing Owl	American Badger	San Joaquin Kit Fox	Plants
	AS-12	U	U	U	P	U	U	U	U	U	P
	AS-13	U	U	U	P	U	U	U	U	U	P
	AS-14	P	U	U	P	U	U	P	P	U	P
	AS-15	U	U	U	P	U	U	P	U	U	U
Bear Creek Basins		P	U	P/A-1	P	U	U	P	P	P	P
Collier Canyon Creek	CCC-1	U	U	U	P	U	U	U	U	U	U
	CCC-2	U	U	U	P	U	U	U	U	U	U
	CCC-3	U	U	U	P	U	U	U	U	U	P
	CCC-4	U	U	U	P	U	U	U	U	U	U
	CCC-5	U	U	U	P	U	U	U	U	U	U
	CCC-6	U	U	P/A-2	P	U	U	U	U	U	P
	CCC-7	U	U	P/A-1	P	U	U	P	P	U	P
Cottonwood Creek	CC-1	U	U	U	P	U	U	P	P	U	P
	CC-2	U	U	P/A-1	P	U	U	U	U	U	P
Granada Channel	GC-1	U	U	U	U	U	U	U	U	U	U
	GC-2	U	U	U	U	U	U	U	U	U	U
Ravenswood Drainage Swales		U	U	U	U	U	U	U	U	U	U
Realigned Arroyo Las Positas	RALP-1	U	U	U	P	U	U	P	U	U	P
	RALP-2	U	U	U	P	U	U	U	U	U	U
	RALP-3	U	U	U	P	U	U	U	U	U	U

Creek or Channel Name	Reach	Longhorn & Vernal Pool Fairy Shrimp	Callippe Silverspot Butterfly	California Tiger Salamander	California Red-Legged Frog	Golden Eagle	Tricolored Blackbird	Western Burrowing Owl	American Badger	San Joaquin Kit Fox	Plants
	RALP-4	U	U	U	P	U	U	P	P	P	P
	RALP-5	U	U	U	P	U	U	P	P	P	P
	RALP-6	U	U	U	P	U	U	P	P	P	P

O* = Presence documented within reach

P = Potential to occur

A-1 = Moderate-high likelihood for occurrence

A-2 = Moderate likelihood for occurrence

A-3 = Low likelihood for occurrence

A-4 = Unlikely likely to occur

H = Historic occurrence; recent occurrence not confirmed

U = Unsuitable habitat, unlikely to occur and/or no known occurrence

Chapter 8
Program Mitigation

8.1 Introduction

Potential SMP impacts are greatly reduced through the avoidance and minimization measures described in Chapters 4, 5, and 7. Efforts are made to reduce potential impacts through pre-maintenance planning and avoidance approaches, using a variety of impact avoidance and reduction measures during the actual maintenance work, and by taking steps to reduce the overall need for maintenance work over the long term. However, there are potential program impacts that are not entirely avoided or reduced through such steps. Such residual impacts will require additional mitigation. This chapter describes the SMP's mitigation program.

Section 8.2, *Regulatory Guidance*, identifies the mitigation standards established in the EACCS and 2008 Mitigation Rule (33_CFR_332). Mitigation for SMP program impacts will be consistent with the 2008 Mitigation Rule and EACCS mitigation ratios and standards, and conservation measures. As described below, mitigation will be developed to meet different regulatory needs in a comprehensive manner. However, conformance with the EACCS mitigation standards may not always provide sufficient mitigation for impacts to waters of the U.S. subject to USACE jurisdiction or waters of the State subject to San Francisco Bay RWQCB jurisdiction.

Sections 8.3 *Mitigation Approach* describes the SMP's three tier approach for mitigation, whereby habitats and ecological functions are enhanced or restored: (1) on-site and in-kind where the maintenance work occurred; (2) at other SMP Area reaches; or (3) outside of the SMP Area streams but within the watershed. The three-tiered mitigation approach ensures that mitigation seeks first and foremost to compensate for the impacts occurring at the specific project reach, then expands to consider other potential reaches or watershed opportunities if compensation cannot be entirely accomplished in the project reach.

Section 8.4, *Mitigation Ratios*, describes the permanent and temporary mitigation ratios for three resource areas: waters, riparian vegetation, and focal species.

Section 8.5, *Mitigation Timing*, describes the timing for development and implementation of annual mitigation plans.

Section 8.6, *Mitigation Notification and Reporting*, describes how mitigation activities will be communicated and coordinated with the relevant regulatory agencies.

8.2 Regulatory Guidance

The SMP mitigation program has been designed to meet the mitigation requirements of a variety of agencies, including the USACE, the San Francisco Bay RWQCB, CDFW, and USFWS. A summary of their relevant jurisdictions is provided in Table 8-1; this table identifies the geographic extent and types of activities over which each agency has authority, and the activities that require coverage under their respective programmatic permits/approvals.

8.2.1 East Alameda County Conservation Strategy

An overview of the EACCS is provided in Section 2.14.1 of this SMP manual. As described, EACCS identifies a set of mitigation standards for impacts to specific focal species and their habitat. These standards include avoidance and minimization measures and a compensation framework to offset impacts expected from projects in the EACCS study area which encompasses the SMP Area. The EACCS also includes a set of specific management prescriptions to benefit natural communities and focal species within specified conservation zones, and creates a framework for future conservation efforts by outlining conservation goals and objectives. Goals and objectives are defined at both a natural community level and focal species level. These are not detailed in this SMP Manual, but can be found in Chapter 3 of the EACCS document.

In EACCS, mitigation requirements for impacts to focal species are typically outlined at the species level when it is determined that focal species utilize affected land cover types for all or part of their life cycle. In cases where no focal or other native species are present but natural communities would be affected by a project, mitigation should include a provision for the protection of the same land cover type at a 3:1 ratio. The mitigation ratio may vary depending on the quality of habitat being lost. This ratio could vary further depending on the total acreage and quality of the natural community in a particular Conservation Zone. In other words, if the project will affect a rare natural community in the Conservation Zone, the ratio could be higher. If the community is fairly common, the ratio could be lower. Changes in the ratio would need to be justified in coordination with CDFW and USFWS.

8.2.2 2008 Final Rule

In 2008, new federal regulations were established to define the standards and criteria for implementation of compensatory mitigation to offset unavoidable impacts to waters of the United States authorized by USACE permits. These regulations are contained in 33 CFR 332 and are commonly known as the *2008 Final Rule*.

The fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable impacts to waters of the United States as authorized by USACE permits (33 CFR 332[a][1]). The 2008 Final Rule provides general compensatory mitigation guidance (33 CFR 332.3) for several key issues regarding mitigation planning including type and location of compensatory mitigation, using a watershed approach, site selection, mitigation type, mitigation amount. Specifically, mitigation should be located within the same watershed as the impact site, and should be located where it is most likely to successfully replace lost functions and services, taking into account such watershed scale features as aquatic habitat diversity, habitat connectivity, relationships to hydrologic sources (including the availability of water rights), trends in land use, ecological benefits, and compatibility with adjacent land uses (33 CFR 332.3 [b][1]). In addition, mitigation should use a watershed approach where the ultimate goal is to maintain and improve the quality and quantity of aquatic resources within watersheds through strategic selection of compensatory mitigation sites (33 CFR 332.3 [c][1]). In determining the amount of compensatory mitigation needed, the amount must be, to the extent practicable, sufficient to replace lost aquatic resource functions. If appropriate functional or condition assessment methods or other suitable metrics are available, these methods should be used to determine how much compensatory mitigation is required. If a functional or condition assessment or other suitable metric is not used, a minimum 1:1 acreage or linear foot compensation ratio must be used (33 CFR 332.3 [f][1]).

8.3 Mitigation Approach

Residual impacts are impacts that are not avoided or minimized through the application of SMP Maintenance Principles and SMP BMPs, or offset by the beneficial effects of SMP activities as described in Chapter 6. As directed by regulatory agencies, these residual impacts may require compensatory mitigation.

The residual impacts include:

- Temporary impacts during or immediately following maintenance activities[1];
- Permanent hardening of the creek or channel due to placement of rock rip-rap for bank stabilization, storm drain outfall protection, etc.; and
- Temporal loss of functions and values of the stream system.

These activities will result in fill of waters of the U.S. and/or waters of the state, and may also affect focal species, and therefore require mitigation. Additional impacts occur as temporal loss due to the time lag between the loss of aquatic resource functions caused by the permitted impacts and the replacement of aquatic resource functions at the compensatory mitigation site (defined in 33 CFR 332.2).

The City of Livermore SMP mitigation approach was developed based on the recently-permitted Sonoma County Water Agency SMP and on EACCS. The approach was refined through multiple discussions with agency representatives from the San Francisco Bay RWQCB, CDFW, USFWS, and USACE. Meetings were held with individual agencies and also as a group to develop the SMP mitigation approach. The mitigation strategy will result in no net loss of the extent of jurisdictional waters, either with respect to acreage or linear feet of jurisdictional waters.

The mitigation approach follows a three-tiered system where mitigation opportunities are sought first on-site at the project location (Tier 1), and second in other SMP Area reaches (Tier 2). Mitigation actions implemented within the SMP Area on City-owned lands will be protected in perpetuity through placement of a deed restriction. Tier 3 mitigation will occur regardless of the location of Tier 1 and 2 mitigation and is intended to address temporal loss. The three-tier mitigation approach ensures that mitigation is first and foremost directed to compensate for the impacts occurring at the specific project reach, then expanded if necessary to consider reaches within the SMP Area and the watershed as a whole should opportunities within the project reach be insufficient to compensate for impacts.

Each tier in this three-tiered approach is described in further detail in the following sections.

8.3.1 Tier 1: On-site Mitigation within Impacted Reaches

Tier 1 mitigation is implemented on-site within the specific project reach where maintenance work is conducted. On-site mitigation is designed to address impacts in the immediate maintenance project area. On-site mitigation actions are intended to enhance and restore the stream and aquatic

[1] Depending on the frequency of the maintenance activity, temporary impacts may be treated as permanent impacts for the purpose of mitigating effects to habitat and focal species. For instance, storm drain outlet maintenance occurring in the same location on an annual or biannual basis would be considered a permanent impact due to the frequency of the activity, whereas bank stabilization which may occur only once in a given location during the SMP permit term may have residual temporary impacts requiring mitigation.

functions, as well as species habitat, that were impacted through the maintenance activities in kind. Tier 1 mitigation, at a minimum, will restore the beneficial uses and ecological functions and values that were provided by a site in its pre-maintenance condition to the extent practicable. In addition, where opportunities exist, it may provide additional benefits.

This approach also seeks in-kind or functional agreement between impacts and mitigation. If riparian habitats are affected, then the mitigation strategy is to re-establish riparian habitat. If in-stream aquatic habitats are impacted, then in-stream aquatic habitat will be the mitigation target. While mitigation targets will be sought based on in-kind or ecosystem functions, it is important to recognize that due to the constraints of a particular site, such functions may not be the most appropriate targets for restoration or enhancement activities. Likewise, the on-site mitigation approach considers what the most appropriate restorative activities are for a particular reach, given the design capacity of the channel. Based on engineering evaluations, in larger channels where there is sufficient capacity, both overstory and understory trees and shrubs may be planted. In smaller systems, planting may be focused on tall trees on the upper bank with little or nothing but sedges and grasses on the side slopes and in channel.

As described below, Tier 1 mitigation activities may include a planting program to develop a fuller riparian corridor, the removal of exotic and invasive species, and the construction of low-flow channels and other geomorphic features to enhance in-stream habitat. Tier 1 mitigation activities may include other actions as well, such as movement barrier removal, if opportunities exist and funding is available.

8.3.1.1 Planting Program

General Approach and Benefits

The City's mitigation program includes a variety of planting and habitat enhancement approaches. The primary objective is to enhance riparian canopy cover and shading, and to develop a native understory along channels that are currently dominated by non-native ruderal species, where conditions allow.

The City will plant trees and shrubs as on-site mitigation at all reach scale maintenance activity sites. For instance, localized sediment removal or culvert repair projects will include a tree planting component if there is available room to plant. Planting will also occur in conjunction with the removal of exotic and invasive species and the replacement of such species with native riparian vegetation suited to conditions in the SMP Area.

Planting new trees along reaches where vegetation was removed during sediment removal or vegetation thinning activities mitigates the temporary impacts of vegetation removal from channel bed and banks. As these trees mature they provide shade to the active channel, provide nesting and foraging habitat for many birds and small mammals, moderate water temperatures and provide forage for aquatic species, and help reduce the need for future sediment and vegetation management as the shade discourages cattail establishment which in turn traps sediment.

When considered at the watershed scale, the planting program will help provide connectivity, via a vegetated corridor throughout the SMP Area. Connected landscapes provide enhanced habitat for local and migrating species. In addition, increased vegetation along the stream banks will improve water quality through shading the stream and cooling water temperatures, and through filtering runoff entering the creek. While the constraints of an urban system (where the majority of the City's

engineered maintenance reaches are located) may limit the degree to which water quality is improved, even small improvements may provide a more hospitable environment for aquatic invertebrates which in turn provide the food source for birds, bats, and other species.

Planting Plan

Revegetation will consist of planting native species in suitable locations in all available channel zones, including: along the channel edge; along the intermediate channel banks; and along the top-of-bank. The intent is to establish vegetation that mimics natural communities found in the SMP Area under similar environmental conditions.

The City's planting strategy focuses on introducing plants and propagules that will be strong competitors for undesirable species such as Himalayan blackberry and cattail species which result in unfavorable flood management conditions. Similarly, for understory enhancement shrubs, grasses, and vines will be selected for their particular ability to compete and establish despite the existing vegetation.

To further support the planting effort, disturbed soils will be hydroseeded and covered with erosion control materials (as specified in project-specific design specifications) with native grasses to discourage erosion and encourage a native herbaceous understory. Specific locations for each planting will be determined on-site by a qualified botanist or restoration specialist following maintenance activities.

Plant densities will be calculated by planting zone and based on area in square feet. In general, trees will be planted on 30-foot centers relative to each other (1 every 900 square feet) and shrubs on 10-foot centers (1 every 100 square feet). Trees will be distributed regularly on both sides of the channel to encourage canopy closure and increase shading over the water surface. Shrubs will be placed strategically in groups to mimic natural distribution patterns over approximately 20% of the area available for planting. In lieu of planting many shrubs on the channel banks which can reduce channel capacity, herbs and grasses will be planted in clusters at 10-foot intervals along the toe (on both sides) to provide natural cover and improve stability. Native emergent species will be planted in the channel bottom to help stabilize the low-flow channel and provide close overhanging vegetation. Emergent plantings are generally limited to 20% of the channel bottom area.

Additional effort will be made during maintenance activities to retain or transplant (using oversized cuttings where feasible) some of the existing willows that currently grow in many of the SMP Area reaches. This may be accomplished during project construction or cuttings will be collected from willows in nearby SMP Area reaches and planted during the restoration work.

Native plant species will be used in densities and compositions that approximate natural plant communities found regionally in riparian areas and blend with nearby natural plant communities (see Table 8-2). Plant stature also is an important consideration, and is related to how the plant is anticipated to behave during periods of higher flows. Herbaceous species tend to bend over in higher flows, allowing debris and sediment to pass over rather than being caught in unyielding stems. The lower the plant, the less debris and sediment it will catch.

Implementation

Plant material will be obtained from local sources preferentially as feasible. Trees will be in the treepot-4 size range. Shrubs will be treepot-4 to one gallon size, and herbaceous species will be

planted from seed or liners. Seed mixtures will either be collected locally on site or will be obtained from a seed supplier that can authenticate a regionally local source and augmented with additional native perennial grass seed collected locally.

Plants will be installed in the native soil and plants on the upper bank will be top dressed with a three-inch thick layer of certified weed-free fir bark mulch to reduce weed growth and retain moisture. An irrigation basin two to three feet in diameter will be formed around each hole where feasible. Plants will be installed and mulched so that root crowns are at, or slightly above, the soil/mulch surface. Precise location of trees and shrub plantings in the upland and riparian zones will be determined in the field following completion of maintenance activities. Landscape fabric will be used for erosion control on slopes and disturbed areas.

Planting will be conducted from late summer to early winter. Generally, the majority of planting is done in the fall and winter with the advent of the season's rains. However, toe plantings can be conducted any time of the year if the channel remains moist and flow velocities are amenable. Following maintenance activities, the project botanist or restoration specialist will either position the plants themselves or place color-coded pin flags in specific planting locations for each shrub and tree species.

Trees and shrubs will be irrigated manually during the dry season for 3 years. Irrigation frequency will be determined by the restoration specialist based on the site conditions, but will occur approximately weekly the first year, every two weeks the second year, and monthly during the third year.

Monitoring

Monitoring will be conducted at the project site for up to 10 years following construction and planting of riparian species and up to 5 years following construction and planting of wetland species. Information collected will include the number and species planted at each site, square footage of channel planted, estimated percent canopy cover, plant vigor, and the number or percent of planted trees and shrubs surviving.

Vegetative cover will be determined using a visual estimate of cover and species composition for both wetland plantings and riparian plantings as outlined in Table 8-3.

Plant vigor will be determined by assigning a vigor rating of good, fair or poor to each plant. Dead plants will not be assigned a vigor rating. The ratings are defined below.

- **Good:** a seedling with less than 25% of its aboveground growth exhibiting one or more of the factors listed above.
- **Fair:** a seedling with 25–75% of its aboveground growth exhibiting one or more of the factors listed above.
- **Poor:** a seedling with more than 75% of its aboveground growth exhibiting one or more of the factors listed above.
- **Dead:** a seedling that is no longer visible or that does not appear capable of growth.

Site conditions will be documented annually by taking repeat photographs at set reference locations. The monitoring data will be reviewed annually to evaluate the overall success of the revegetation approach.

Success Criteria

For this SMP, a *performance standard* is a measure of a habitat characteristic used to assess the progress of the restored habitat toward meeting a success criterion. A *success criterion* is a measure that indicates whether the mitigation goals have been achieved at the end of the performance monitoring period. Channel bed plantings are considered wetland plantings. Channel toe of slope, floodplain bench, lower slope, upper slope, and top of bank plantings are considered riparian plantings.

Performance standards for wetland, riparian shrub, and riparian willow plantings are applied during the first 4 years of the monitoring period, and success criteria are applied at the end of the 5-year monitoring period. Performance standards for riparian trees are applied during the first 9 years of the monitoring period, and success criteria are applied at the end of the monitoring period. Performance standards for riparian trees change from individual plant success to vegetative cover trends at Year 5 due to the density of vegetation and the ultimate success criteria. The mitigation plantings will be evaluated annually using the annual performance standards. The performance standards and success criteria for wetland and riparian plantings are summarized in Table 8-3.

In the event of poor plant survival or failure to meet stated performance criteria, corrective measures will be implemented, including replanting to reach the 75% goal. The number of plant replacements will be above the threshold to meet the percent survival. The monitoring period for replacement plants will be reset to Year 1, while the original surviving plantings remain on the original monitoring schedule. As a last resort, new mitigation would be provided elsewhere, should a project not be capable of meeting performance criteria. For the in-channel zone, selective replanting will be conducted along the low-flow channel to help stabilize it when needed.

Invasive and Exotic Plant Removal Program

Because the removal of invasive and exotic plants is closely integrated with the general vegetation management activities, it is described in the vegetation maintenance description of Chapter 5, Section 5.4.

Specific mitigation activities include the targeted removal of invasive and exotic species. The removal of invasive and exotic species provides more room for desirable native species to establish. An increase in abundance of native vegetation over non-native vegetation improves overall riparian health. For example, native vegetation can provide more habitat opportunities to insects and birds that show preferential treatment for use of native plant species. Removing exotic species also helps prevent the monoculture common to areas dominated with exotics. When replaced with a diverse selection of native vegetation, the channels of the SMP Area can support a more diverse set of species including insects, birds, small mammals, amphibians, and reptiles.

Monitoring of invasive and exotic plant removal will include tracking the number of invasive or exotic trees removed, length of channel of removal activities, area of removal activities for shrub or ground-cover species, and observing whether recolonization of invasives occurs after removal.

8.3.1.2 Geomorphic Design

For reach-scale sediment removal projects, the City will design and implement a low-flow inset channel along the bed of the flood control channel. The low-flow channel provides on-site mitigation

through multiple benefits. Because low-flow channels are implemented together with sediment removal activities, they are described in Chapter 5, Section 5.3.

A key objective of a low-flow channel is to successfully transport sediment under lower flow conditions (annual flows and smaller). This is achieved through increased flow depth and velocity under low-flow conditions which are adequate to convey and pass sediments under the smaller flow conditions. This reduces sediment deposition, and ultimately reduces the need to conduct sediment removal activities. A sustainable low-flow channel also provides mitigating benefits of improving water quality, enhancing in-stream habitats, and preserving a migration corridor for fish.

8.3.2 Tier 2: Off-Site Mitigation at Other Drainage Reaches

Tier 2 mitigation is similar to Tier 1 mitigation in seeking in-kind mitigation in creeks and channels that have undergone maintenance in the SMP Area. However, Tier 2 mitigation is applied at other SMP Area creeks and channels, and is therefore not on-site. Tier 2 mitigation is sought when there are no suitable opportunities for enhancement or restoration in a maintenance reach and the next best opportunity is to pursue in-kind mitigation at a neighboring reach that does afford an opportunity for mitigation. Monitoring, reporting, and remedial actions (if necessary) will be combined with Tier 1 monitoring and reporting activities.

8.3.3 Tier 3: Integrated Watershed Mitigation

Tier 3 mitigation is off-site mitigation that provides compensation for temporal loss in the form of enhancement of Beneficial Uses. Off-site mitigation projects provide restorative and mitigating watershed solutions that address SMP impacts. Examples of off-site mitigation projects include native riparian plant revegetation, large woody debris installation, invasive plant removal, bioengineering/erosion control, and watershed-based sediment or other contaminant reduction actions. Tier 3 mitigation will be funded by an amount that is equal to or greater than 10% of the annual SMP activity budget.

Tier 3 mitigation is not only different in its geographic scope, it is also different in that it is not always solely a City effort, but may be a collaborative effort with partnering agencies. This is accomplished through a watershed-based mitigation program, whereby the City implements or funds Tier 3 projects to be implemented with local non-profit agencies, municipalities, restoration organizations, creek groups, schools and Resource Conservation Districts (RCDs). Partnership opportunities are described in Section 8.3.3.2.

8.3.3.1 Tier 3 Monitoring

Tier 3 mitigation projects will be monitored and reported for 5 years at minimum. The required number of years will be determined individually for each annual mitigation program. Monitoring of site conditions will the responsibility of the City or respective partner overseeing a given project. However, it will be the City's responsibility to communicate monitoring results annually as part of the SMP reporting process. SMP annual notification and reporting actions are described in Section 8.6 below and in Chapter 9, Sections 9.6 and 9.8.

Monitoring reports for watershed mitigation projects will include a description of how the project achieved objectives identified in the proposal, how the project is developing over time, and if the

project requires adaptive management or maintenance. More specifically, data to be tracked and collected for watershed mitigation projects includes the following.

- **For erosion control projects.** The status of the erosion control treatments and their effectiveness will be monitored annually. Are the treatments working effectively, is sediment actively eroding at the mitigation site beyond and above expected natural rates, are additional management or maintenance actions required? Photographs will be taken annually at consistent and referenced locations to allow comparisons of site conditions.
- **For planting and habitat enhancement projects.** Monitoring will be performed as prescribed for Tier 1 projects. Success criteria prescribed for Tier 1 projects will also apply to Tier 3 projects.
- **For invasive and exotic removal projects.** Monitoring will include the number and type of invasive trees removed (as applicable), square feet of removal for shrub or ground-cover species (as applicable), and the percent of managed area re-colonized by invasives. The success criteria will define whether the removal project is intended to eradicate or manage an invasive plant population. In addition, the removal sites will be monitored for at least 5 years to verify that the success criteria are successfully met.

8.3.3.2 Partnership Opportunities

The City of Livermore currently partners with a number of groups to support watershed stewardship activities (Living Arroyos Program) and to manage some existing City mitigation projects. These existing relationships provide a strong footing on which to implement the Tier 3 component of the mitigation strategy. Agencies with whom the City current partners are identified below and the anticipated role in Tier 3 mitigation strategy is described. The City may partner with agencies not listed below.

Alameda County Resource Conservation District

The Alameda County Resource Conservation District (ACRCD) partners with the USDA Natural Resources Conservation Service (NRCS) to provide and support natural resource conservation and agricultural enhancement activities in Alameda County. The ACRCD implements its programs through partnerships, education, outreach, resource services, technical assistance, and funding. Resource Conservation Districts (RCDs), including ACRCD, are independent, non-regulatory, special districts of California. They are authorized by Division 9 of the California Public Resources Code to provide resource conservation leadership within district boundaries. They are locally governed agencies with their own appointed, independent boards of directors.

The City has worked with the ACRCD in the past on grant proposals through the Alameda Creek Watershed Network, to review work plans and monitoring reports for the Living Arroyos program, and has contracted with ACRCD to do monitoring of City mitigation sites.

The City plans to continue to expand on this partnership through implementation of the SMP and associated mitigation activities. The City envisions working with the RCD to establish off-site mitigation projects for which the RCD would hold the conservation easement associated with a project. The City may also contract with the RCD for site management and monitoring.

Alameda Creek Watershed Network

In 2009, the City together with eight other Alameda Creek Watershed stakeholders entered into a Letter of Understanding to work together to protect and enhance water related beneficial uses and resources in the Alameda Creek Watershed in order to create a healthy and sustainable watershed for the community. In addition to the City, stakeholders included the Alameda County Flood Control and Water Conservation District, Zone 7 of the Alameda County Flood Control and Water Conservation District (Zone 7), the Alameda County Resource Conservation District, Alameda County Water District, East Bay Regional Park District, LARPD, the Friends of the Arroyo, and the San Francisco Bay RWQCB. Outcomes of this partnership include an annual watershed forum, website updated to provide the public information about projects and activities within the watershed, and the formation and management of the Adopt a Creek Spot Program in Livermore. Currently, the City, Zone 7, LARPD, and the Livermore Valley Joint Unified School District manage ten creek spots coinciding with the identified trash hot spots on their land. Each of these creek spots have been adopted by residents and organizations who pick up trash, monitor the creek, and engage volunteers in creek clean-up, water quality monitoring, and public education projects. Four additional spots will be added to the program in 2015.

Living Arroyos Program

The Living Arroyos Program, initiated in 2013, is a Multi-Party Master Agreement (Agreement) between the City, Urban Creeks Council (UCC), and Zone 7 with the purpose of initiating a public volunteer and apprenticeship program that engages the community in the stewardship of local streams within the Upper Alameda Creek Watershed. As the founding partners, the City, UCC (an urban stream restoration and management nonprofit organization), Zone 7 (local water supply and flood protection agency), seek to increase opportunities for local residents of all ages, with the assistance and guidance of professional staff and apprentices, to engage in hands-on stewardship of natural resource, increase public awareness of important watershed issues, improve habitat and water quality of local streams while maintaining and enhancing both public safety and regional flood protection, and strengthen public/private partnerships within the community.

Zone 7 will be the fiscal agent of the Program during the initial three-year period. UCC will be the managing partner for the implementation of the Program. UCC will carry out Program tasks, and report annually on Program accomplishments. The partners anticipate that other public entities may wish to participate in the Program as well. Presently, UCC contributes a minimum of 50% of the overall Program cost each year, which it will secure from private contributions, government grants, or other sources. The City will contribute 13.3%, and Zone 7 36.7%. The Workplan will be created and approved annually by the partners.

Workplan 2013–14

The first year of the Living Arroyos program features four Projects, which taken together include restoration of nearly 1.5 miles of stream and more than 13 acres of riparian habitat. Three of the proposed projects are Partner Projects: Arroyo Las Positas at Airway Boulevard, Arroyo Las Positas at Bluebell, and Arroyo Mocho—Stanley Reach. The fourth, Stoneridge Drive Bridge, was proposed by the Alameda County Surplus Property Authority. The program personnel will include volunteers, apprentices, and staff. The Workplan includes a minimum of 32 volunteer workdays and will be targeted at the general public. Apprentices from Las Positas College (LPC) will assist in a variety of tasks including managing volunteer workdays, planting project sites, and collecting scientific data.

Staff will include a program manager, senior ecologist, and program coordinator. The complete Workplan includes other activities in support of the program, a detailed budget, rates, personnel roles and responsibilities, and a timeline.

8.4 Mitigation Ratios

Mitigation ratios are defined for three resource areas: waters of the U.S. and State, riparian vegetation, and focal species. Mitigation ratios for each resource area are described below. The mitigation ratios described below will be met through implementation of projects using the three-tiered approach as described in Section 8.3.

Mitigation ratios are defined for temporary and permanent impacts. Temporary impacts occur if the site is restored to pre-project or better condition within one year of construction completion. A determination of project conditions will be made based on an evaluation of the functions and values of the reach affected by the activity in the context of the resource being affected.

Permanent impacts are impacts that are not temporary (i.e., do not return to pre-project or better condition within a year of construction completion). Permanent impacts are generally only anticipated in locations where new hardscape is placed (e.g., a bank stabilization that requires use of rock rip-rap). Permanent impacts may also accrue over time if a specific site is maintained so often that the implementation of temporary mitigation eventually equals the amount of mitigation that would have been required if the site had only been impacted one time but with a permanent impact. Mitigation is not required for sites that have already been attributed with a permanent impact; however, SMP BMPs (Table 7-1) will continue to be required for subsequent maintenance activities at the site.

Mitigation for one resource area (waters, riparian, or focal species) may be designed in such a way that it can address other resource mitigation needs. In such cases, the same restoration, creation, and preservation actions and acreages may be used to meet multiple mitigation needs and are not additive. An example of how this could be applied is provided in Section 8.4.3.

8.4.1 Waters of the U.S. and State

In order to ensure that implementation of the SMP results in no net loss of waters of the U.S. or state as measured by both acres and linear feet, mitigation for such impacts is required. The amount of mitigation required depends on if the impact is temporary or permanent.

The permanent mitigation ratio for impacts to waters of the U.S. or state will be 1.5:1 (mitigation to impact). Temporary impacts to waters of the U.S. or state will be mitigated at a ratio of 1.1:1 (mitigation to impact) through enhancement of the project site following the impacting SMP activity based on the three-tiered mitigation approach. If the site does not allow sufficient space to mitigate temporary impacts, the Tier 2 mitigation approach will be applied (i.e., off-site mitigation). Mitigation actions will ensure that the functions and values of the stream reach are improved over pre-project conditions.

8.4.2 Riparian Vegetation

In order to ensure that implementation of the SMP results in no net loss of riparian vegetation functions and values, the City will mitigate for permanent impacts to riparian vegetation through restoration, creation, and/or preservation of riparian vegetation. Restoration, creation, and preservation opportunities within the SMP Area include areas along the stream reaches covered by the SMP. The mitigation ratio for permanent impacts will be 1.5:1 (mitigation to impact). This ratio applies to impacts to in-channel (the channel banks and creek bed), non-invasive riparian vegetation (see Table 5-1 for a list of Cal-ICP invasive species).

Temporary impacts to riparian vegetation will be mitigated at a ratio of 1.1:1 (mitigation to impact) following the impacting SMP activity based on the three-tiered mitigation approach.

8.4.3 Focal Species

Table 8-4 provides temporary and permanent impact mitigation ratios to compensate for impacts to focal species if impacts cannot be avoided by implementation of the SMP Maintenance Principals (Chapter 4) and SMP BMPs (Table 7-1). Species-specific mitigation ratios are provided for special-status species including longhorn fairy shrimp, vernal pool fairy shrimp, Callippe silverspot butterfly, California red-legged frog, California tiger salamander, golden eagle, tricolored blackbird, western burrowing owl, American badger, San Joaquin kit fox, San Joaquin spearscale, Congdon's tarplant, palmate-bracted bird's-beak, and Livermore tarplant (Table 8-4). Permanent impact mitigation needs will be met by replacement of habitat affected. For example, if a bank stabilization project results in a permanent loss of 0.02 acre seasonal wetland and a temporary loss of 0.3 acre California annual grassland in an area where California red-legged frog are assumed to be located (but outside critical habitat), then 0.06 acre of seasonal wetland would need to be created (at a 3:1 ratio) and 0.3 acre of California annual grassland would need to be protected (at a 1:1 ratio). This mitigation would address both the wetland impact and the impact to the California red-legged frog. Species mitigation may also be met through the purchase of mitigation credits at an approved mitigation bank that serves the area in which the impact occurs.

Temporary impact ratios for focal species are one-third of the permanent impact ratio, and mitigation needs will be met in the same way as permanent impacts through restoration, creation, and protection, or purchase of mitigation credits. Mitigation for temporary impacts will be required every time focal species habitat is affected, up to three times in the same location. Once a site has been mitigated three times over, the total mitigation for that site over time will be equal to the mitigation ratio for permanent impacts to species and their habitat. As such, once a site has been temporarily impacted three times, and mitigation for the same site has accrued to the equivalent of a permanent impact to species habitat, the site is assumed to be permanently impacted and no further species mitigation is required even if the site is maintained one or more times thereafter. SMP BMPs (Table 7-1) will continue to be applied to future projects regardless of the number of times a site has been impacted.

8.5 Mitigation Timing

The SMP mitigation activities will be implemented within a short time period following the SMP activities themselves (typically at the end of the maintenance season to take advantage of the wet

season to support new plantings, but no more than one year from conclusion of the maintenance season). The following requirements will be met before impacts are allowed to occur:

- The mitigation plan, including schedule for implementation, shall be approved;
- Ownership or demonstrated authority to implement mitigation at the mitigation site shall be obtained; and
- Financial assurances to construct and maintain the mitigation site shall be established.

All of these criteria will be met by mitigation projects conducted under the SMP. As described in more detail below, contractual arrangements and financial assurances will be provided, all mitigation plans will be approved by the relevant regulatory agencies, and mitigation projects will be monitored for success, and remedial actions taken if necessary.

SMP mitigation will be occurring annually as an ongoing program. As such, the ecological benefits of mitigation activities will accrue on a continual basis. The mitigation monitoring and reporting program will provide feedback on the effectiveness of mitigation efforts to inform and improve future mitigation.

Certain mitigation projects may exceed that needed for a given year's portfolio of projects, and may be banked for future years with advance approval from USACE, USFWS, CDFW, and San Francisco Bay RWQCB. In these cases, the impacts of future SMP will have implemented advance mitigation.

8.6 Mitigation Notification and Reporting

Notification and reporting details for the overall program are described in Chapter 9, Sections 9.6 and 9.8. An annual mitigation plan will be developed as part of the maintenance project work plan notification, submitted by the City to the permitting agencies in the spring of each year. This notification (Section 9.6) will include a description of maintenance project details, including locations, activities, and impact avoidance and minimization measures. The notification packet will also include information regarding the annual mitigation plan.

Mitigation information to be included in the annual notification packet will include the following.

- A description of Tier 1 activities including locations, lengths, areas, and other project details.
- A description of Tier 2 activities (if occurring) on other SMP Area channels including locations, lengths, areas, and other project details.
- The proposed Tier 3 watershed mitigation plan, including:
    - a description of each candidate restoration project, including the project name, project partners, project cost, length and area of mitigating activities;
    - a description of how the proposed watershed projects will address watershed processes and functions to provide suitable mitigation for the year's maintenance activities (relating the temporal loss to be addressed through the watershed mitigation);
    - schedule for implementation of mitigation activities; and
    - a statement describing the status of permit approvals necessary to perform project (if applicable).

- A monitoring and reporting plan including success criteria for mitigation sites (up to 10 years for some riparian tree restoration programs).

Permitting agencies will have the opportunity to review and comment on the proposed annual mitigation plan. The SMP annual mitigation plans will be consistent with the mitigation approaches and requirements described in this SMP Manual.

In the fall of each year, the City will submit an annual report on SMP activities including summary descriptions of the maintenance activities conducted in the past year. The annual report will also include status reporting on the program's mitigation activities, including the submittal of follow up monitoring reports.

Table 8-1. Regulatory Agencies and Relevant Jurisdictions

Agency	Regulatory Authority	Geographic Extent of Jurisdiction	Trigger for Permitting	Are SMP Activities under Agency's Jurisdiction?							
				Sediment Removal	Bank Stabilization	Vegetation Management	Bridge Maintenance	Culvert Repair and Replacement	Habitat Restoration and Landscape Maintenance	Access Road and Trail Maintenance	Trash and Debris Removal
USACE and San Francisco Bay RWQCB	Clean Water Act Sections 404 and 401	Waters of the United States; for the purposes of the SMP, this will primarily be areas below the Ordinary High Water Mark.	Placement of dredge or fill materials within waters of the United States.	Yes, where riprap placed at storm drain outlets. Also possible, where temporary fill to Waters of the United States (e.g., coffer dams for dewatering) is necessary.	Yes	Yes	Yes	Yes	Yes	Yes, where maintenance of access roads and trails involve temporary or permanent fill to waters of the United States and/or waters of the State.	Yes
San Francisco Bay RWQCB	Clean Water Act Section 402 and the Porter-Cologne Water Quality Control Act	Waters of the State; for the purposes of the SMP, this will primarily be areas below Top of Bank.	Discharge of waste that could adversely affect the quality of waters of the State.	Yes	Yes	Yes	Yes	Yes	Yes	Yes, where maintenance activities could result in discharges within or that could reach waters of the State (e.g., herbicide use, grading activities).	Yes
CDFW	Fish and Game Code Section 1600 et seq.	Rivers, streams, or lakes that flow at least intermittently through a bed or channel.	Activities that will: • substantially divert or obstruct the natural flow of any river, stream or lake; • substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake; or • 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.	Yes	Yes	Yes	Yes	Yes	Yes	Yes, where maintenance activities could result in impacts to bed or channel of a river, stream, or lake.	Yes
CDFW	CESA	Defined by suitable habitat for species listed as threatened or endangered under CESA.	Activities with potential for take of species listed as threatened or endangered under CESA.	Yes, where activities could result in take of listed species.							
USFWS	ESA	Defined by suitable habitat for species listed as threatened or endangered under ESA.	Activities with potential for effect to species listed as threatened or endangered or to critical habitat under ESA.	Yes, where activities could result in effects to listed species or critical habitat.							

Table 8-2. SMP Preferred Plant Palette

Scientific Name	Common Name	Planting Area/Zone
Trees		
Aesculus californica	Buckeye	Upper Bank
Juglans hindsii	California black walnut	Mid to Upper Bank
Platanus racemosa	California sycamore	Toe to Upper Bank
Populus fremontii	Fremont cottonwood	Toe to Upper Bank
Quercus agrifolia	Coast live oak	Upper Bank
Quercus douglasii	Blue oak	Upper Bank
Quercus lobata	Valley oak	Mid to Upper Bank
Salix laevigata	Red willow	Toe to Mid Bank
Salix lasiandra	Pacific willow	Toe to Mid Bank
Salix lasiolepis	Arroyo willow	Toe to Mid Bank
Shrubs		
Asclepias fascicularis	Narrow leaf milkweed	Toe to Upper Bank
Baccharis salicifolia	Mule fat	Toe to Mid Bank
Frangula californica	California coffeeberry	Mid to Upper Bank
Grindelia hirsutula	Hairy gumplant	Toe to Upper Bank
Grindelia stricta	Gumweed	Toe to Upper Bank
Heteromeles arbutifolia	Toyon	Upper Bank
Sambucus Mexicana	Blue elderberry	Mid to Upper Bank
Grasses/Sedges/Ferns		
Agrostis exarata	Spike bentgrass	In-Channel to Mid Bank
Artemesia douglasiana	California mugwort	Toe to Upper Bank
Baccharis glutinosa	Marsh baccharis	Toe
Bromus carinatus	California brome	Toe to Upper Bank
Calamagrostis nutkaensis	Pacific reedgrass	In-Channel
Carex barbarae	Santa Barbara sedge	Toe to Upper Bank
Carex densa	Dense sedge	Toe
Carex gracilior	Slender sedge	Toe
Carex nudata	Naked sedge	In-Channel to Toe
Carex praegracilis	Field sedge	Toe
Cyperus eragrostis	Tall flatsedge	In-Channel to Toe
Deschampsia cespitosa	Tufted hair grass	Toe to Mid Bank
Distichlis spicata	Saltgrass	Toe to Mid Bank
Eleocharis macrostachya	Common Spikerush	In-Channel to Toe
Elymus trachycaulus	Slender wheatgrass	Toe to Upper Bank
Elymus triticoides	Beardless wild rye	Toe to Upper Bank
Equisetum laevigatum	Smooth scouring rush	Toe to Mid Bank
Euthamia occidentalis	Western goldenrod	Toe to Mid Bank
Festuca microstachys	Small fescue	Mid to Upper Bank
Helenium puberulum	Sneezeweed	In-Channel to Mid Bank
Hoita macrostachya	Leather root	Mid Bank
Hordeum brachyantherum	Meadow barley	Toe to Upper Bank
Isolepis cernua	Low bulrush	Toe to In-Channel
Juncus balticus	Baltic rush	In-Channel to Mid Bank
Juncus effuses	Soft rush	Toe to Mid Bank
Juncus mexicanus	Mexican rush	In-Channel to Toe
Juncus patens	Spreading rush	Toe
Juncus xiphioides	Irisleaf rush	Toe
Schoenoplectus acutus	Hardstem bulrush	In-Channel to Toe
Schoenoplectus californicus	California bulrush	In-Channel to Toe
Vines		
Rosa californica	California wild rose	Toe to Upper Bank
Rubus ursinus	California blackberry	Toe to Mid Bank
Vitis californica	California wild grape	Toe to Mid Bank

Table 8-3. Performance Standards and Success Criteria for Mitigation Plantings

Monitoring Parameter	Year	Performance Standard	Success Criterion
Wetland Plantings			
Vegetative Cover	1–4	Demonstrate trend of increasing cover and species dominance	
	5		75% cover of wetland species with a dominance of native wetland species
Riparian Plantings			
Plant Survival (percentage of plants in good or fair condition)	1	90%	
	2	85%	
	3	80%	
	4	75%	
	5		75%
Plant Vigor	1–5	Surviving plants must be in good or fair condition	Surviving plants must be in good or fair condition
Vegetative Cover (riparian trees only)	6–9	Demonstrate trend of increasing cover	
	10		75% canopy cover of riparian tree species with a dominance of native riparian woody species

Table 8-4. Focal Species Mitigation Ratios

Species	Scientific Name	Mitigation Ratios (Acres of Mitigation to Acres of Impact)	
		Temporary Impacts	Permanent Impacts
Invertebrates			
Longhorn fairy shrimp	*Branchinecta longiantenna*	3:1 (2 acres preservation, 1 acre restoration)	10:1 (6.5 acres preservation, 3.5 acres restoration)
Vernal pool fairy shrimp	*Branchinecta lynchi*	3:1 (2 acres preservation, 1 acre restoration)	10:1 (6.5 acres preservation, 3.5 acres restoration)
Callippe silverspot butterfly	*Speyeria callippe callippe*	1:1	3.5:1
Amphibians			
California tiger salamander	*Ambystoma californiense*	1:1 outside Critical Habitat, 2:1 inside Critical Habitat	3.25:1 outside Critical Habitat, 6.5:1 inside Critical Habitat
California red-legged frog	*Rana draytonii*	1:1 outside of Critical Habitat, 2:1 inside of Critical Habitat	3:1 outside of Critical Habitat, 6:1 inside of Critical Habitat
Birds			
Golden eagle	*Aquila chrysaetos*	1:1	3.5:1
Tricolored blackbird	*Agelaius tricolor*	1:1	3.5:1
Western burrowing owl	*Athene cunicularia hypugea*	1:1	3.5:1
Mammals			
American badger	*Taxidea taxus*	1:1	3:1
San Joaquin kit fox	*Vulpes macrotis mutica*	1:1	3:1
Plants			
San Joaquin spearscale	*Atriplex joaquiniana*	1:1	5:1
Congdon's tarplant	*Centromadia parryi* ssp. *congdonii*	1:1	5:1
Palmate-bracted bird's-beak	*Cordylanthus palmatus*	1:1	5:1
Livermore tarplant	*Deinandra bacigalupii*	1:1	5:1

Chapter 9
Program Management

9.1 Stream Maintenance Program Work Cycle

This chapter outlines and describes how the SMP will be implemented and administered by the City. The management and operation of the SMP occurs as an annual cycle of activities described in this chapter as the "work cycle." The work cycle begins each year with a field based creek and channel reconnaissance and assessment. The components of the SMP work cycle are described in greater detail in the sections below.

The work cycle begins with the SMP Area-wide creek and channel assessment. The creek and channel assessment guides the development of that year's work plan. Projects such as vegetation maintenance, localized sediment removal at culvert crossings, or minor bank repairs do not generally require additional engineering or design details. Such routine maintenance activities which do not require additional engineering design represents the large majority of SMP projects. Reach-scale sediment removal projects or some larger scale restoration projects may require site assessment and/or detailed engineering drawings. In these cases, the physical site conditions, erosion or deposition causes, and the maintenance requirements will guide the appropriate project design. As described previously in Chapter 7, activities or projects that require this level of analysis and engineering will be designed with a consideration of sustainable solutions that can reduce future maintenance needs.

Sediment disposal planning will also occur in the work cycle, with annual disposal plans developed and implemented yearly in support of planned maintenance projects. All maintenance activities will utilize the appropriate programmatic impact avoidance, minimization, and mitigation programs outlined in this SMP manual.

Creek and channel reconnaissance and assessment begins in late winter or early spring with the development of the annual work plan. Project descriptions are then developed, and mitigation planning occurs through the remainder of the spring. The relevant regulatory agencies are notified of the year's projects in mid-spring and provided information on project locations, activities, mitigation, sediment disposal, and any other key issues.

Projects are then implemented during the summer and early fall seasons with follow up annual reporting activities occurring in the late fall. The City will administer and oversee the SMP throughout all steps of the work cycle. It is recognized that a successful program will be based on continuous management and oversight. The City has designated an SMP Manager who has responsibility to supervise and guide the program. A key responsibility for the SMP Manager will be to provide communication and coordination between the City and the regulatory agencies throughout all steps of the work cycle. The SMP will be administered consistently with the goals, principles, and activities as described in this SMP manual. In addition to the annual work cycle, every five years the SMP will be reviewed for its overall effectiveness and adequacy.

Another key element to supporting an effective stream maintenance program is to establish and maintain a comprehensive data management system. Data management is required throughout the SMP work cycle from organizing the initial creek and channel assessment, to charting reach

conditions and project requirements, to providing post project monitoring and reporting. Data management for the SMP is described below in Section 9.9.

9.2 Creek and Channel Reconnaissance and Assessment

In the late winter or early spring, the City will initiate a reconnaissance of the stormwater drainage system included in the SMP on a reach-by-reach basis to assess potential maintenance needs.

City staff familiar with the guidelines and principles of the SMP will conduct the creek and channel assessments. The City will use an assessment checklist to help organize and prioritize maintenance activities.

The assessment process will evaluate the need for maintenance and follow the guidance questions and maintenance triggers described in Chapter 4. Conditions and resources will be assessed in terms of the potential need for sediment removal, vegetation management, or bank stabilization. Assessment categories will receive rankings ranging from 1 (high priority) to 4 (low priority). Creek and channel vegetation conditions will be assessed for the presence of cattails, willows, exotics, etc. and need for vegetation removal or management. Photographs will be taken of each reach and archived in the SMP database. The creek and channel assessment process will also be supported by information provided by geographic information system (GIS) mapping and aerial photography.

Information from the completed assessment checklist will be integrated into an SMP data management system ("SMP Tracker"). The data system will be accessed during the creek and channel assessment process to query past maintenance activities, identify specific resource conditions, and prioritize maintenance activities by reach to develop the year's work plan.

Based on the field reconnaissance, completion of the reach assessment checklist, and subsequent prioritization using the SMP database, an initial listing of reaches requiring maintenance for the current work cycle will be compiled.

9.3 Develop Annual Work Plan

The preliminary list of project sites developed during the reconnaissance process will be reviewed and further prioritized based on:

- guidance provided by SMP Maintenance Principles (Chapter 4);
- the relative severity of reach conditions and need for maintenance;
- SMP framing considerations, management goals, and management triggers, as described under the corresponding approach in Chapter 4;
- consideration of past/recent flooding conditions;
- City's overall maintenance needs in the SMP Area; and
- available funding.

Following this prioritization, the SMP program manager will consolidate the list of potential projects into a smaller set of projects to serve as the work plan for the given year. Projects that are marked as low priority and not included in the current cycle's work plan will be noted for inspection and assessment during the next work cycle. The City will not be obligated to perform annual maintenance.

Maintenance activities are expected to generate from 1,000 to 2,000 cubic yards of sediment and debris per year. Selection of disposal sites will also occur as part of planning efforts. Following the approach described in Chapter 4, the work plan will identify disposal locations available for use in the given year and the associated criteria for disposal at those locations. A preferred location and alternate locations may be identified to allow disposal flexibility.

9.4 Develop Annual Summary Project Description

Following the analysis of site context and the development of treatment designs, a summary project description will be developed for each sediment removal or vegetation management project. The project description serves as the formal characterization of project activities and supports permitting requirements. The project description will include the following information:

- Project type (e.g., sediment removal, vegetation removal, or bank stabilization work)
- Project location address and/or location description
- Project site map
- Short description of activities including treatments selected, equipment used, access, staging, etc. If activities will be conducted differently from the activity description in Chapter 5, identify differences and provide an explanation of why the different approach is required.
- Short description of why the selected treatment is appropriate for the reach (e.g., sinuous low-flow channel in areas where such design is appropriate to transport sediment and provide aquatic habitats).
- Linear feet of creek and acres of creek or channel that will be disturbed by activities.
- Acres of waters of the United States and waters of the State that will be affected.
- For sediment removal projects, identify quantity of sediment to be removed and provide cross section of existing creek or channel condition vs. as-built condition.
- For bank stabilization projects, identify how much material will be placed in the bank slope.
- For all projects, identify how much sediment and other debris requires disposal.
- Identify sediment sampling locations on a map. Four samples per site will be collected and analyzed for every 20,000 cubic yards of material removed. This does not apply to gravel.
- Test the sediment samples according to the acceptance criteria for the disposal sites. Based on results from the sediment samples, select the final sediment disposal sites and identify the available capacity at each site. Also, identify the routes for transport from the maintenance sites to the disposal sites.
- Identify the routes for transport from the maintenance sites to the disposal sites.

- Any appropriate figures including cross sections, design details of structures to be maintained, and plan view maps for activities as appropriate.
- Evaluation of anticipated impacts to focal species.
- Additional cultural resource information, if needed.
- A brief summary of the activity-specific BMPs that will be utilized in the project, including BMPs for sediment handling, transport, and disposal activities.

9.5 Develop Annual Mitigation Plan

If mitigation is required for the proposed projects in a given work cycle, the mitigation plan will describe the on-site and off-site planned mitigation activities for that cycle. The mitigation plan will include the topics described in Chapter 8, Section 8.6 regarding the information to be notified to the regulatory agencies. This information includes the following.

- A description of on-site (Tier 1) restoration activities planned for the coming year including locations, lengths, areas, and other project details.
- A description of Tier 2 restoration activities (if occurring) on other City creeks and channels planned for the coming year including locations, lengths, areas, and other project details.
- The proposed off-site watershed mitigation plan (Tier 3), including:
    - a description of each candidate off-site restoration project, including the project name, project partners, project cost, length and area of mitigating activities;
    - a description of how the proposed off-site watershed projects will address watershed processes and functions to provide suitable mitigation for the year's maintenance activities (relating the temporal impacts that are to be addressed through the watershed mitigation as described above to the proposed projects);
    - schedule for implementation of mitigation activities; and
    - a statement describing the status of permit approvals necessary to perform project (if applicable).
- A monitoring and reporting plan.

As described in Section 8.6, permitting agencies will have the opportunity to review and comment on the proposed annual mitigation plan. The SMP annual mitigation plans will be consistent with the mitigation approaches and requirements described in this manual.

9.6 Agency Notification

During spring, by April 15th, the City will notify the relevant regulatory agencies about the planned projects for that year's work plan through submittal of a work plan notification packet. The notification packet will contain the work plan, project descriptions, and supporting materials described above in Section 9.4. The notification packet will also contain a cover letter directing each regulatory agency to the projects and project descriptions that fall within their jurisdiction. This notification packet will contain a complete project list (i.e., the work plan) including vegetation

management planned for creeks and channels. The notification packet will include details of the annual mitigation plan as described above and in Section 9.5.

The notification packet will also provide details if any of the planned maintenance activities should deviate from the description of routine activities as described in this manual. If such deviations are anticipated to implement the annual work plan, then they will be described in detail along with any relevant impact avoidance measures, BMPs, or mitigation considerations that are necessary. Similarly, if during the implementation of maintenance activities, something arises during the course of executing the maintenance work that requires a different treatment or approach than described in the notification package, then the SMP Manager will send an updated notification to the relevant agencies with this project change.

The regulatory agencies will have 60-days to review the notification packets and will respond back to the City by June 15th to confirm the annual work plan and provide a notice to proceed. The City SMP Manager will also invite agency representatives to a pre-implementation field tour and meeting. The purpose of this field tour will be to ensure understanding by the regulatory agency staff of the project setting and scope of maintenance activities for the given year. Any residual questions regarding the submitted notification packet can be addressed during this meeting or through subsequent communication and information exchange.

9.7 Project Implementation

Once the City receives a notice to proceed from the relevant regulatory agencies, maintenance activities may be initiated. All maintenance activities will be conducted in accordance with the project description, program-wide and activity-specific BMPs, and terms of the SMP programmatic permits. This includes conducting preconstruction surveys for fish and wildlife and other resources if activities may affect these resources.

An on-site project supervisor trained in the SMP Manual will oversee and guide all maintenance activities and will ensure that the proper Maintenance Principles and avoidance and minimization approaches as described in Chapters 4 and 7 are employed. When projects are implemented, data will be collected at the project site prior to, and immediately after, project implementation. Data collected will include before and after photos, cross section surveys after sediment removal is conducted, quantification of material removed (for sediment removal projects) or placed (for bank stabilization projects), length of creek or channel maintained, sensitive species or other resources encountered at the site during preconstruction surveys or during project implementation, quantity, characteristics, and location of any debris disposed off-site, and any additional information as required to update the SMP database. Recording and monitoring data collected following project implementation will be collected within seven working days of final maintenance activities.

9.8 Annual Reporting

At the conclusion of the maintenance season (soon after October 31st), the City will send the relevant regulatory agencies a summary announcement describing the work plan status and confirming which projects from the work plan were completed in the maintenance period. During the fall, the City will also develop an annual report describing the maintenance activities recently conducted in

the previous work period. This annual report will be submitted to the relevant regulatory agencies by December 15th. The report will include the following information:

- The extent to which the work plan was completed (i.e., identify projects that were or were not implemented). If projects were not implemented, note why and if the project will be incorporated into the following year's work plan or if the project will be placed on a watch list.
- If activities were conducted according to the project description, and if not, how the actual project varied from the project description.
- Site photos before and after project completion.
- GIS data showing total footprint of project, and areas of permanent and temporary impact.
- Total length of creek or channel that was maintained for the individual projects in the work plan.
- How much sediment and vegetation was removed and acres affected, if applicable.
- How much material was placed on-site and acres affected, if applicable.
- How much material was disposed off-site, disposal locations, and acres affected, if applicable.
- If any species or other sensitive resources were encountered during construction and if so, what impact avoidance steps the City took in response.
- A brief description of on-site and off-site mitigation enacted.
- A summary of required reporting for recent and past mitigation activities.
- A brief description of site monitoring.
- Any lessons learned from that year's activities including treatments that were not effective, administrative difficulties, and proposed steps to facilitate the process.
- Recommended updates (if any) to the BMPs identified in the BMP Manual.

Following submittal of the annual report, the City's SMP Manager will invite regulatory agency staff to a summary meeting to discuss the events, maintenance activities, and lessons learned over the past work cycle. This meeting may also include a site visit to see the project sites after project completion. In this way, the SMP manger can adaptively manage and improve program effectiveness based on past experience. The annual report will also include status reporting on the program's mitigation activities, including the submittal of follow up monitoring reports. Topics to be addressed in the monitoring reports are described in Chapter 8, Section 8.6.

At the conclusion of the annual work cycle, the City shall also update and verify the SMP database, and the BMP list (Table 7-1) as appropriate to include any updates or changes made over the recent work cycle. In this way, developing the following year's work plan will be built on updated information across the program.

9.9 Data Management

Data collection and monitoring efforts are critical to measuring the success of SMP implementation. In order to properly track the progress of management activities towards achieving the SMP's goals and compliance with programmatic permit conditions, a database will be created. This database will

serve as the central storage location for multiple types of information gathered as part of annual and long-term SMP implementation.

The following data will be collected or updated at various stages in the implementation process:

- GIS reach mapping
- maintenance activities to date
- BMP tracking
- pre- and post-project photos
- creek/channel characterizations
- creek/channel cross sections
- mitigation projects
- sediment disposal sites
- specific data required by permits
- notification packages
- annual reports

Data or documentation of the maintenance projects will be entered into the SMP database during each cycle of the work plan, as described in Section 9.1 above.

The SMP database will serve as an important tool for the SMP Manager. The database will contain back-up technical information documentation for the agency notification packages and annual reports. The SMP database will include checklists to ensure all conditions of programmatic permits are met. As described in Chapters 4 and 7, SMP implementation requires tracking of important items or tasks to protect sensitive species and for permit compliance, such as pre-construction survey dates, meeting the terms and conditions of the issued Biological Opinion, and tabulating annual mitigation funding and implementation.

The SMP database will ensure this information is gathered, used, and documented to meet permit compliance. The regulatory agencies will receive the necessary information on the maintenance activities (based on the permit requirements and the description of activities in this manual). Information saved in the database will also provide insight into future SMP updates, as discussed in Section 9.10 below.

9.10 Five-Year Program Review

Every 5 years, the City and the relevant regulatory agencies will review the Stream Maintenance Program for its overall effectiveness. This review will include an assessment of maintenance activities conducted to date, BMPs employed, adequacy of the SMP Mitigation Program, SMP data management, adequacy of SMP adaptive updates and revisions, and overall program coordination and communication between the City and the regulatory agencies. The SMP Manager will collect and organize the above review information and provide a summary report to the regulatory agencies. These findings will be discussed with the regulatory agencies at a collective meeting and at individual agency meetings as necessary. As a result of these discussions, potential program changes

or updates shall be integrated into the SMP Manual through an addendum or revision process. The updated SMP Manual will be redistributed to regulatory agencies. SMP program changes or updates made at the 5-year reviews may require additional CEQA review. SMP Manual revisions may also require an updating of permit terms, which would occur through a collaborative process between the City and the relevant permitting agencies.

Chapter 10
Literature Cited

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Appendix A

Figures