

Attachment 3

Work Plan

1. Introduction

1.1 Goals and Objectives of City Watersheds of Sonoma Valley – Phase 1

The Sonoma County Water Agency, in partnership with the Sonoma County Agricultural Preservation and Open Space District, Sonoma Ecology Center, and the City of Sonoma, proposes to implement a regionally integrated project in the Fryer Creek sub-watershed of the Sonoma Creek watershed between West MacArthur Street north to the Montini Open Space Preserve in the City of Sonoma. This public-private partnership intends to accomplish the following objectives:

- Alleviate flooding within the Fryer Creek sub-watershed and contain the 10-year storm event (10% chance of occurrence event) along the mainstem of Fryer Creek by diverting stormwater to a 12-acre-foot multi-use detention basin on the Montini Open Space Preserve, replacing a flood-prone culvert at MacArthur Street, and improving channel capacity through strategic [vegetative] habitat enhancement.
- Enhance groundwater recharge and water supply reliability.
- Provide ecosystem benefits through habitat restoration/enhancement on various reaches of Fryer Creek, including removal of a fish passage barrier at MacArthur Street that is identified in the draft Steelhead Recovery Plan as requiring removal.
- Enhance public recreational and educational opportunities by adding 1.8 miles of new trails, an ADA spur, and interpretive elements relating to stormwater detention and groundwater recharge at Montini Open Space Preserve.

In this proposal, site-appropriate flood protection is balanced with environmental stewardship, cost, and community benefit. Surface water quality will be protected and enhanced. The project will improve flood protection, reduce downstream sediment deposits, recharge groundwater, improve groundwater supply reliability, improve fish passage, and create a site for public access and education about hydrology and watershed geomorphic processes.

The proposed project is the first phase of a broader project listed in the San Francisco Bay Area Integrated Regional Water Management Plan called **City Watersheds of Sonoma Valley**. The City Watersheds project, which ranked ninth out of 315 projects listed in the IRWMP, is focused on benefitting the Nathanson/Fryer Creek watersheds within and around the City of Sonoma, which together cover approximately 80% of the geographic area of the City of Sonoma. The currently proposed phase of City Watersheds (Phase 1)-- for which Prop 1E grant funding is being sought-- focuses primarily within the Fryer Creek sub-watershed. Future phases of City Watersheds are anticipated to include more project elements within the Nathanson

Creek sub-watershed and eventually integrate with a broader program for the entire Sonoma Valley.

1.2 Purpose and Need of the Project

The City Watershed project will provide flood protection, water supply, and water quality benefits within the City of Sonoma. The goal of this multi-element project is to meet the water management needs of the community while improving watershed function by enhancing the connection between surface and groundwater systems. A primary impetus for this effort was the development of the Sonoma Valley Groundwater Management Plan, a voluntary, non-regulatory plan that identifies actions needed to develop sustainable groundwater supplies in the Sonoma Valley.

The objectives of Phase 1 of the City Watersheds project are to:

- Alleviate flooding within the Fryer Creek subwatershed and contain, at a minimum, the 10-year storm event (10% chance of occurrence event) along the mainstem of Fryer Creek.
- Enhance groundwater recharge and water supply reliability
- Provide ecological benefits through habitat restoration/enhancement
- Enhance public recreational and educational opportunities

Over the past 50 years, the Sonoma Valley has experienced rapid population growth and land use changes. This project is designed to address multiple interlocking water-related problems arising from these changes. The problems include groundwater aquifer decline (such as lowered groundwater levels, salt water intrusion, and groundwater intrusion), flooding and sedimentation resulting from changes to runoff patterns, dependence on water imported from the Russian River, and severe declines in riparian forest, anadromous steelhead and salmon, and other aquatic-dependent species and habitats.

Principal causes of flooding in the City of Sonoma are perched channel conditions, encroachment of development onto floodplains, and inadequately-sized storm drainage infrastructure such as bridges and culverts. The City of Sonoma is built on the alluvial fan deposited by Nathanson Creek, Arroyo Seco, and Fryer Creek. Through years of flooding and sediment deposition, the banks of some creeks have formed natural levees. Floodplains adjacent to streams with natural levees gently slope away from the stream channel, resulting in banks that are higher than in surrounding development. As a result, when these channels overtop their banks, floods can inundate a large area.

There are a number of sources of flooding in the Fryer Creek watershed; primarily these are flows overtopping creek banks, insufficient capacity in parts of the storm drain system, and clogged storm drain inlets. Flooding generally results in overland flow, localized ponding, and street flooding that affects not only residences in the area, but retail establishments, businesses, Sonoma Valley Hospital, and a portion of Highway 12. Areas of localized flooding result from Fryer Creek not being able to contain the 10-year, 24-hour event within its banks. More extensive flooding occurs during less frequent, higher magnitude events.

The December 31, 2005 flood of record in the Sonoma Creek basin was a catalyst in heightening local awareness of existing flood hazards and the need to develop a reliable foundation for land use and flood management planning, as several million dollars' worth of damage was incurred, including \$2.4 million in the City of Sonoma. The City Watersheds of Sonoma Valley project will address flood hazard reduction, water supply, water quality, habitat and ecosystem function, and climate change resilience goals within the City of Sonoma. Most of the Sonoma Creek watershed is designated as Critical Habitat for Central Coast Steelhead (NOAA) and is listed as water quality-impaired for sediment by the Regional Water Quality Control Board. The opportunities to enhance Sonoma Creek and its tributaries so as to make real differences for water quality and this federally-listed threatened species are tremendous in this relatively rural watershed, tributary to San Francisco Bay.

1.3 Integrated Regional Water Management Plan Goals and Objectives

The San Francisco Bay Area Integrated Regional Water Management Plan (BAIRWMP) was adopted in 2006 by the governing bodies of 24 agencies and entities that were signatories to the original Memorandum of Understanding (MOU). Appendix B-3 of the BAIRWMP is the *Flood Protection and Stormwater Management Service Function Area Component*, and its purpose is to address the major flood protection and stormwater management objectives for watersheds in the region, including identifying opportunities and efficiencies possible by working collaboratively within the region towards a multi-benefit, multi-beneficiary management of resources.

The City Watersheds Project meets the goals and objectives of the BAIRWMP in the following ways:

1. The combined stormwater detention and groundwater recharge basin will capture and detain/retain direct storm water surface runoff and avoid a costly storm drain diversion to Sonoma Creek.
2. Culvert replacement will increase flow capacity, as will habitat enhancement and invasive species removal.
3. Multiple reach improvements will reduce 10-year flood hazard in multiple locations. Culvert replacement will reduce existing ponding conditions, flood hazards, and sediment deposits.
4. The habitat enhancement and invasive species removal will protect and enhance wetlands, streams, and riparian areas by controlling bed and bank erosion and managing sedimentation, protecting and recovering fish populations, improving floodplain connectivity, enhancing ecological structural complexity, improving natural filtration of point and non-point-source pollutants, protecting wildlife corridors, preserving perviousness and maintaining the health of upland soil and vegetation to reduce runoff quantity and improve runoff quality, and managing pests and invasive species.

1.4 Project Element Table

Project Element	Abstract	Design Completion Percent	Implementing Agency
Storm Drain Master Plan (SDMP)	The City of Sonoma Storm Drain Master Plan describes the performance of the existing storm drain system and the capital improvement projects needed to address a significant portion of the 10, 25- and 100-year flooding throughout the City. Projects that target the Fryer Creek stormdrain system include: 1) a diversion of stormdrain flows directly to Sonoma Creek and 2) replacement of the MacArthur culvert.	100%	City of Sonoma
1 st Street West Storm Drain Modifications	Installed a debris rack over the end of an open storm drain pipe along First St. West near Depot Park. The rack helps to reduce flooding by capturing, and facilitating timely and safe removal of, large debris and keeping it from entering the storm drain, and eliminated public safety concerns associated with the open inlet.	100%	City of Sonoma
Montini Open Space Preserve Stormwater Detention/Groupwater Recharge Basin	The detention/recharge basin will receive flows from the storm drain system and release them gradually. It will be located within the Montini Open Space Preserve, have a capacity of approximately 12 AF, contain a mix of wetland and upland vegetation, and will improve water quality.	10%	SCWA
Fryer Creek Culvert Replacement	Currently the Fryer Creek culvert at MacArthur St. is undersized and perched above the channel bed at both the upstream and downstream ends, creating a fish barrier, flow constriction, and sediment trap. The proposed replacement culvert will be larger, and will have lower upstream and downstream invert elevations, which will provide the added flow capacity that is needed and significantly enhance both sediment and fish passage.	10%	SCWA
Habitat Restoration at Montini Open Space Preserve and Fryer Creek	This element will enhance regional ecosystem function, improve hydrologic function of the stream and flood-control channels, and provide recreational and educational benefits to the community. Sonoma Ecology Center (SEC) will perform erosion control and restoration of the stream channel in a 1200-ft reach directly upstream of the MacArthur Street culvert, where activities will include invasive weed control, native plant revegetation, site maintenance, sediment	10%	SCWA

Project Element	Abstract	Design Completion Percent	Implementing Agency
	<p>erosion control, debris removal, and monitoring vegetation establishment success. Site maintenance includes ongoing weed control, irrigation maintenance, and plant protection, as needed. The restoration objective is to maximize fish and wildlife habitat benefits, while maintaining optimal flood conveyance in a designated flood control channel. Appropriately placed native trees will provide needed riparian canopy, yet minimize debris accumulation and flow reduction.</p> <p>On the Montini Open Space Preserve, SEC will perform restoration of wetland and upland habitat surrounding the proposed detention basin. Prior to installation, SEC will develop a restoration planting plan, which will include a list of recommended plant species, installation methods, plant protection, maintenance and monitoring procedures. SEC will also develop ADA public access trail spur and interpretive elements on a part of the trail overlooking the basin.</p>		
Montini Open Space Preserve Trail System	The Open Space District will provide approximately \$380k to design and construct 1.8 miles of new trails throughout the Preserve.	90%	Sonoma County Agricultural Preservation and Open Space District

1.5 Integrated Project Elements

The City Watersheds project will engage the Sonoma County Water Agency, the Sonoma County Agricultural Preservation and Open Space District, Sonoma Ecology Center, and the City of Sonoma in an ongoing, inclusive framework for efficient intra-regional cooperation, planning, and project implementation. This partnership will produce a regionally integrated project that will provide flood protection, creek habitat enhancement, and enhancement of permanent open space. The elements of City Watersheds – Phase 1 will culminate in storm water management benefits, habitat improvement, and increased educational and recreational benefits to the region.

- The Storm Drain Master Plan provides the hydrologic and hydraulic analyses to support the prioritization, design and implementation of the major project elements, which include the multi-use detention basin, culvert replacement, channel enhancement and other system improvements.
- Stream enhancements improve channel capacity while improving ecological function, habitat, and water quality, and augment the storm drain system improvements.

- The Montini basin reduces stormwater flows within Fryer Creek and those reaching the MacArthur culvert, where localized flooding affects not only residences in the area, but retail establishments, businesses, Sonoma Valley Hospital, and a portion of Highway 12.
- The basin design integrates with the Montini Preserve trails and grazing land use practices, and may contribute to the goal of restoring natural diversity of wetland areas, and provides a means of infiltrating stormwater to replenish groundwater.
- New trails, an ADA spur and interpretive elements, including an exhibit with trail maps and a display illustrating the different functions that the basin serves, will enhance public recreational and educational opportunities at the Montini Open Space Preserve.

All elements of the City Watersheds project are consistent with the Sonoma Valley Groundwater Management Plan (GWMP). The GWMP was prepared under the authority of the Groundwater Management Act, California Water Code (Water Code) § 10750 et seq, originally enacted as Assembly Bill (AB) 3030 in 1992 to encourage voluntary, non-regulatory groundwater management at the local level.

The GWMP was developed in coordination with the Water Agency, the Valley of the Moon Water District (VOMWD) and the City of Sonoma (City) under a collaborative and cooperative process that included a broad range of 20 stakeholders participating on the Basin Advisory Panel (Panel). The Panel consists of representatives from local agriculture, dairies, government, private business enterprises, environmental groups, and domestic well users. The GWMP was adopted by the Water Agency, City, VOMWD, and the Sonoma Valley County Sanitation District in late 2007.

1.6 Maps and Figures

Maps and figures are located at the end of this Attachment 3.

- Figure 3-1. Regional Map
- Figure 3-2. Project Activities Location Map
- Figure 3-3. Storm Drain Location Map
- Figure 3-4. Proposed New Trail System Map

1.7 Completed Work

The following project elements or tasks have been or are expected to be completed prior to the date of the grant award:

1. Storm Drain Master Plan: Completed.
2. 1st Street West Storm Drain Modifications: Completed.
3. Montini Open Space Preserve Stormwater Detention/Groundwater Recharge Basin
 - Basin preliminary design is complete
4. Fryer Creek Culvert Replacement
 - Culvert replacement preliminary design is complete
5. Habitat Restoration at Montini Open Space Preserve and Fryer Creek
 - Fryer Creek: CEQA is complete (adopted by Sonoma County Water Agency Board of Directors) and permits are in place.

6. Montini Open Space Preserve Trail System

- Property held for the basin and associated activities.
- Montini Open Space Management Plan has been developed by the Open Space District
- CEQA Initial Study and Mitigated Negative Declaration for the Management Plan has been prepared, deemed compliant with CEQA, and adopted by the Sonoma County Agricultural Preserve and Open Space District Board of Directors
- Trail system plan has been developed.

1.8 Existing Data and Studies

Existing Data and Studies Table		
Technical Document Name	Page references	How was it used?
Andrews, B., Diaz, C., 2012. <i>Technical Memorandum to the SCWA, Sonoma Valley City Watersheds Proposition 1E Grant Proposal: Flood Damage Reduction Benefits.</i>	p.1-24	Describes hydrologic modeling of basin and replaced culvert, existing and post-project flood simulations, sizing and general shape of basin, outlet control characteristics, resizing of the MacArthur culvert, reshaping and grading of the channel upstream of the culvert
Brown, T.C. 2007. "The Marginal Economic Value of Streamflow from National Forests: Evidence from Western Water Markets." In: M. Furniss, C. Clifton, and K. Ronnenberg, eds. <i>Advancing the Fundamental Sciences: Proceedings of the Forest Service National Earth Sciences Conference, San Diego, CA, October 2004.</i> Gen. Tech. Rep. PNW-GTR-689. Portland, OR: U.S. Forest Service, Pacific Northwest Research Station.	p. 458-466	Modeling the economic value of water management for engineering design.
Dawson, A., Salomon, M., Whipple, A., Grossinger, R., 2008. <i>Historical Ecology of Sonoma Creek Watershed.</i>	P. 1 - 8	Background information on historical conditions of streams and wetlands in the Sonoma Creek Watershed.
Dawson, A., 2012. <i>Montini Open Space Preserve and Vallejo Home, Sonoma State Historic Park, Historical Hydrology Study for Sonoma County Water Agency.</i>	p. 1-25	Hydrology assessments
ESW PWA, et al., 2012. <i>Sonoma Valley Stormwater Management and Groundwater Recharge Scoping Study: Screening Evaluation and Prioritization Memorandum, for Sonoma County Water Agency.</i>	p. 1-46	Stormwater management and groundwater recharge assessments
Farrar, C.D., Metzger, L.F., Nishikawa, Tracy, Koczot, K.M., and Reichard, E.G. 2006,	Information throughout	Used to evaluate the potential to recharge groundwater through infiltration at the Montini site based on geologic

Existing Data and Studies Table		
Technical Document Name	Page references	How was it used?
Geohydrologic characterization, water-chemistry, and ground-water flow simulation model of the Sonoma Valley area, Sonoma County, California: U.S. Geological Survey Scientific Investigations Report 2006-5092	the 181 page document.	mapping and cross sections, well locations and information, generalized groundwater hydraulic head and water level contour maps, groundwater chemical composition, hydraulic conductivity maps, a basin-wide groundwater flow model, and other relevant information.
Fischenich, C., 2002. <i>Design of Low-Flow Channels</i> , U.S. Army Corps of Engineers, August	p. 1-9	Reference for engineering design planning
Griggs, F. T., 2008. <i>California Riparian Habitat Restoration Handbook</i> , September.	p. 22-28	Reference for habitat restoration planning
Katapothis, C., Micheli, L., Orme, M., Rossi, C., Branciforte, R., 2005. <i>Fish Passage Barrier Assessment in the Sonoma Creek Watershed</i> , Final Report.	p. 17 table T-1, p.	Used to verify that fish passage barriers exist on Fryer Creek.
Cheeseman, S., 2005. <i>Montini Wetland Mitigation and Monitoring Plan Update</i> . April	Exhibits A, B, and C.	Existing and mitigation wetland maps and cross sections. Background on easement rights, requirements, restrictions, and original design.
National Marine Fisheries Service, Chinook Salmon and Steelhead Critical Habitat and Distribution GIS data, 2011, http://swr.nmfs.noaa.gov/salmon/layers/finalgis.htm	Pages for coastal Chinook and northern California steelhead.	Verify distribution of Chinook and steelhead salmon
Reich, S., MacMullan, E., 2013. <i>Non-Monetized and Monetized Benefits Analysis of the Sonoma City Watersheds Project</i> , for Sonoma County Water Agency. January	p.1-17	Benefit-cost analysis of the proposed City Watersheds project.
Riley, A. L., 2008. <i>Putting a Price on Riparian Corridors as Water Treatment Facilities</i> , San Francisco Bay Regional Water Quality Control Board.	p. 1-16	Reference for engineering design and planning
Schlumberger Water Services, prepared for Sonoma County Water Agency, 2007. <i>Sonoma Valley Groundwater Management Plan</i> .	Entire document	Reference for engineering design planning
Sesser, B., et al., <i>Sonoma Valley Groundwater Recharge Potential Mapping Project</i> , SEC Report No. 20100922	Information throughout report; map of recharge potential on p. 20.	Used to assess the potential to recharge groundwater through infiltration at the Montini site.

Existing Data and Studies Table		
Technical Document Name	Page references	How was it used?
Sonoma County Agricultural Preserve and Open Space District, 2008. <i>Sonoma Montini Open-Space Preserve Management Plan and Initial Study</i> .	p. 1 - 53	Used for ecological and historical background, and to support trail planning, location of interpretive elements, and number of anticipated visitors.
Sonoma County Water Agency, 2012. <i>Annual Notification for 2012 Maintenance Projects</i> .	P. 4, 9, 10, 67, 98. Tables 1.1, 1.3, 1.4, 3.2, 4.1, 4.3, 4.5, 5.2.	Information on past channel maintenance and enhancement activities, locations, practices, quantities, schedules, permits, maps, photos, and future plans.
Sonoma County Water Agency, 2012. <i>City Watersheds Project Objectives Report</i>	2 pages	Describes the project background and objectives
Sonoma County Water Agency, <i>Stream Maintenance Program Manual</i> , January 2009. http://www.scwa.ca.gov/stream-maintenance-program/	Table 7-1, pages 1-32; Table 8-3, pages 1-3; Appendix E, pages E-1 through E-22	Guidance for habitat restoration and invasive species removal; planting palette; best management practices.
Wagner, D.L., Clahan, K.B., Randolph-Loar, C.E., Sowers, J.M., 2006. Geologic map of the Sonoma 7.5' quadrangle, Sonoma and Napa Counties, California: A digital database: California Geological Survey website, ftp://ftp.consrv.ca.gov/pub/dmg/rgmp/Prelim_geo_pdf/Sonoma_prelim.pdf .	1 page	Determination of the surficial geologic properties to evaluate the potential for the basin to recharge the groundwater through infiltration, and also to assess the properties of the site that may affect the excavation and earthwork, and potential for erosion.
Winzler and Kelly, 2011. <i>City of Sonoma Storm Drain Master Plan</i> . Prepared for City of Sonoma Public Works. Sonoma, CA. May	Entire Document, Table 7-7	Guidance in order to reduce flooding in flood-prone regions of the City of Sonoma as well as determination of avoided cost of Implementing CIP-5.
Wright, J.M., 2008. <i>Floodplain Management—Principals and Current Practices</i> . Chapter 7 Flood Damage Reduction. Federal Emergency Management Agency.	Chapter 7	Flood damage reduction analysis

1.9 Project Specifics Table

Project Element	Explanation/Geo Location/Function in Relation to other Conveyance
Storm Drain Master Plan (SDMP)	The City of Sonoma Storm Drain Master Plan describes an up-to-date hydrologic analysis of the City’s storm drain system and capital improvement projects required to address a significant portion of the 10, 25- and 100-year flooding throughout the City. Projects that target the Fryer Creek storm drain system include: 1) a diversion of storm drain flows directly to Sonoma Creek and 2) replacement of the MacArthur culvert.
1 st Street West Storm Drain Modification	Install a debris rack over the end of an open storm drain pipe along First St. West near Depot Park in the City of Sonoma. The rack helps to reduce flooding by capturing, and facilitating timely and safe removal of, large debris from entering the storm drain, and eliminate public safety concerns associated with the open inlet.
Montini Open Space Preserve Stormwater Detention/Groundwater Recharge Basin	Create a 12 acre-foot detention basin at the upstream end of Fryer Creek, immediately upstream of the developed portion of the City of Sonoma on a mildly sloping 9.2-acre parcel at the base of the foothills (see Project Map). It will retain stormwater runoff and release it slowly to reduce the peak flow and delay it so it does not superimpose on the peaks from the developed watershed downstream. It will also infiltrate some of the retained water. Flooding that occurs at the W Napa St (Highway 12) crossing and along the northern end of W 5th Street during 25-year flow event will be eliminated.
Fryer Creek Culvert Replacement and habitat restoration at MacArthur Street	Replace Fryer Creek culvert at MacArthur St. in the City of Sonoma. The replacement will drop the invert at the upstream and downstream end
Habitat Restoration at Montini Open Space Preserve and Fryer Creek	Perform rehabilitation and revegetation of the stream channel in a 1200-ft reach directly upstream of the MacArthur Street culvert, where activities will include: bank stabilization, landscaping, fencing, mowing, sediment and debris removal, selectively thinning and removing vegetation, removal of exotic vegetation species, and staking and planting of desirable native vegetation, and transplanting or training mature trees to create shady riparian canopies. On the Montini Open Space Preserve, develop a landscape plan, planting and management of wetland and grassland vegetation, and ADA public access trail spur and interpretive elements on a part of the trail overlooking the basin.
Montini Open Space Preserve Trail System	Design and construct 1.8 miles of new trails throughout the Montini Open Space Preserve.

1.10 Project Timing and Phasing

The City Watersheds Project Phase 1 is the project being proposed for Prop 1E SWFM Grant funding. No other project phases or elements must be completed before it is undertaken. Phase 1 provides significant measurable benefits to the community even if no other phases of the City Watersheds Project were to be undertaken. Grant funds for the City Watersheds Project will provide immediate flood protection relief (1st Street West storm drain modification and Fryer Creek Culvert Replacement), a 12 AF detention basin that will contain surface water runoff from the watershed, multiple habitat enhancement and sediment reduction activities that will improve creek capacity and long-term health, and 1.8 miles of trail, through meadows, quarries, and oak woodlands on the Montini Open Space Preserve. The trail will connect to the Sonoma Overlook Trail to the east, providing hikers with an option to extend their wilderness experience.

Phase 1 and subsequent phases of City Watersheds of Sonoma Valley (Program) will address flood hazard reduction, water supply, water quality, habitat and ecosystem function, and climate change resilience goals within the City of Sonoma. The Program identifies a set of specific multi-objective projects as well as program components to address flood hazards within Sonoma Valley. Both the GWMP and the flood event were influential in triggering the development of the Sonoma Valley Stormwater Management and Groundwater Recharge Study (2012), an effort by the Sonoma County Water Agency that prompted the development of this program and many of its specific project elements.

Most of the Sonoma Creek watershed is designated as Critical Habitat for Central Coast Steelhead (NOAA) and is listed as water quality-impaired for sediment (RWQCB). The opportunities to enhance Sonoma Creek and its tributaries so as to make real differences for water quality and this federally-listed threatened species are substantial in this relatively rural watershed, tributary to San Francisco Bay.

Public access and education will be integrated into many of the Program's components. Additional off-line surface water basins for combined flood detention and groundwater recharge that are located on public and park lands will include public access and interpretive features. The rural and urban lands stormwater management programs are explicitly focused on public education, through demonstration projects, workshops, and development of educational and technical support materials. Other Program projects may include development of a new small park, with ample opportunity to explain the role of the project in the recovery of the Central Coast Steelhead and educate visitors on the status of Steelhead in the watershed and the challenges faced by this iconic native fish.

2. PROPOSED WORK

2.1 Description of Work

The Sonoma County Water Agency, in partnership with the Sonoma County Agricultural Preserve and Open Space District, Sonoma Ecology Center, and the City of Sonoma, proposes to implement a regionally integrated project in the Fryer Creek sub-watershed of the Sonoma Creek watershed between West MacArthur Street north to the Montini Open Space Preserve in the City of Sonoma. This public-private partnership intends to accomplish the following objectives:

- Alleviate flooding within the Fryer Creek sub-watershed and contain the 10-year storm event (10% chance of occurrence event) along the mainstem of Fryer Creek by diverting stormwater to a 12-acre foot detention basin on the Montini Open Space Preserve, replacing a flood-prone culvert at MacArthur Street, and other improvements
- Enhance groundwater recharge and water supply reliability
- Provide ecosystem benefits through habitat restoration/enhancement on various reaches of Fryer Creek, including removal of a fish passage barrier at MacArthur Street that is identified in the draft Steelhead Recovery Plan as requiring removal.
- Enhance public recreational and educational opportunities by adding 1.8 miles of new trails, an ADA spur, and interpretive elements relating to stormwater detention and groundwater recharge at Montini Open Space Preserve.

The project will improve flood protection, reduce downstream sediment deposits, recharge groundwater, improve groundwater supply reliability, improve fish passage, and create a site for public access and education about hydrology and watershed geomorphic processes.

2.2 Coordination with Partners

The partnership between the City Watersheds project proponents has a long history.

1. All partners -- Sonoma County Water Agency and Sonoma County Agricultural Preserve and Open Space District, City of Sonoma, and Sonoma Ecology Center—are members of the Bay Area IRWMP Regional Management Group, and collaborated together on the City Watersheds of Sonoma Valley Project, which is listed in the current BAIRWM Plan.
2. Sonoma County Water Agency and Sonoma County Agricultural Preserve and Open Space District share a common Board of Directors.
3. The City of Sonoma has expressed its intent to take ownership of the Montini Open Space Preserve through a resolution of the City Council. The Open Space District continues to work with the City on refining a proposed maintenance schedule and a transfer document to transfer ownership of the Preserve to the City.
4. Both the City of Sonoma and the Sonoma County Water Agency are water suppliers and signatories of the Restructured Agreement for Water Supply.
5. The City of Sonoma occupies two seats on the Sonoma County Water Agency's Zone 3A Flood Control Advisory Committee. Both the City of Sonoma and the Sonoma County Water Agency have seats of the Sonoma Valley Groundwater Management

Basin Advisory Panel. These roles facilitate collaborative partnerships between SCWA and the City on Flood Control and Groundwater issues

Lead Agency on Project

If Prop 1E grant funds are awarded to the City Watersheds – Phase 1 project, the Sonoma County Water Agency will serve as lead agency and coordinate monthly conference calls, quarterly meetings, and submission for review and comment of design and environmental documents at key project milestones. The Water Agency will also prepare individual agreements with partners to formalize work on specific tasks, such as with SEC for planting plans and installation at the Montini site.

Consultant and Subcontractor Agreements

Water Agency will be the sole agency responsible for managing the proposed project, including its budget and schedule. It is anticipated that discrete tasks of the proposed project will be subcontracted to consultants and non-governmental agencies. If this project is approved for funding, these agreements will be made available to DWR. The Water Agency will be responsible for all subcontractor agreements and will ensure compliance with all applicable laws and regulations.

2.3 Implementation Standards and Methods

The following standards will be used in the project implementation:

- Best Management Practices that will be implemented for sediment removal, revegetation, invasive species removal and bank stabilization are identified in Tables 7-1 and 7-2 of the Sonoma County Water Agency Stream Maintenance Program Manual (see Appendix 2 at the end of this Attachment 3).
- Numerous construction standards including: ASTM, AWWA, Caltrans, UBC, UPC, CBC, CMC, CEC, CCR. Examples include, but are not limited to:
 - ASTM Standard Specifications for Precast and Cast In Place Concrete
 - ASTM D 1557 Tests for Moisture-Density Relations of Soils and Soil Aggregate Mixtures
 - California Building Code Appendix Chapter 33 Excavation and Grading
 - California Test Method 216 (mod) Relative Compaction of Untreated and Treated Soils and Aggregates
 - California Test Method 202 Sieve Analysis of Fine and Coarse Aggregates
 - California Test Method 217 Sand Equivalent
 - California Test Method 229 Durability Index
 - California Test Method 231 (mod) Relative Compaction of Untreated/Treated Soils and Aggregates (Area Concept Utilizing Nuclear Gauges)
 - Caltrans 26 Aggregate Base
 - Caltrans 72-2.02 Rock Slope Protection, Material
 - Caltrans 72-2.03 Rock Slope Protection, Placement
- Health and Safety Standards

- Injury and Illness Prevention Program (IIPP): Conforming to the General Industrial Safety Orders (CCR Title 8, Division 1, Chapter 4, Subchapter 7, Section 3203), and the California Labor Code (Section 6401.7).
- Site-Specific Safety and Health Plan (SSHP): Describing health and safety procedures that shall be implemented during the Work in order to ensure safety of the public and those performing the Work. Follow the guidelines for a SSHP listed in CCR Title 8, Division 1, Chapter 4, Subchapter 7, Section 5192, Item (b)(4) f., (3) Fire Protection Plan
- Comply with CCR Title 8, Division 1, Chapter 4, subchapter 4 (Construction Safety Orders), Section 1541.1

2.4 Development of Performance Measures and Monitoring Plans

A project performance monitoring plan will be developed that is consistent with IRWM Guidelines. The plan that will address, at a minimum, the following elements:

1. Identify project performance goals
2. Define performance indicators for each goal Identify the method, frequency, and schedule for collection of monitoring data
3. Identify the party responsible for the collection of data and data management

The plan will be prepared as part of Task 1 of the project work plan.

2.5 Status of Acquisitions or Rights-of-Way

All rights of way are held by project partners. There are no acquisitions or costs associated with the project.

2.6 Required Permits and Status

1. 1st Street West storm drain modification - work completed; no permits required
2. Montini stormwater detention/groundwater recharge basin - AND
3. Fryer Creek culvert replacement will require the following permits:
 - Section 404 Federal Clean Water Act
 - Section 401 certification from San Francisco Bay Regional Water Quality Control Board
 - Sonoma County grading permit

4. Habitat Restoration at Montini Open Space Preserve and Fryer Creek

Fryer Creek work will be performed under the auspices of the Water Agency's stream maintenance program. The Montini Preserve habitat restoration will be subject to the stormwater detention/groundwater recharge basin permitting process. Permits held for Fryer Creek are as follows:

- California Department of Fish and Game (CDFG)
Streambed Alteration Agreement
Notification Number 1600-2006-0254-3
Start Date 6/15/2010

End date 10/31/2025

Consistency Determination

Number 2080-2010-029-03, 8/6/10

- California Regional Water Quality Control Board, San Francisco Region (SFRWQCB)
Order No. R2-2001-0020
Waste Discharge Requirements, expires April 13, 2016
401 Water Quality Certification, expires April 13, 2016
- National Marine Fisheries Service (NMFS)
Petaluma River and Sonoma Creek Watersheds Biological Opinion, Zones 2A, 3A, issued April 5, 2010
Tracking No. 2009/03082, Corps File No. 2009-00136N
- Sonoma County Agricultural Commissioner's Office (Herbicide)
Pesticide Operator Identification Number 49-11-490909
Private Applicator Permit for Jon Niehaus
Effective Date 12/11 /2008
Expiration Date 12/31/2013
- US Army Corps of Engineers (USACE Zones 2A and 3A)
Permit No. 2009-00136N Zone 2A, 3A Authorization expires May 15, 2020
- US Fish and Wildlife Service (USFWS)
Programmatic Biological Opinion for SMP, USFWS PBO
Received October 29, 2009
Reference No. 81420-2009-F-0788-1

5. Montini Open Space Preserve Trail System

Permitting complete - State Right-of-Entry permit, and Sonoma County ministerial permit conditions

2.7 Status of Environmental Compliance

1. 1st Street West storm drain modification - work completed
2. Montini stormwater detention/groundwater recharge basin – AND
3. Fryer Creek culvert replacement
Initial Study (anticipate Mitigated Negative Declaration) required for the stormwater detention/groundwater recharge basin and the Fryer Creek culvert replacement - work will begin in spring 2013.
4. Habitat Restoration at Montini Open Space Preserve and Fryer Creek
Fryer Creek riparian habitat restoration CEQA process is complete; the Montini Preserve habitat restoration will be subject to the stormwater detention/groundwater recharge basin environmental review process.
5. Montini Open Space Preserve Trail System
CEQA Initial Study and Mitigated Negative Declaration for the Management Plan has been prepared, deemed compliant with CEQA, and adopted by the Sonoma County Agricultural Preserve and Open Space District Board of Directors

2.8 Work Plan Outline

The following is the work plan for the City Watersheds of Sonoma Valley Phase 1 project.

Category (a): Direct Project Administration

Task 1: Administration

The Sonoma County Water Agency (Water Agency) will administer and manage the project to assure that it is completed within budget, on schedule, and in accordance with requirements of the grant agreement and applicable laws and regulations.

Activities will include developing plans for project management, financing, and project monitoring. Other activities will include the following: prepare and execute consulting agreements, coordinate activities of project partners (Water Agency, SEC, City of Sonoma, Open Space District) and consultants, including preparation of invoices, project status reports, submission of deliverables, and compliance with requirements of the grant funding agreement.

- Arrange and participate in project coordination and progress meetings and conference calls with project partners.
- Prepare and track budget, expenses, and schedule.
- Coordinate and participate in meetings and conference calls
- Prepare invoices and backup documentation.
- Review and track compliance with DWR contract requirements.
- Prepare Requests for Proposals (RFPs), bidding documents, and construction documents, and procure consultants and contractors.
- Award and administer contracts with consultants and contractors including reviewing and tracking scope, schedule and budget, and compliance with contract terms.

Deliverables

- Project Management Plan
- Financing Plan
- Project Monitoring Plan

Task 2: Labor Compliance Program

The Water Agency shall comply, and require all its contractors and subcontractors to comply, with the requirements of California Labor Code section 1771.5(b) regarding Labor Compliance Programs. This includes registering with the Department of Industrial Relations to monitor and enforce prevailing wage requirements on public projects that receive Prop 1E funding. Work will include coordinating with the state compliance monitoring unit.

Deliverable:

Labor compliance documentation

Task 3: Reporting

3.1 Quarterly Reports

Reports will be submitted quarterly via email throughout the project performance period. The progress reports will describe activities undertaken and accomplishments of each task during the quarter, milestones achieved, and any problems encountered in the performance of the work under the agreement.

The description of activities and accomplishments of each task during the quarter will provide a basis for payment of invoices and percent of task work completed for the purpose of calculating invoice amounts.

- Prepare progress reports every three months in accordance with DWR reporting format
- Describe project progress, such as activities completed and problems encountered in current quarter
- Provide percent complete status for all project tasks

3.1 Deliverable:

- Quarterly Reports- submitted every 3 months until completion

3.2 Final Report

A draft will be provided 60 days before the end of Grant Agreement. Comment period on draft will be 30 days and Final Report will incorporate comments to the extent possible or provide explanation to comment source. The report shall include the following narrative sections:

- An introduction section including a statement of purpose, the scope of the project, and a description of the approach and techniques used during the project.
- A list of the task deliverables.
- Determination of whether the purpose of the project has been met. Information collected in accordance with the project monitoring and reporting (“assessment and evaluation”) plan.
- Track project activities, including photo monitoring
- Summarize project activities, achievements and difficulties
- Prepare Draft Project Report and include DWR report content requirements
- Provide Draft report to appropriate agencies for review and comment
- Prepare Final Project Report

3.2 Deliverables:

- Draft Final Report
- Final Report

3.3 Post-Performance Reports

Post-Performance Reports shall be submitted to State within ninety (90) calendar days after the first operational year of a project has elapsed. This record keeping and reporting process shall be repeated annually for a total of 10 years after the completed project begins operation.

3.3 Deliverables:

- Post-Performance Reports (annual for 10 years)

Category (b): Land Purchase/Easement

None required for this project.

Category (c): Planning/Design/Engineering/Environmental Documentation

Task 4: Assessment and Evaluation

- Conduct initial assessments and evaluation
- Perform preliminary planning
- Conduct kickoff and planning meetings
- Meet with partners
- Prepare preliminary workplans, schedules, budgets
- Prepare assessment and planning documents

1. 1st Street West storm drain modification - work completed
2. Montini stormwater detention/groundwater recharge basin - AND
3. Fryer Creek culvert replacement – 60% complete
4. Habitat Restoration at Montini Open Space Preserve and Fryer Creek – 40% complete
5. Montini Open Space Preserve Trail System – work completed

Completed Planning Documents:

Sonoma Valley Groundwater Management Plan (GWMP):

The Sonoma Valley GWMP identifies a range of water management actions to sustain resources for future generations. The goal of the Plan is to locally manage, protect, and enhance groundwater resources for all beneficial uses, in a sustainable, environmentally sound, economical, and equitable manner for generations to come.

City of Sonoma Storm Drain Master Plan (SDMP):

The purpose of this Master Plan is to establish a Capital Improvement Program (CIP) for the City's storm drain system infrastructure in order to reduce flooding in flood-prone regions of the City. This is accomplished by delineating watershed boundaries, estimating respective flows within each watershed, and routing flows into the existing storm drain network and associated open channels. Using a combination of one-dimensional channel hydraulics and storm drain hydraulic modeling and a two-dimensional floodplain and street flooding hydraulic model, hydraulic analyses of these systems dynamically coupled together provides a mechanism to assess deficiencies within the City's storm drain system and creeks, and predicts where localized flooding may occur. Recommended improvements have been developed to alleviate operational deficiencies with respect to the Sonoma County Water Agency's Flood Control Design Criteria.

Fish Passage Barrier Assessment in Sonoma Creek Watershed 01/2005

Sonoma Ecology Center (SEC) conducted the Sonoma Creek Watershed Fish Passage Barrier Assessment between June 2003 and December 2004. Funding was provided by the California Department of Fish and Game (CDFG) Agreement # P0210556, and the Bella Vista Foundation. The goals of this project were to compile a complete inventory of road and stream crossings that are potentially functioning as barriers to fish movement, to evaluate whether potential barriers pose a full or partial obstacle to fish passage, and to estimate the loss of habitat due to these barriers. This information is vital to begin the process of ranking these sites for remediation.

Montini Open Space Preserve Plan: (2008)

The purpose of the management plan is to provide a framework for how the District will manage the Preserve's natural and cultural resources and visitor services. The plan provides for opening the Preserve for public use beyond the periodic guided tours currently offered. In addition, the plan provides recreational access for disabled individuals.

Sonoma County Water Agency Stream Maintenance Program Manual (SMP):

The SMP Manual describes activities, natural resources, and approaches to avoid or minimize impacts to environmental resources. It serves as the description of activities permitted by the relevant regulatory agencies. The evaluation of program environmental impacts is addressed through a parallel Environmental Impact Report (EIR) developed in compliance with CEQA. It contains conceptual

planting plans, species selection, vegetation management techniques and Best Management Practices to support a proactive regional approach to flood protection and stream and wildlife habitat restoration.

Deliverables:

1. Sonoma Valley Groundwater Management Plan (GWMP):
2. City of Sonoma Storm Drain Master Plan (SDMP)
3. Fish Passage Barrier Assessment in Sonoma Creek Watershed 01/2005
4. Montini Open Space Preserve Plan: (OSMP) (2008)
5. Sonoma County Water Agency Stream Maintenance Program Manual (SMP): Selected sections

Task 5: Final Design

- Prepare conceptual (10%), 30%, 60%, 90% and Final Design
 - Prepare habitat restoration and interpretive signage designs
 - Prepare design for ADA spur and trail
1. 1st Street West storm drain modification - work completed
 2. Montini stormwater detention/groundwater recharge basin - AND
 3. Fryer Creek culvert replacement – 10% complete
 4. Habitat Restoration at Montini Open Space Preserve and Fryer Creek – 10% complete
 5. Montini Open Space Preserve Trail System – work completed

Deliverables:

- 30%, 60%, 90% design plans for Montini stormwater detention/groundwater recharge basin and Fryer Creek culvert
- Final landscape plan/planting palette for Montini stormwater detention/groundwater recharge basin and Fryer Creek culvert sites
- Final ADA spur/trails/ interpretive element designs for Montini site

Task 6: Environmental Documentation

1. First St. West storm drain modification - work completed; no environmental document required
2. Montini Open Space Preserve stormwater detention/groundwater recharge basin
 - Prepare Initial Study (anticipate Mitigated Negative Declaration)
3. Fryer Creek Culvert Replacement
 - Prepare Initial Study (anticipate Mitigated Negative Declaration)
4. Habitat Restoration Montini Open Space Preserve and Fryer Creek

Fryer Creek: work under this task will be performed under the auspices of the Water Agency's Stream Maintenance Program. The Water Agency completed a CEQA document (Environmental Impact Report) in 2009 for vegetation management and riparian and wetland restoration and enhancement activities – work complete.

- Draft Stream Maintenance Program EIR completed January 2009

- Final Stream Maintenance EIR completed June 2009
- Notice of Determination filed June 23, 2009

For Montini Open Space Habitat Restoration the Montini Preserve habitat restoration will be subject to the stormwater detention/groundwater recharge basin environmental review process

5. Montini Open Space Preserve Trail System

CEQA Initial Study and Mitigated Negative Declaration for the Management Plan has been prepared, deemed compliant with CEQA, and adopted by the Sonoma County Agricultural Preserve and Open Space District Board of Directors

Deliverable:

Approved and adopted environmental documentation for the above activities.

Task 7: Permitting

1. First St. West storm drain modification: Work completed; no permits required
2. Montini Open Space Preserve stormwater detention/groundwater recharge basin – AND
3. Fryer Creek Culvert Replacement
 - Section 404 Federal Clean Water Act
 - Section 401 certification from San Francisco Bay Regional Water Quality Control Board
 - Sonoma County grading permit

4. Habitat Restoration Montini Open Space Preserve and Fryer Creek

Fryer Creek: work under this task will be performed under the auspices of the Water Agency's Stream Maintenance Program. Permits held are as follows:

- California Department of Fish and Game (CDFG)
Streambed Alteration Agreement
Notification Number 1600-2006-0254-3
Start Date 6/15/2010
End date 10/31/2025
Consistency Determination
Number 2080-2010-029-03, 8/6/10
- California Regional Water Quality Control Board, San Francisco Region (SFRWQCB) Order No. R2-2001-0020
Waste Discharge Requirements, expires April 13, 2016
401 Water Quality Certification, expires April 13, 2016
- National Marine Fisheries Service (NMFS)
Petaluma River & Sonoma Creek Watersheds Biological Opinion, Zones 2A, 3A, issued 4/5/ 2010
Tracking No. 2009/03082, Corps File No. 2009-00136N
- Sonoma County Agricultural Commissioner's Office (Herbicide)
Pesticide Operator Identification Number 49-11-490909
Private Applicator Permit for Jon Niehaus
Effective Date 12/11 /2008
Expiration Date 12/31/2013
- US Army Corps of Engineers (USACE Zones 2A and 3A)

Permit No. 2009-00136N Zone 2A, 3A Authorization expires May 15, 2020

- US Fish and Wildlife Service (USFWS)
Programmatic Biological Opinion for SMP, USFWS PBO
Received October 29, 2009
Reference No. 81420-2009-F-0788-1

For Montini Open Space Habitat Restoration the Montini Preserve habitat restoration will be subject to the stormwater detention/groundwater recharge basin permitting process

5. Montini Open Space Preserve Trail System – work completed

Permitting complete - State Right-of-Entry permit, and Sonoma County ministerial permit conditions

Deliverables:

Summary of permits, approval dates, and status

Category (d): Construction/Implementation

Task 8: Construction Contracting – Bidding and Award

1. First St. West storm drain modification: Work completed by City of Sonoma; N/A
2. Montini Open Space Preserve stormwater detention/groundwater recharge basin AND
3. Fryer Creek Culvert Replacement
 - Advertisement for bids
 - Pre-bid contractors meeting
 - Addenda preparation
 - Evaluation of bids
 - Award contract
 - Notice to Proceed
4. Habitat Restoration Montini Open Space Preserve and Fryer Creek
 - SEC will perform this work under an agreement with Sonoma County Water Agency.
5. Montini Open Space Preserve Trail system:
 - Advertisement for bids
 - Pre-bid contractors meeting
 - Addenda preparation
 - Evaluation of bids
 - Award contract
 - Notice to Proceed

Deliverables:

Summary of bids, Notice of Award

Task 9: Construction

1. First St. West storm drain modification: work completed by City of Sonoma, N/A
 2. Montini Open Space Preserve stormwater detention/groundwater recharge basin
 - Mobilize: bring equipment to site, set up staging areas, flag to indicate site routes.
 - Site survey work: identify alignment, elevation of project features, earthwork, project boundaries
 - Contractor submittals: health and safety plan, traffic control measures
 - Clear and grub field
 - Earthwork for basin
 - Install inlet and outlet pipes, flow control structure
 - Demobilize construction area
 3. Fryer Creek Culvert Replacement
 - Site survey work: identify alignment, elevation of project features, earthwork, project boundaries
 - Contractor submittals: health and safety plan, traffic control measures
 - Demolition, removal, and disposal of existing culvert and roadway
 - Excavation of channel bed and lowered culvert alignment
 - Placement of structural concrete for culvert and road base
 - Placement of asphalt roadway surface, and finishes
 - Removal of sediment deposits around Arroyo Way
 - Demobilize construction area
 4. Habitat Restoration Montini Open Space and Fryer Creek; ADA Spur and Interpretative Signage
 - Mobilize: bring equipment to site, set up staging areas, flag to indicate site routes.
 - Prepare sites for planting
 - Install plants
 - Install plant protection
 - Install ADA spur and interpretive element (Montini site only)
 - Demobilize construction areas
 5. Montini Open Space Preserve Trail System
 - Mobilize: bring equipment to site, set up staging areas, flag to indicate site routes.
 - Site survey work: identify alignment, elevation of project features, earthwork, project boundaries
 - Contractor submittal, e.g., health and safety plan, traffic control measures
 - Prepare and install trail pursuant to Open Space specifications
- Demobilize construction area

Category (e): Environmental Compliance/Mitigation/Enhancement

Task 10: Environmental Compliance/Mitigation/Enhancement

1. First St. West storm drain modification: work completed by City of Sonoma, N/A
2. Montini Open Space Preserve stormwater detention/groundwater recharge basin, AND
3. Fryer Creek Culvert Replacement

For both activities, the Sonoma County Water Agency staff will implement regulatory agency conditions/measures, mitigation measures and applicable best management practices to insure compliance during all work activities.

Best management practices typically implemented on projects of similar size and scope include measures identified in Appendix 1 at the end of this attachment. Some of these practices are:

- Limiting work in the stream/riparian corridor to the period of June 15 to Oct. 15
- Bird surveys and tree surveys performed by a qualified biologist within 48 hours of any staging, excavation or clearing/grubbing
- Mitigation measures and best management practices will be incorporated into contracts and a copy must be maintained at the project site and provided to the contractor and all subcontractors who work within the stream zone.

4. Habitat Restoration Montini Open Space and Fryer Creek; ADA Spur and Interpretative Signage

This work will be done in accordance with the applicable sections of the Sonoma County Water Agency's Stream Maintenance Program (SMP) Manual, which are included in Appendix 2 at the end of this attachment.

These practices and measures are:

- Follow Impact Reduction, Minimization Measures, and Best Management Practices (BMPs) as prescribed in Table 7-1 of the SMP Manual.
- Follow environmental compliance, mitigation and enhancement measures SMP Manual Appendix E, Vegetation Management Plan

5. Montini Open Space Preserve Trail System

- The Open Space District staff will implement regulatory agency conditions/measures, mitigation measures and applicable best management practices to insure compliance during all work activities.

Category (f): Construction Administration

Task 11: Construction Administration

1. First St. West storm drain modification: work done by City of Sonoma, N/A
2. Montini Open Space Preserve stormwater detention/groundwater recharge basin
 - Water Agency construction managers and inspectors will be onsite every day to manage and monitor implementation, and to ensure compliance with plans, laws and regulations.
 - A labor compliance program is required for all contractors and subcontractors to ensure

<p>compliance with all laws and regulations</p> <ul style="list-style-type: none">• A labor compliance program is required for all contractors and subcontractors to ensure compliance with all laws and regulations <p>3. Fryer Creek Culvert Replacement</p> <ul style="list-style-type: none">• Water Agency construction managers and inspectors will be onsite every day to manage and monitor implementation, and to ensure compliance with plans, laws and regulations.• A labor compliance program is required for all contractors and subcontractors to ensure compliance with all laws and regulations• A labor compliance program is required for all contractors and subcontractors to ensure compliance with all laws and regulations <p>4. Habitat Restoration Montini Open Space and Fryer Creek; ADA Spur and Interpretative Signage</p> <ul style="list-style-type: none">• Water Agency coordinators and lead workers will oversee work crews and manage implementation in accordance with landscape design, SMP manual and BMPs.• Water Agency coordinators and lead workers will be onsite every day to manage and monitor implementation, and to ensure compliance with plans, laws and regulations. <p>5. Montini Open Space Preserve Trail System</p> <ul style="list-style-type: none">• Open Space District staff will provide daily management and monitoring of trail implementation and ensure compliance with plans, applicable laws and regulations.

The items below appear in the following pages:

Figure 3-1. Regional Map

Figure 3-2. Project Activities Location Map

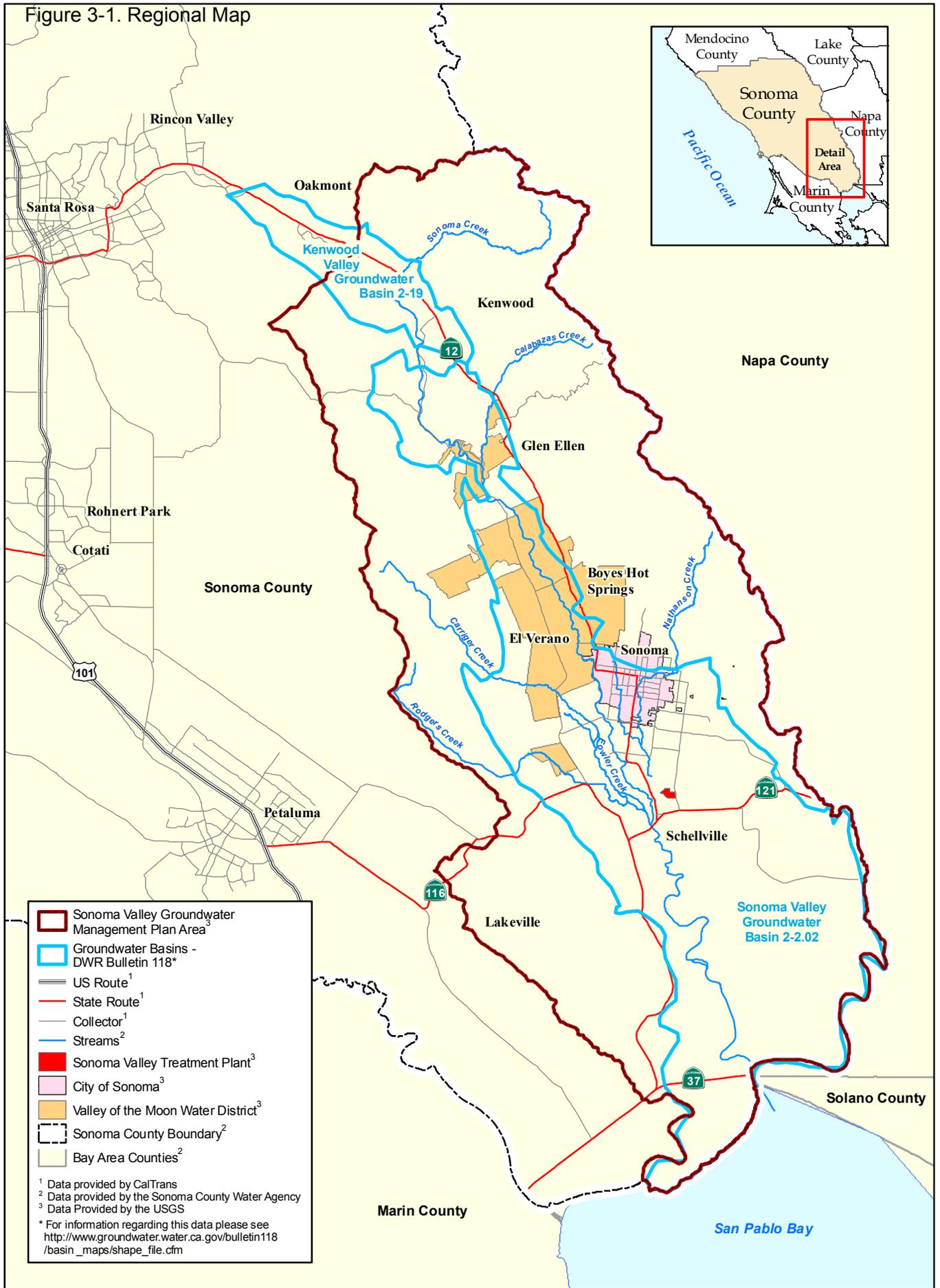
Figure 3-3. Storm Drain Location Map

Figure 3-4. Proposed New Trail System Map

Appendix 1. Environmental Mitigation during Construction

Appendix 2. Riparian Habitat Restoration Environmental Compliance and Mitigation Measures

Figure 3-1. Regional Map



- Sonoma Valley Groundwater Management Plan Area²
- Groundwater Basins - DWR Bulletin 118*
- US Route¹
- State Route¹
- Collector¹
- Streams²
- Sonoma Valley Treatment Plant³
- City of Sonoma³
- Valley of the Moon Water District³
- Sonoma County Boundary²
- Bay Area Counties²

¹ Data provided by CalTrans
² Data provided by the Sonoma County Water Agency
³ Data Provided by the USGS

* For information regarding this data please see http://www.groundwater.water.ca.gov/bulletin118/basin_maps/shape_file.cfm

\\S:\data\proj\special projects\Groundwater\Sonoma_Valley\Final_Figures\Sonoma_Valley_Groundwater_Management_Area - Figure 1-1.mxd 12/10/2007



Figure 3-2. Project Location Map

-  Project Element Locations
-  Fryer Creek Habitat Enhancement
-  USGS Fault Lines
-  Montini Multi-objective Detention Basin
-  Fryer Creek Watershed (GHD)
-  City of Sonoma
-  Sonoma County Agriculture and Open Space Holdings - Montini Properties

**Stormwater Detention/Groundwater Recharge Basin
Habitat Restoration & Interpretive Element
New Trail System**

**1st Street West Storm
Drain Modifications (complete)**

**Fryer Creek Habitat
Restoration**

**Fryer Creek Culvert
Replacement**



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**City Watersheds of
Sonoma Valley - Phase 1**

DISCLAIMER
This map document and associated data are distributed for informational purposes only "AS-IS" at the published scale and provided without warranty of any kind expressed or implied. The positional accuracy of the data is approximate and not intended to represent survey map accuracy. The Sonoma County Water Agency assumes no responsibility arising from use of this information.

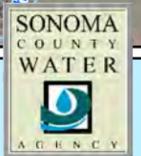
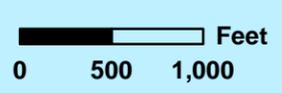
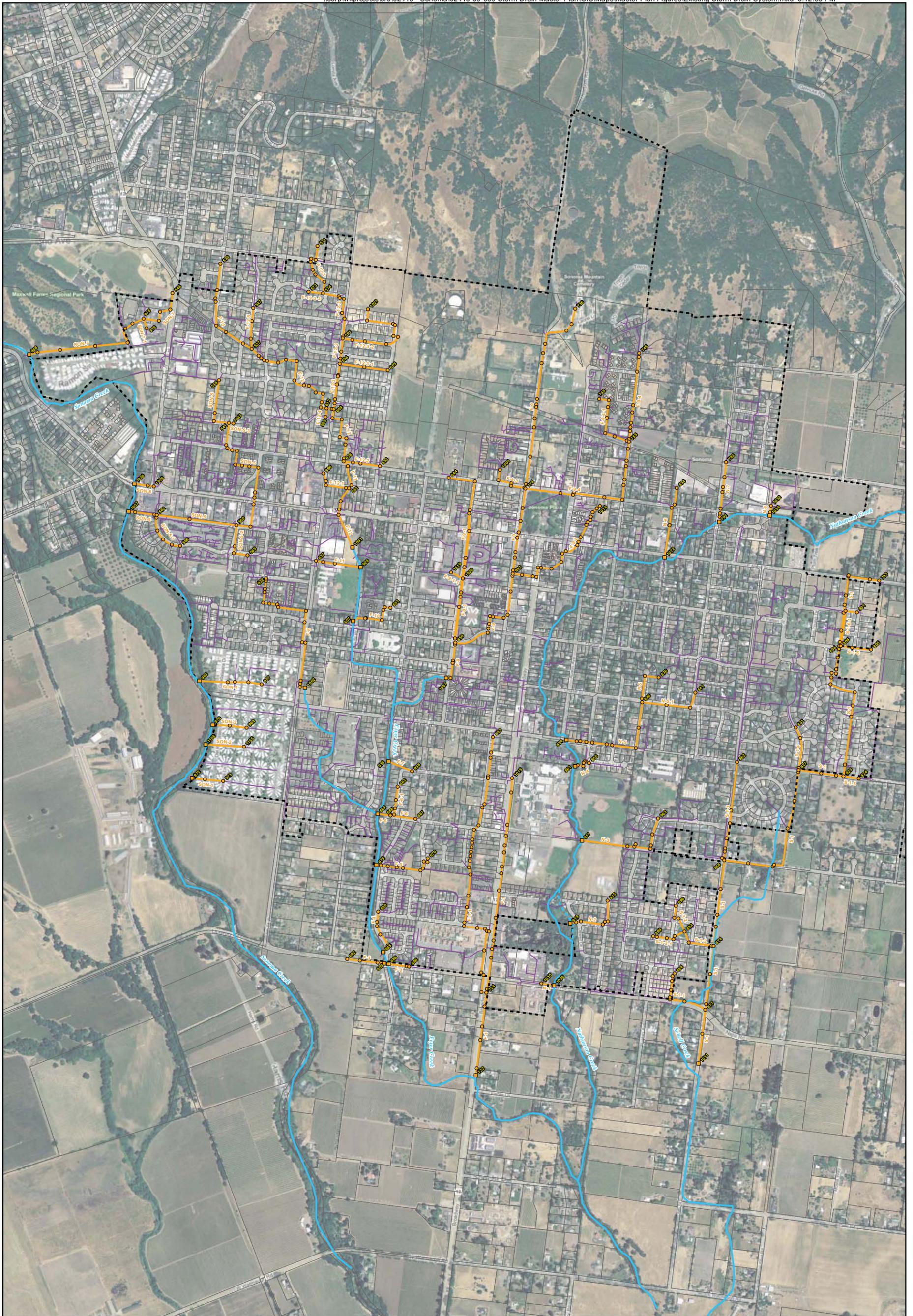


Figure 3-3. Storm Drain System

\\corp\wkprojects\sr02418 - Sonoma\02418-09-039 Storm Drain Master Plan\GIS\Maps\Master Plan Figures\Existing Storm Drain System.mxd 3:42:38 PM



City Limits	Modeled Storm Drain Pipes & Run ID
Parcel Boundaries	Storm Drain Pipes (not modeled)
Creeks	Storm Drain Manholes & ID
Bypass Channel	Storm Drain Outlets & ID

0 600 1,200 ft

1 inch = 600 feet printed at 22x34

N

Sources: ESRI Basemap: Imagery, Transportation; Sonoma County GIS: City Limits; Winzler and Kelly GIS: Creeks, Storm Drain System.

WINZLER & KELLY

www.w-and-k.com

Cartography AF	Date 5/13/2011	Project # 0241809039
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Figure 2-1
Existing Storm Drain System

Storm Drain Master Plan

City of Sonoma

Figure 3-4. Montini Open Space Preserve - New Trail System

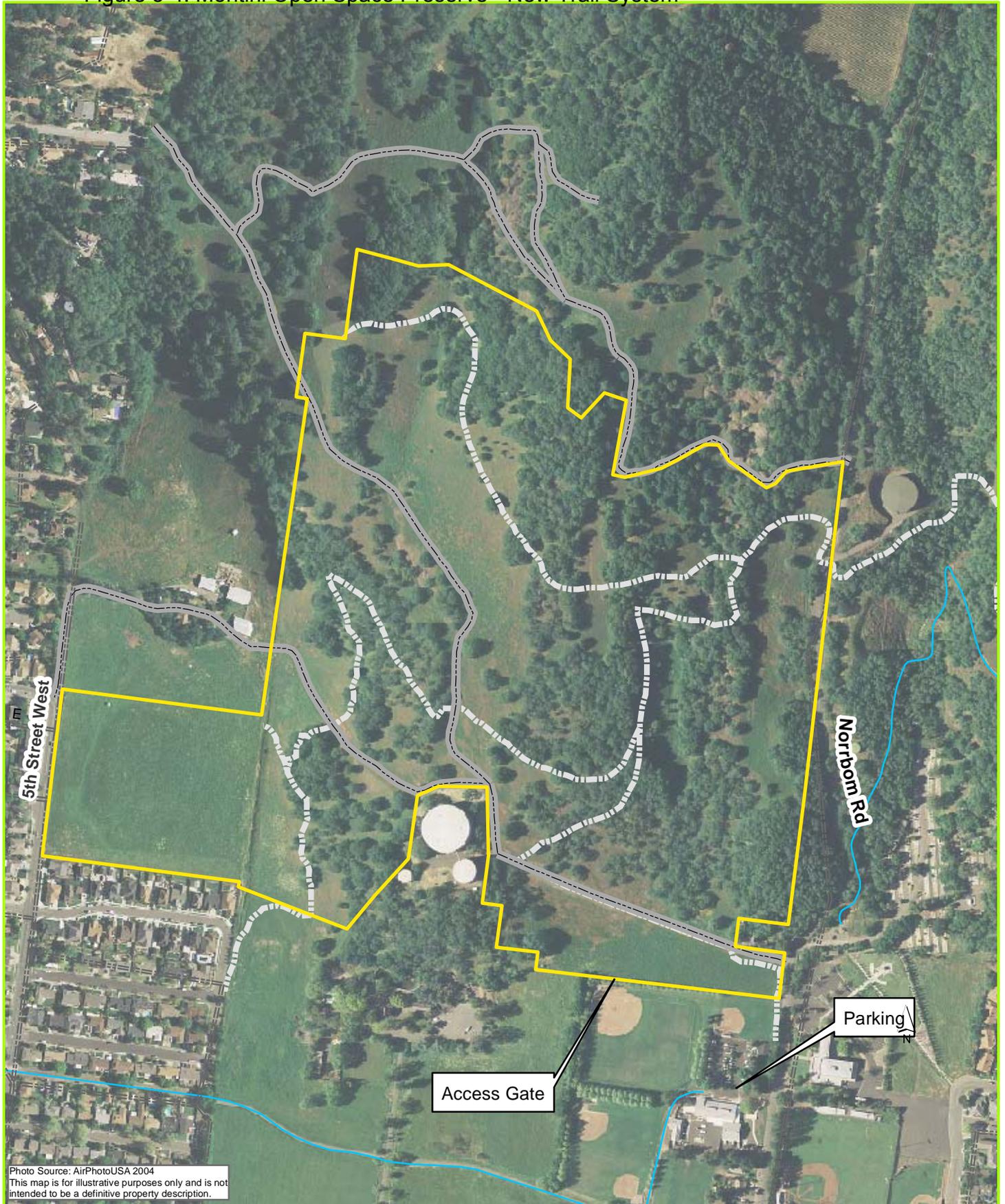
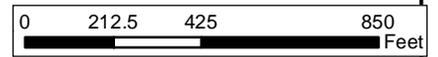


Photo Source: AirPhotoUSA 2004
 This map is for illustrative purposes only and is not intended to be a definitive property description.

**Montini
 Open Space Preserve
 Volunteer Patrol Map**

- Montini Open Space Preserve
- Streets
- Existing Roads and De Facto Trails
- Proposed Trail
- Overlook Trail and other Regional Trails



Appendix 1

Environmental Mitigation during Construction

The Sonoma County Water Agency's Environmental Resources staff will implement regulatory agency conditions/measures, mitigation measures and applicable best management practices to insure compliance during all work activities.

Best management practices typically implemented on projects of similar size and scope include measures identified below as applicable:

1. Work within the stream/riparian corridor will be confined to the period of June 15 to October 15.
2. No phase of the project will be started if that phase cannot be completed prior to the onset of a storm event. Seventy-two-hour weather forecasts from the National Weather Service will be consulted prior to start up of any phase of the project.
3. Provide California Department of Fish and Wildlife (DFW) with written documentation that the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) have been informed about the project prior to the commencement of work in the stream zone. The Operator shall provide the USFWS and NMFS a current description and location of the proposed activity. If the USFWS and NMFS determine that take will occur, then a copy of the Federal Permit (Section 7 or 10) shall be provided to the Department.
4. Within 48 hours prior to beginning of any excavation, clearing, or staging in or near the riparian area, the project site will be surveyed for active nests of breeding birds or raptors roosts; will be conducted by a qualified biologist (as determined by a combination of academic training and professional experience in biological sciences and related resource management activities). If any listed species are found, work will not start until USFWS has been contacted and has given their approval for work to continue. In addition, if any listed species are found, DFW will be contacted within 24 hours at (707) 944- 5520. If active nests are found, consult with DFW and the USFWS regarding appropriate action to comply with the Migratory Bird Treaty Act of 1918 and the Fish and Game Code of California.

For projects constructed in phases, a qualified biological monitor and Service-approved biologist will conduct nesting bird surveys each morning prior to construction.

6. Prior to clearing and grubbing operations, a qualified biologist will clearly mark/flag trees within the designated construction corridor that should be avoided or will be trimmed only as directed by the arborist. Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations. Vegetation outside the construction corridor shall not be removed or damaged without prior consultation and approval of a Department representative.

Where feasible, hand tools (chain saw, etc.) shall be used to trimmed vegetation to the extent necessary to gain access to the work sites. All cleared material/vegetation shall be removed out of the riparian/stream zone.

7. The disturbance or removal of vegetation will not exceed the minimum necessary to complete operations. Precautions will be taken to avoid other damage to vegetation by people or equipment. The disturbed portions of the stream channel within the normal high-water mark of the stream shall be restored to as near their original condition as possible.

8. A certified arborist will provide oversight for those portions of the project that will result in the destruction of or damage to, trees in the riparian area. The intent of the oversight is to minimize damage and retain trees that might otherwise be destroyed or damaged beyond saving.

9. Trenches shall be covered with plywood when project activities are not occurring. Temporary fencing shall be installed around bore pits and an ingress egress method shall be installed within the bore.

10. Erosion control measures shall be utilized throughout all phases of operation where sediment runoff from exposed slopes threatens to enter waters of the State. At no time shall silt laden runoff be allowed to enter the stream or directed to where it may enter the stream.

11. Debris, soil, silt, bark, rubbish, creosote-treated wood, raw cement/concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances which could be hazardous to aquatic life, resulting from project related activities, shall be prevented from contaminating the soil and/or entering the waters of the State. Any of these materials, placed within or where they may enter a stream or lake, by Applicant or any party working under contract, or with the permission of the Applicant, shall be removed immediately.

12. Building materials and/or construction equipment shall not be stockpiled or stored where they could be washed into the water or where they will cover aquatic or riparian vegetation.

13. The contractor shall not dump any litter or construction debris within the riparian/stream zone. All such debris and waste shall be picked up daily and properly disposed of at an appropriate site.

14. Spoils from the projects shall be properly disposed of outside the riparian zone.

15. Equipment shall not be operated in wetted areas (including but not limited to ponded, flowing, or wetland areas) or within the stream channel below the level of top-of-bank.

16. Any equipment or vehicles driven and/or operated adjacent to the stream shall be checked and maintained daily to prevent leaks of materials that if introduced to water could be deleterious to aquatic life, wildlife, or riparian habitat.

17. Refueling of construction equipment and vehicles may not occur within 300 feet of any water body, or anywhere that spilled fuel could drain to a water body. Tarps or a similar material shall be placed underneath construction equipment and vehicles, when refueling to capture incidental spillage of fuels. The project proponent will check and maintain equipment and vehicles operated in the project area daily to prevent leaks of fuels, lubricants or other liquids.

18. Mitigation measures and best management practices will be incorporated into contracts and a copy must be maintained at the project site and provided to the contractor and all subcontractors who work within the stream zone.

19. Disturbance or removal of vegetation shall be minimized. The site shall be stabilized through incorporation of appropriate Best Management Practices, including the successful reestablishment of native vegetation, to enhance wildlife habitat values, and to prevent and control erosion and sedimentation.

20. Corps permits do not authorize the take an endangered species. In order to legally take a listed species, you must have a separate authorization under the Endangered Species Act (ESA) (e.g., an ESA Section 10 permit or a Biological Opinion (BO) under ESA Section 7 with “incidental take” provisions with which you must comply.) The enclosed U.S. Fish and Wildlife Service (FWS) BO, dated September 21, 2009, contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with “incidental take” that is also specified in the BO. Your authorization under this Corps permit is conditional upon your compliance will all of the mandatory terms and conditions associated with incidental take authorized by the attached BO, whose terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the BO, where a take of the listed species occurs, would constitute an unauthorized take and it would also constitute non-compliance with this Corps permit. The FWS is the appropriate authority to determine compliance with the terms and conditions of its BO and with the ESA.

21. Whenever feasible, vegetation shall be removed during the non-breeding season.

Appendix 2
Applicable Sections from the Sonoma County Water Agency
Stream Maintenance Program (SMP) Manual
for Riparian and In-Stream Activities

1. From Section 7, Impact Reduction, minimization Measures, and Best Management Practices:
Table 7-1. Stream Maintenance Program Best Management Practices (32 Pages)
2. Appendix E: Vegetation Management Plan (22 pages)

Table 7-1. Stream Maintenance Program Best Management Practices

BMP ID	Name	BMP
General Impact Avoidance and Minimization		
GEN-1	Work Window	<ol style="list-style-type: none"> 1. All ground-disturbing maintenance activities occurring in the channel (i.e., from top-of-bank to top-of-bank) will take place during the low-flow period, between June 15 and October 31. Exceptions may be made for emergencies or on a project-by-project basis with advance approval of RWQCB, CDFG, NMFS, and/or USFWS as appropriate. 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 stream 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.
GEN-2	Staging and Stockpiling of Materials	<ol style="list-style-type: none"> 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. 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. 3. As necessary, to prevent sediment-laden water from being released back into waters of the Statethe channel 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. 4. Building materials and other maintenance-related materials, including chemicals and sediment, will not be stockpiled or stored where they could spill into water

Table 7-1. Cont.

BMP ID	Name	BMP
		<p>bodies or storm drains or where they will cover aquatic or riparian vegetation.</p> <ol style="list-style-type: none"> <li data-bbox="926 318 1923 626">5. 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 on-site temporary sediment stockpile or storage areas, to waters of the State, including surface waters or surface water drainage courses, outside of the active project site, is prohibited. No runoff from the project or staging areas may be allowed to enter waters of the State, including from stockpiled spoils, may be allowed to enter the creek channel or storm drains without being subjected to filtration (e.g., vegetated buffer, hay wattles or bales, silt screens). <li data-bbox="926 643 1923 756">6. During dry season, no stockpiled soils shall remain exposed and unworked for more than 30 days. During wet season, no stockpiled soils shall remain exposed, unless surrounded by properly installed and maintained silt fencing or other means of erosion control. <li data-bbox="926 773 1923 967">7. 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. Selection of the disposal location will be determined after the spoils have been tested for hazardous chemicals (see BMP HAZ-8).
GEN-3	Channel Access	<ol style="list-style-type: none"> <li data-bbox="926 984 1923 1114">1. Access points to the channel 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 possible. Temporary access points shall be sited and constructed to minimize tree removal. <li data-bbox="926 1130 1923 1260">2. In considering 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. <li data-bbox="926 1276 1923 1393">3. Personnel will use the appropriate equipment for the job that minimizes disturbance to and compaction of the stream bottom. Appropriately-tired vehicles, either tracked or wheeled, will be used depending on the site and maintenance activity.

Table 7-1. Cont.

BMP ID	Name	BMP
Air Quality Protection		
AQ-1	Dust Management (based on Bay Area Air Quality Management District's basic dust control measures for all sites)	<ol style="list-style-type: none"> 1. Water all active maintenance areas 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. Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain freeboard as necessary to prevent transported material from blowing from the trucks. 3. Sweep as necessary (with water sweepers or dry sweepers, as appropriate) all paved access roads, parking areas and staging areas at construction sites. 4. Sweep streets as necessary (with water sweepers or dry sweepers, as appropriate) if visible soil material is carried onto adjacent public streets.
AQ-2	Enhanced Dust Management (based on Bay Area Air Quality Management District's enhanced dust control measures for sites greater than 4 acres)	<ol style="list-style-type: none"> 1. As necessary, enclose, cover, water, or apply (non-toxic) soil binders to exposed stockpiles. 2. Limit traffic speeds on unpaved roads to 15 mph. 3. Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
Biological Resources Protection		
General Measures		
BR-1	Area of Disturbance	<ol style="list-style-type: none"> 1. Activities will avoid damage to or loss of native vegetation to the maximum extent feasible. 2. Soil disturbance shall not exceed the minimum area necessary to complete the operations as described.
BR-2	Pre-Maintenance Educational Training	<ol style="list-style-type: none"> 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 This training will include instruction

¹ A qualified biologist (including those specializing in botany, wildlife, and fisheries) is determined by a combination of academic training and professional experience in biological sciences and related resource management activities. SCWA may also utilize appropriately experienced and/or trained environmental staff. Resumes will be submitted to CDFG, USFWS and/or NFMS for approval prior to commencement of biological surveys, as stated in CDFG, USFWS and NMFS permit conditions.

Table 7-1. Cont.

BMP ID	Name	BMP
BR-3	Biotechnical Bank Stabilization	<p>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.</p> <p>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.</p>
BR-4	Impact Avoidance and Minimization During Dewatering	<p>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.</p> <p>1. All dewatering activities conducted in streams bearing state- or federally-listed salmonids shall comply with the terms and conditions of the Russian River Biological Opinion (summarized in BMP BR-18), and any other Biological Opinions and associated Consistency Determinations issued by NOAA or DFG for the SMP.</p> <p>2. Prior to dewatering, the best means to bypass flow through the work area will be determined to minimize disturbance to the 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 channels, such as concrete box culverts often used at road crossings.</p> <p>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.</p> <p>4. Instream cofferdams shall only be built from materials such as sandbags, clean gravel, or rubber bladders which will cause little or no siltation or turbidity. Visqueen shall be placed over sandbags to minimize water seepage into the maintenance areas. The visqueen shall be firmly anchored to the streambed to minimize water seepage. If necessary, the footing of the dam shall be keyed into the channel bed at an appropriate depth to capture the majority of subsurface flow needed to dewater the streambed.</p> <p>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</p>

Table 7-1. Cont.

BMP ID	Name	BMP
BR-5	Fish and Amphibian Species Relocation Plan	<p>required to prevent sediment from re-entering the wetted channel.</p> <ol style="list-style-type: none"> 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 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 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 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. 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. <ol style="list-style-type: none"> 1. All fish relocation conducted in streams bearing state- or federally-listed salmonids shall comply with the terms and conditions of the Russian River Biological Opinion (summarized in BMP BR-18), and any other Biological Opinions and associated Consistency Determinations issued by NOAA or DFG for the SMP. This measure will also apply to relocation of other special status species

Table 7-1. Cont.

BMP ID	Name	BMP
		<p>aquatic species (i.e., foothill yellow-legged frog and western pond turtle), and native aquatic species that could be relocated. Relocation for California red-legged frog will be conducted in accordance with BMPs BR-10 and BR-11 and any additional measures contained in the forthcoming SMP Biological Opinion issued by the USFWS.</p> <ol style="list-style-type: none"> 2. Prior to and during dewatering activities, native fish, tadpoles, and other vertebrates will be excluded from the work area by blocking the stream channel above and below the work area with fine-meshed net or screens. The bottom of the screens will be completely secured to the channel bed. Exclusion screening will be placed in areas of low water velocity to minimize fish impingement. Screens will be checked periodically and cleaned of debris to permit free flow of water. 3. The most efficient means for capturing fish will be determined and implemented. Complex stream habitat generally requires the use of electrofishing equipment, whereas in deep pools, fish may be concentrated by pumping-down the pool and then removing the fish by seining or dipnetting. Ample time will be scheduled to allow for a reasonable fish removal effort to be conducted. 4. Initial fish relocation efforts will be conducted several days prior to the start of maintenance activities. This provides the biologist an opportunity to return to the work area and perform additional electrofishing passes immediately prior to maintenance activities. 5. All native captured fish will be allowed to recover from electrofishing before being returned to the stream. 6. During dewatering, a qualified biologist will direct and monitor activities as necessary to net and rescue any additional fish and/or amphibians that may have become stranded throughout the dewatering process. 7. Prior to capturing fish and/or amphibians, the most appropriate release location(s) will be identified and used. The following issues will be considered when selecting release site(s): <ul style="list-style-type: none"> ▪ proximity to the project area; ▪ similar water temperature as capture location; ▪ ample habitat availability prior to release of captured fish;

Table 7-1. Cont.

BMP ID	Name	BMP
		<ul style="list-style-type: none"> ▪ presence of other same species so that relocation of new individuals will not upset the existing prey/predation function; ▪ low potential for relocated individual to transport disease; and ▪ low likelihood of fish reentering work site or becoming impinged on exclusion net or screen. <p>8. 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.</p>
BR-6	On-Call Wildlife Biologist	A qualified biologist will be on-call in southern Sonoma County and available to visit a project site at any point during maintenance activities in the event a special status species is encountered.
<i>Species-Related Measures</i>		
BR-7	Special Status Plants	<ol style="list-style-type: none"> 1. For projects located in areas where federally-listed plant species 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. If these species is observed in or near the project site, SCWA will follow the measures below as well as any additional measures contained in the forthcoming Biological Opinion issued by the USFWS for the SMP. The USFWS BO does not cover Sonoma white sedge (<i>Carex albida</i>) or many-flowered navaarretia (<i>Navarretia leucocephala</i> ssp. <i>plieantha</i>). SCWA will initiate ESA Section 7 consultation with USFWS if these species are found. 2. For projects located in areas where special status plant populations 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 special status plant occurrences. 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. 3. If discovered, special-status 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.

Table 7-1. Cont.

BMP ID	Name	BMP
		<p>4. Special-status plant species near the project site will be protected from temporary disturbance by installing environmentally sensitive area fencing (orange construction barrier fencing) around special-status 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 least 50 ft. from the edge of the population. Where special-status 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.</p> <p>5. 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.</p> <p>6. If impacts to state or federally listed plants are unavoidable, then the Agency 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 Agency, in conjunction with a qualified restoration ecologist and DFG 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. 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. 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</p>

Table 7-1. Cont.

BMP ID	Name	BMP
		<p>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.</p> <p>7. If appropriately timed focused botanical surveys cannot be conducted in areas identified as suitable for listed plants prior to vegetation management activities, then the Agency 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.</p>
BR-8	Nesting Migratory Bird and Raptor Pre-maintenance Surveys	<p>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.</p> <p>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 Program 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. 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.</p> <p>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 the CDFG. 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 CDFG shall be contacted. Buffers will be developed through consultation with CDFG. Buffers will remain in place until biologists determine that the young have successfully fledged or nests have been otherwise abandoned.</p>
BR-9	California Freshwater Shrimp Avoidance and Impact	Maintenance activities occurring along streams supporting California freshwater shrimp will be restricted to only conducting vegetation management and/or debris

Table 7-1. Cont.

BMP ID	Name	BMP
	Minimization for Vegetation Management	<p>removal above the water level. In addition, vegetation or debris overhanging into pools or glides (slow or slack water) within the natural reaches of Sonoma Creek will not be removed or altered.</p> <p><i>Note: The only stream maintained under the SMP that supports California freshwater shrimp is Sonoma Creek. This creek has natural and modified channels along its length, and does not have any engineered channels. Therefore, the only type of activity that will be conducted along Sonoma Creek is vegetation management for hydraulic easement purposes. Applying this BMP will ensure that stream channels which support California freshwater shrimp will retain habitat elements (e.g., undercut banks with exposed, fine roots of willows or alders, trailing vines and overhanging woody vegetation) and continue to provide habitat for this species.</i></p>
BR-10	California Red-legged Frog Avoidance and Impact Minimization Measures for Ground-Disturbing Activities	<ol style="list-style-type: none"> 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 biological monitor, or a biologist with an Incidental Take Permit, will inspect the area daily before the start of work and will be present during maintenance activities in sensitive habitats. If appropriate, SCWA will install exclusionary fencing. 4. In the event that a CRLF is encountered within the maintenance area, the USFWS Sacramento Field Office will be contacted within 48 hours of any CRLF observations, and a qualified biologist 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 CDFG regulations and permits. The biological monitor 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.

Table 7-1. Cont.

BMP ID	Name	BMP
BR-11	California Red-legged Frog Avoidance and Impact Minimization Measures for Vegetation Management	<ol style="list-style-type: none"> 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 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 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 biological monitor or a biologist with an Incidental Take Permit, will be on-site during project activity in sensitive habitats. The biological monitor 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. The USFWS Sacramento Field Office will be contacted within 48 hours of any CRLF observations.
BR-12	California Tiger Salamander Avoidance and Impact Minimization Measures for Sediment and Debris Removal	<ol style="list-style-type: none"> 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. Maintenance activities will be restricted to the streambed and avoid disturbance to adjacent upland habitat. 3. Sediment and debris removal activities shall minimize removal of upland vegetation and soil compaction. 4. If upland banks must be traversed by heavy equipment to access a streambed, the route will be located where no small mammal burrows are present and will be delineated by temporary fencing to minimize upland habitat disturbance. 5. If burrows or other suitable aestivation habitat are present where sediment or debris removal activities are proposed, a qualified biological monitor or a biologist with an Incidental Take Permit will be on call during project activity in proximity to upland CTS habitat. The biological monitor will have the authority to stop work

Table 7-1. Cont.

BMP ID	Name	BMP
		<p>if a CTS is encountered until such a time as the animal is moved to an area away from the project site.</p> <ol style="list-style-type: none"> 6. 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. 7. In the event that a California tiger salamander is encountered within the maintenance area, a biologist with an Incidental Take Permit, or biologist approved by the USFWS, 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 CDFG regulations and permits. 8. The USFWS Sacramento Field Office will be contacted within 48 hours of any California tiger salamander observations.
BR-13	California Tiger Salamander Avoidance and Impact Minimization Measures for Bank Stabilization	<ol style="list-style-type: none"> 1. For bank stabilization activities occurring in areas where California tiger salamander 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 biological monitor or a biologist with an Incidental Take Permit, will be on call during project activity in proximity to upland CTS habitat. The biological monitor will have the authority to stop work if a 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. 4. In the event that a California tiger salamander is encountered within the maintenance area, a biologist with an Incidental Take permit, or biologist approved by the USFWS, 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

Table 7-1. Cont.

BMP ID	Name	BMP
BR-14	California Tiger Salamander Avoidance and Impact Minimization Measures for Vegetation Management	<p>applicable USFWS and CDFG regulations and permits.</p> <ol style="list-style-type: none"> 5. The USFWS Sacramento Field Office will be contacted within 48 hours of any California tiger salamander observations. <hr/> <ol style="list-style-type: none"> 1. For vegetation management activities occurring in areas where California tiger salamander 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 California tiger salamander is identified as potentially present, then access across upland channel banks and adjacent upland habitats will be by foot only. Vehicles will be restricted to existing access roads. 3. A qualified biological monitor, or biologist with an Incidental Take Permit, will be on call during project activity in proximity to upland CTS habitat. The biological monitor will have the authority to stop work if a 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 California tiger salamander is encountered within the maintenance area, a biologist with an Incidental Take Permit, or biologist approved by the USFWS, 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 CDFG regulations and permits. 5. The USFWS Sacramento Field Office will be contacted within 48 hours of any California tiger salamander observations.
BR-15	Foothill Yellow-legged Frog Avoidance and Impact Minimization Measures for Ground-Disturbing Activities	<ol style="list-style-type: none"> 1. For ground-disturbing activities occurring in areas where foothill yellow-legged frog 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. A qualified biologist will inspect the maintenance area daily before the start of work. If appropriate, SCWA will install exclusionary fencing. In the event that foothill yellow-legged frogs are encountered within the maintenance area, a qualified biologist will move the frog to a safe location outside of the maintenance area. Actions taken to move foothill yellow-legged frog will be consistent with

Table 7-1. Cont.

BMP ID	Name	BMP
		<p>applicable CDFG regulations and permits.</p> <ol style="list-style-type: none"> 3. If dewatering a creek segment is required, a qualified biologist will conduct visual and dipnet surveys and move captured frogs and tadpoles to a safe location in the creek. Actions taken to move foothill yellow-legged frog will be consistent with applicable CDFG regulations and permits. 4. CDFG will be notified within 48 hours of any foothill yellow-legged frog observations.
BR-16	Foothill Yellow-legged Frog Avoidance and Impact Minimization Measures for Vegetation Management	<ol style="list-style-type: none"> 1. For vegetation maintenance activities occurring in areas where foothill yellow-legged frog has been identified as potentially occurring (see SMP Manual Table 7-3), a qualified biologist will conduct pre-maintenance surveys of aquatic habitats and identify potential foothill yellow-legged frog breeding and foraging areas. These areas will be flagged and avoided by maintenance crews. 2. Based on surveys, if foothill yellow-legged frog is identified as potentially present, then field crews will access channel banks by foot only and will avoid entering open water. Vehicles will be restricted to existing access roads.
BR-17	Western Pond Turtle Pre-maintenance Surveys for Ground-Disturbing Activities	<ol style="list-style-type: none"> 1. For projects located in areas where western pond turtle 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 instream habitat for the western pond turtle is present in the maintenance area, a qualified biologist 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 CDFG 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 CDFG regulations and permits. 4. CDFG will be notified within 48 hours of any western pond turtle observations.
BR-18	Zone 1A Salmonid Avoidance and Impact Minimization Measures	<p>These conditions apply to steelhead-bearing streams identified in the BO as: Laguna de Santa Rosa, Copeland Creek, Santa Rosa Creek, and Windsor Creek.</p>

Table 7-1. Cont.

BMP ID	Name	BMP
	(based on NMFS Russian River BO issued on September 24, 2008)	<p>SCWA will not perform any flood control maintenance activities in the Mark West Creek mainstem or tributaries of Mark West Creek upstream of the confluence with its largest tributary, the Laguna de Santa Rosa. As such, maintenance activities conducted on Wikiup or Fulton Creeks are not covered under the Zone 1A BO and will require a separate consultation with NMFS.</p> <p>Sediment maintenance activities conducted in steelhead-bearing streams will comply with the terms and conditions of Reasonable and Prudent Measure 5 of the Russian River BO for Zone 1A, which states:</p> <ol style="list-style-type: none"> 1. Term and Condition A: SCWA shall isolate work areas located in aquatic habitat from the flowing stream and relocate listed salmonids prior to proceeding with in-channel work for food control maintenance or habitat enhancement: <ul style="list-style-type: none"> ▪ retain a qualified biologist with expertise in anadromous salmonid biology; ▪ the biologist shall be onsite during all dewatering events; ▪ all captured salmonids will be properly cared for; ▪ if any salmonids are found dead or injured, the Santa Rosa Area NMFS office will be contacted immediately; and ▪ NMFS staff or persons designated by NMFS will be allowed on-site during dewatering activities. 2. Term and Condition B: at all channel maintenance sites in Zone 1A, SCWA will: <ul style="list-style-type: none"> ▪ check construction equipment for leaks each day prior to conducting work in the channel; ▪ ensure that all fill material for cofferdams is fully contained; ▪ ensure that all diversion pumps are screened in compliance with NMFS' and CDFG's fish screening criteria; ▪ ensure that coffer dams are properly sized and maintained throughout the duration of maintenance activities; and ▪ ensure that all material is removed after completion of the project. 3. Term and Condition C: SCWA will provide NMFS and DFG with reports on

Table 7-1. Cont.

BMP ID	Name	BMP
		<p>construction-related and fish relocation activities by February 15 of the year following maintenance.</p> <p>4. Term and Condition D: SCWA will reduce impacts on habitat complexity:</p> <ul style="list-style-type: none"> ▪ all work in natural channels, except for revegetation activities, will be conducted between June 15 and October 15; ▪ no work will be started that cannot be completed before the onset of a storm event; ▪ vehicles may be driven in the dry streambed only as necessary to accomplish work; ▪ all exposed/disturbed areas on upper stream banks within the project site will be stabilized; ▪ install erosion control measures to divert runoff to stable areas; ▪ all new riprap will be planted with willows or other native trees; ▪ no grouted riprap shall be installed; ▪ bioengineering techniques shall be incorporated into all bank stabilization projects; ▪ when grading gravel bars, a buffer of 25 feet or 10 percent of the maximum bar width, whichever is greater, shall be maintained; ▪ SCWA will construct a low flow channel at sediment removal sites in Zone 1A to provide enhanced migration habitat through sediment removal areas. <p>5. Sediment removal project designs will be submitted to NMFS and DFG 60 days prior to implementation for approval.</p> <p>6. The low flow channel shall be monitored at least two times in-between large storm events during the winter period to assess its function as a migration corridor and impact on stream stability.</p>
BR-19	Zone 2A and 3A Salmonid Avoidance and Minimization Measures	<i>[placeholder for forthcoming NMFS BO for Zone 2/3A. Until then, BR-18 will be utilized for salmonid-bearing streams.]</i>

Table 7-1. Cont.

BMP ID	Name	BMP
Cultural Resources Protection		
CR-1	Cultural Resources Investigation	<p>For maintenance activities which require excavation into native soils (e.g., bank stabilization, culvert replacement, etc.), and for all new sediment disposal sites, a cultural resources investigation shall be conducted by a qualified professional archeologist prior to performing the maintenance activity. The cultural resources investigation shall include the following elements:</p> <ol style="list-style-type: none"> <li data-bbox="926 508 1923 846"> <p><i>1. Background Research and Native American Consultation.</i> 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.</p> <p>In conjunction with the background research, the appropriate Native American organization 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.</p> <li data-bbox="926 1008 1923 1404"> <p><i>2. Pedestrian Survey.</i> 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 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 1/4-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</p>

Table 7-1. Cont.

BMP ID	Name	BMP
		<p>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.</p> <p>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).</p> <p>3. <i>Documentation.</i> 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 document, a copy will be provided to the 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 SCWA 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.</p> <p>4. <i>Management Requirements.</i> 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.</p> <ul style="list-style-type: none"> ▪ <i>Archaeological and Native American Monitoring:</i> SCWA 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

Table 7-1. Cont.

BMP ID	Name	BMP
		<p>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 SCWA 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 SCWA. 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.</p> <ul style="list-style-type: none"> ▪ <i>Cultural Resources Monitoring Plan:</i> If monitoring is the preferred recommendation, a cultural resources monitoring plan shall be prepared by a qualified professional archaeologist. Prior to finalization of such document, 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: <ul style="list-style-type: none"> - Training program for all construction involved in site disturbance and field workers; - Person(s) responsible for conducting monitoring activities, including Native American monitors; - How the monitoring shall be conducted and the required format and content of monitoring reports, including any necessary archaeological re-survey; - Person(s) responsible for overseeing and directing the monitors; - Schedule for submittal of monitoring reports and person(s) responsible for review and approval of monitoring reports; - Procedures and construction methods to avoid sensitive cultural resource areas; - Clear delineation and fencing of sensitive cultural resource areas

Table 7-1. Cont.

BMP ID	Name	BMP
CR-2	Previously Undiscovered Cultural Resources	<p>requiring monitoring;</p> <ul style="list-style-type: none"> - 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 SCWA, 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, SCWA 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, and SCWA, 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 SCWA for review and approval. Prior to finalization of such document, 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.
<p><i>Inadvertent Discoveries:</i> 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</p>		

Table 7-1. Cont.

BMP ID	Name	BMP
		<p>chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking 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 SCWA. Maintenance will not resume until authorization is received from the SCWA.</p> <ul style="list-style-type: none"> ▪ In the event of unanticipated discovery of archaeological indicators during construction, SCWA 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. ▪ 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, SCWA will implement an ADRP, prepared by a qualified archaeologist, as outlined under BMP CR-1. <p><i>Discovery of Human Remains:</i> If potential human remains are encountered, SCWA 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.</p>
CR-3	Previously Undiscovered Paleontological Resources	<p>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. SCWA 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. SCWA shall be responsible for ensuring that the recommendations of the paleontologist regarding treatment and reporting are</p>

Table 7-1. Cont.

BMP ID	Name	BMP implemented.
Hazardous Materials Safety		
HAZ-1	Spill Prevention and Response Plan	<p>The Agency 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:</p> <ol style="list-style-type: none"> 1. 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; 2. 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. 3. 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. 4. 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. <p>The Agency will routinely inspect the work site to verify that the Spill Prevention and Response Plan is properly implemented and maintained. The Agency will notify contractors immediately if there is a noncompliance issue and will require compliance.</p> <p>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 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.</p> <p>As defined in 40 CFR 110, a federal reportable spill of petroleum products is the spilled quantity that:</p> <ul style="list-style-type: none"> ▪ 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.

Table 7-1. Cont.

BMP ID	Name	BMP
HAZ-2	Equipment and Vehicle Maintenance	<p>If a spill is reportable, the contractor’s superintendent will notify the Agency, and the Agency 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 appropriate RWQCB 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.</p> <p>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 Agency 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 Agency, DTSC, and the RWQCB.</p> <ol style="list-style-type: none"> 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 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 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, sandbags, 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

Table 7-1. Cont.

BMP ID	Name	BMP
		<p>removed from the site.</p> <ol style="list-style-type: none"> 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.
HAZ-3	Equipment and Vehicle Cleaning	<ol style="list-style-type: none"> 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 SCWA's maintenance center.
HAZ-4	Refueling	<ol style="list-style-type: none"> 1. No fueling shall be done in the channel (top-of-bank to top-of-bank) unless equipment stationed in these locations cannot be readily relocated (e.g., pumps and generators). 2. All off-site fueling sites (e.g., on access roads above the top-of-bank) shall be equipped with secondary containment and avoid a direct connection to underlying soil, surface water, or the storm drainage system. 3. For stationary equipment that must be fueled on-site, secondary containment, such as a drain pan or drop cloth, 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	<ol style="list-style-type: none"> 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

Table 7-1. Cont.

BMP ID	Name	BMP
		<p>water or water contaminated with the aforementioned materials shall not be allowed to enter receiving waters or the storm drainage system.</p> <ol style="list-style-type: none"> 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	<p>Upon selection of maintenance project locations, the Agency 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). For any proposed maintenance sites located within 1,500 feet of any "open" sites where contamination has not been remediated, the Agency will contact the RWQCB case manager listed in the database. The Agency will work with the case manager to ensure maintenance activities would not affect cleanup or monitoring activities or threaten the public or environment.</p> <p>If hazardous materials, such as oil or paint cans, are encountered at the maintenance sites, the Agency will carefully remove and dispose of them according to the Spill Prevention and Response plan. Agency staff will wear proper protective gear and store the waste in an appropriate hazardous waste container until it can be disposed at a hazardous waste facility.</p>
HAZ-7	Fire Prevention	<ol style="list-style-type: none"> 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 (as issued by the relevant Air Pollution Control District), 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

Table 7-1. Cont.

BMP ID	Name	BMP
HAZ-8	Testing and Disposal of Spoils	<p>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).</p> <p>As specified in the Sediment Sampling and Analysis Guidelines (SMP Manual Appendix B), after selecting potential sediment disposal locations and prior to disposing of excavated sediment, the Agency 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.</p> <p>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.</p>
Vegetation Management		
VEG-1	Removal of Existing Vegetation	<ol style="list-style-type: none"> 1. Vegetation pruning and removal activities will be conducted under the guidance of a staff biologist or certified arborist. For tree relocation activities, a botanist, certified arborist, or other vegetation specialist will be on site to help direct maintenance activities and to consult if questions and/or issues arise. 2. Only vegetation that is noxious, invasive, hazardous, or could obstruct 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 (<i>Quercus</i> spp.) 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 (<i>Alnus</i> spp.) and cottonwoods (<i>Populus</i> spp.) are the second priority for preservation; these single-trunked species offer the benefit

Table 7-1. Cont.

BMP ID	Name	BMP
		<p>of improved flood conveyance and reduced roughness by comparison with multi-trunked species.</p> <ol style="list-style-type: none"> 4. Vegetation will be removed and/or pruned in such a manner that 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, <i>phasing of removal</i> 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 stream shading, and add vertical complexity to the riparian corridor. 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 (<i>Salix lasiolepis</i>). 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	Use of Herbicides	<ol style="list-style-type: none"> 1. All herbicide use shall be consistent with all Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) label instructions and any use conditions issued by the Sonoma County Agricultural Commissioner.

Table 7-1. Cont.

BMP ID	Name	BMP
		<ol style="list-style-type: none"> 2. Herbicide use will be restricted to the minimum amount needed to ensure adequate control of vegetation. 3. Application of herbicides to upland areas shall not be made within 72 hours of predicted rainfall. 4. Herbicides will not be directly applied to waters of the U.S., such as for ludwigia eradication. 5. Herbicides, 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. This includes areas in Zones 1A and 3A, as well as Zones 8A and 9A (see SMP Manual Figure 3-29 for detail on where these areas are located.) The Agency will review the details and exceptions in the court order and comply with the herbicide use buffers as appropriate. 6. As required by the Court-Ordered Stipulated Injunction for pesticide use near Pacific salmon-supporting waters in Sonoma County, pesticides specified in the injunction including triclopyr (Renovate©) will not be used within 20 yards of salmon-supporting waters. The Agency will review the details and exceptions in the court order and comply with the herbicide use buffers as appropriate.
VEG-3	Planting and Revegetation After Soil Disturbance	<ol style="list-style-type: none"> 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. 6. Revegetation shall be regularly monitored for survival for at five years or until minimum survival/cover is achieved. If invasive species colonize the area, action shall be taken to control their spread; options include hand and mechanical

Table 7-1. Cont.

BMP ID	Name	BMP
removal and replanting with native species.		
Water Quality and Channel Protection		
WQ-1	Apply Erosion Control Fabric to or Hydroseeding of Exposed Soils	<ol style="list-style-type: none"> 1. Upland soils exposed due to maintenance activities will be seeded and stabilized using erosion control fabric or hydroseeding. The 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. 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	After sediment removal, the channel shall be graded so that the transition between the existing 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 channel.
WQ-3	In-Channel Grading	<ol style="list-style-type: none"> 1. Where pre-maintenance channel form exhibited desirable features, the channel bed will be regraded to mimic the channel form before work was conducted. 2. Where possible, grading may include channel enhancements such as excavation of a low-flow channel, development of a meander, or riffle/pool configurations. No

Table 7-1. Cont.

BMP ID	Name	BMP
		<p>channel grading will occur below the as-built design for the flood control channels.</p> <ol style="list-style-type: none"> If gravels that have the potential to be utilized for spawning are removed to conduct maintenance activities, the gravels will be carefully removed and stored where maintenance activities will not impact the quality of the gravel. The gravel shall be replaced as close to original conditions as possible upon completion of the maintenance activities. 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.
Good Neighbor Policies		
GN-1	Work Site Housekeeping	<ol style="list-style-type: none"> SCWA 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. 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	<ol style="list-style-type: none"> 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, SCWA will post and update information about the SMP and maintenance activities on their website (http://www.scwa.ca.gov/about_your_water/). 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 SCWA’s website. For high profile projects, at SCWA’s discretion, signs will be posted in the neighborhood to notify the public at least one week in advance of maintenance schedules, trail closures, and road/land closures as necessary and as possible.

Table 7-1. Cont.

BMP ID	Name	BMP
GN-3	Noise Control	<p>Signage used at work sites will provide contact information for lodging comments and/or complaints regarding the activities.</p> <ol style="list-style-type: none"> 1. With the exception of emergencies, normal work will be limited to normal business hours (8:00 a.m.–5:00 p.m.). Routine activities in residential areas will not occur on Saturdays, Sundays, or SCWA observed state holidays except during emergencies, or with approval by the local jurisdiction and advance notification of surrounding residents. 2. SCWA 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	<ol style="list-style-type: none"> 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 coordinated with the appropriate jurisdictional agency and scheduled to occur outside of peak traffic hours (7:00 – 10:00 a.m. and 3:00 – 6:00 p.m.) to the maximum extent practicable. and Any lane closures will include advance warning signage, a detour route and flaggers will be provided in both directions. When work is conducted on public roads and may have the potential to affect traffic flow, work will be coordinated with local emergency service providers as necessary to ensure that emergency vehicle access and response is not impeded. 2. Public transit access and routes shall be maintained to the extent feasible. If public transit would be affected by temporary road closures and require detours, affected transit authorities will be consulted and kept informed of project activities. 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. Roadway segments or intersections in the vicinity of project sites will be assessed to determine if they are at, or approaching an LOS that exceeds local standards. Maintenance traffic will avoid these locations to the extent feasible, either by traveling different routes or by traveling at non-peak times of day. 5. Adequate off-street parking will be provided or designated public parking areas

Table 7-1. Cont.

BMP ID	Name	BMP
GN-5	Odors	<p>will be used for maintenance workers' personal vehicles and maintenance-related vehicles not in use through the maintenance period.</p> <p>6. 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.</p> <p>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.</p>

Appendix E: Vegetation Management Plan

1. Introduction

This vegetation management plan describes the Stream Maintenance Program's (SMP's) approach and procedures for conducting vegetation management activities. This plan summarizes the planning steps taken prior to conducting vegetation maintenance work to ensure that the work is effective and also avoids, minimizes, and compensates for potential environmental impacts. This plan also describes how vegetation management activities are implemented and is consistent with the descriptions provided in the main body of the SMP Manual. The purpose of this plan is to provide a comprehensive and single summary of the SMP's vegetation management activities. This plan reflects the information presented in Chapters 5, 6, 7, 8, and 9 of the SMP Manual, as well as additional details describing the rationale and basis for vegetation management decisions and actions.

The vegetation management plan is divided into the following sections:

- Section 1: Introduction
- Section 2: Vegetation management planning approach and goals;
- Section 3: Vegetation classes for management planning;
- Section 4: Vegetation assessment and maintenance decision making
- Section 5: Description of vegetation maintenance activities
- Section 6: Impact reduction and best management practices (BMPs)
- Section 7: Mitigation for vegetation management activities
- Section 8: Annual work cycle and reporting
- Section 9: References

2. Vegetation Management Planning Approach and Goals

The planning approach for SMP activities, including vegetation management actions, is a five-step process that begins with large scale considerations and then focuses down to details informing maintenance at a specific project site. This planning approach was developed to avoid and minimize environmental impacts and to prioritize activities in a consistent manner. The five planning steps occur as follows:

1. **Maintenance Principles:** provide overarching guidance to avoid and minimize potential impacts while also prioritizing and potentially limiting maintenance activities;
2. **Framing Considerations:** provide more specific management and resource questions related to vegetation management activities;
3. **Goals:** describe desired outcomes for vegetation management activities;

4. **Vegetation Assessments:** are conducted to evaluate existing vegetation conditions, their functions, and to also assess the maintenance need; and
5. **Triggers:** are used to clearly define the need and timing for vegetation management activities.

These planning steps are described below in the remainder of Section 2 and in Sections 3 and 4.

2.1 Maintenance Principles

The following Maintenance Principles were developed to guide the SMP and ensure that maintenance activities are conducted in such a way to avoid and minimize potential impacts from routine activities:

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)

These principles are described in detail in the SMP Manual Chapter 5 and help guide the decision making process and avoid unnecessary removal.

2.2 Framing Considerations for Vegetation Management Activities

Five key considerations frame the context and approach for vegetation management activities. Recognizing these framing concepts helps provide consistency and guide each maintenance project.

- **Vegetation along flood control channels managed to accommodate natural recruitment and focused planting forms two discrete zones that should be managed separately but in parallel.** These are the toe and instream versus the side and upper bank zones. Toe and instream areas are managed to allow inundation tolerant species (alders (*Alnus* spp.), willows (*Salix* spp.), maples (*Acer macrophyllum*) and ash (*Fraxinus* spp.)) to naturally recruit and are augmented with additional plantings. This lower zone establishes and matures much more rapidly than the slower growing species that establish or are planted along the side and upper bank. Along many of the Agency's engineered channels this zone is in an early to middle seral stage (less than 10 -20 years old). Often flooding, scouring, and bank failures in the channel work to keep this zone in an early to middle seral stage. These species are also shorter lived, more exposed to stream changing flood events, and more likely to vary in overall cover, density, and species makeup than upper bank species. Species growing higher on the channels represent the longer term more permanent makeup of the riparian corridor and include the oaks (*Quercus* spp.), poplars (*Populus* spp.), boxelders (*Acer negundo*), and buckeye (*Aesculus californica*). Late seral

stage for this zone is anticipated to change little in terms of cover, density and species makeup, but takes decades to establish and mature, but will provide the densest stable riparian canopy over time.

- **Riparian vegetation benefits instream habitat by shading the 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, such as salmonids (NMFS 2008) and don't exclude native warm water fish assemblages which are also an important component of regional low gradient streams. Deeply rooted riparian vegetation pulls subsurface moisture up via the transpirational stream, in some cases depending on depth to groundwater and geologic constraints, keeping water in the channel. It also provides cover, forage, and breeding habitat for a variety of birds and other wildlife that use the streambank area. Shading provided by a mature riparian canopy can also hinder the growth of instream emergent vegetation, which in turn reduces the need for future instream vegetation management.
- **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 more desirable native species. This may occur to the point that entire channels are filled with fast-growing, invasive vegetation that further degrades habitat and water quality.
- **Excessive vegetation growth can decrease a channel's flood conveyance capacity.** This occurs in three ways. First, excess growth of instream and bank vegetation can obstruct the channel by reducing its cross sectional area and conveyance capacity of the floodway as a whole. Second, vegetation increases bed and bank friction or hydraulic roughness, resulting in bank erosion, 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. This effect is illustrated in photos in Figure 6-12 and 6-14 through 6-16 in the SMP Manual.
- **Riparian vegetation provides physical stabilization for bank and terrace surfaces through the growth of root structure.** Densely rooted vegetation in suitable locations provides appropriate boundary conditions (provide hard and soft structure that affects stream form) that further geomorphic equilibrium and channel stability. 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, stream function, and bank stabilization efforts.
- **Establishing adequate flood protection may require aggressive vegetation management.** In areas where creeks are closely bordered by developed land uses or agriculture, or have severely reduced floodplains, 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.

2.3 Vegetation Management Goals

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

- ensure that adequate flood conveyance capacity is maintained; and to
- develop a mature and complex riparian canopy and corridor comprised of native species that armors the side banks, stabilizes boundary conditions, offers habitat functions and beneficial uses including creek shading, provides aesthetic value, and reduces the need for future understory maintenance.

In most channels, meeting these goals will require balancing flood protection needs and habitat protection or enhancement opportunities. Although it is possible to identify an “ideal” or “target” vegetation configuration, it may not be possible to achieve this condition in all reaches of all channels. As described in SMP Manual Chapter 3 *Environmental Setting*, a range of channel vegetation conditions is observed in the SMP Program Area. SMP Manual Figure 5-1 synthesizes this range of conditions into a spectrum of channel characteristics, each with varying ecologic and habitat quality. Generally vegetation is managed toward the ideal spacing and arrangement of trees, shrubs, grasses and sedges as presented in Figures 8-2 and 8-3 of the SMP Manual.

Within this context and the goals stated above, 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 channel;
- to establish optimal boundary conditions that promote stream form and pattern stability
- to minimize flow obstructions; and
- to improve bank stability.

3. Vegetation Classes to Guide Management Actions

Three primary vegetation classes are identified in the SMP to help attain program goals, guide management activities, and provide appropriate mitigation (Section 7 below). These three vegetation classes include:

Class 1: Native Riparian Vegetation: Class 1 native vegetation (except for those species listed under Class 2, below) shall be retained wherever possible, and pruned or thinned where necessary so as to foster the development of a riparian canopy. Examples of native riparian vegetation include: white alder (*Alnus rhombifolia*), box elder (*Acer negundo*), big leaf maple (*Acer macrophyllum*), Oregon ash (*Fraxinus latifolia*), red willow (*Salix laevigata*), Pacific willow (*Salix lucida lasiandra*), Fremont’s poplar (*Populus fremontii*), and oaks (*Quercus* spp.) as appropriate. Additionally there are a number of native understory riparian shrubs suitable for flood control channels (depending on location) including: American dogwood (*Cornus sericea*),

Western spicebush (*Calycanthus occidentalis*), elderberry (*Sambucus* spp.), snowberry (*Symphoricarpos* spp.), hazelnut (*Corylus cornuta californica*), and a number of others. Most of these shrub and tree species are included in the SMP plant palette included in Figures 8-2 and 8-3 of the SMP Manual. The removal of such native vegetation will be avoided to the greatest extent possible.

Class 2: Problematic In-Channel Vegetation: Class 2 vegetation is identified as particularly problematic for flood management purposes. These species inhibit and prevent the establishment of a native riparian canopy and limit the beneficial uses that can be achieved in the riparian zone. Impact avoidance and minimization approaches applied for the removal and thinning of these species is described in the SMP Manual. This class of vegetation includes the following species:

- | | |
|---|--|
| 1. Cattails (<i>Typha</i> sp.) | 12. Sweet fennel (<i>Foeniculum vulgare</i>) |
| 2. Himalaya blackberry (<i>Rubus discolor</i>) | 13. Harding grass (<i>Phalaris aquatica</i>) |
| 3. Arroyo willow (<i>Salix lasiolepis</i>) | 14. Water primrose (<i>Ludwigia peploides montevidensis</i>) |
| 4. Giant reed (<i>Arundo donax</i>) | 15. Eucalyptus (<i>Eucalyptus</i> spp.) |
| 5. Pampas grass (<i>Cotaderia selloana</i> , and <i>C. jubata</i>) | 16. Tree of heaven (<i>Ailanthus altissima</i>) |
| 6. Indian bean (<i>Catalpa bignoniodes</i>) | 17. Acacia (<i>Acacia</i> spp.) |
| 7. Privet (<i>Ligustrum</i> sp.) | 18. White poplar (<i>Populus alba</i>) |
| 8. English and Algerian ivy (<i>Hedera helix</i> , <i>H. canariensis</i>) | 19. Lombardy poplar (<i>Populus nigra 'Italica'</i>) |
| 9. Periwinkle (<i>Vinca major</i> .) | 20. Tamarisk (<i>Tamarix</i> spp.) |
| 10. Red clusterberry (<i>Contoneaster</i> sp.) | 21. Rattlebox (<i>Sesbania punicea</i>) |
| 11. Brooms (<i>Spartium</i> and <i>Genista</i> spp.) | |

Class 3: Other Non Native Vegetation: Class 3 vegetation consists of non-native species that are not listed under Class 2, above. Examples of Class 3 vegetation include various landscaping species that are establishing in the flood control channels but are recognized as providing beneficial uses similar to their native counterparts. These species include: a variety of ash species (Modesto ash (*Fraxinus velutina*), green ash (*F. pennsylvanica*), raywood ash (*F. oxycarpa*), and evergreen ash (*F. uhdei*), London plane tree (*Platanus acerifolia*), and Carolina poplar (*Populus canadensis*).

4. Vegetation Assessment and Maintenance Prioritization and Decision Process

4.1 Vegetation Assessment

Understanding existing vegetation conditions in the flood control channels for which SCWA has maintenance responsibilities provides the basis for maintenance prioritization and decision making. SCWA undertakes a complete assessment of vegetation conditions in the program flood control channels annually, typically in the spring season. In order to evaluate the need to conduct vegetation maintenance, an assessment of the stream channels must be conducted. The following questions guide the assessment process. This information is recorded in the data forms for the annual vegetation assessment.

A. Understand channel hydrologic and geomorphic context and setting:

- 1) What geomorphic processes are dominant in the channel? Is the channel generally erosional or depositional? In general, more roughness (vegetation) is allowed in erosional reaches than depositional reaches.
- 2) What is the available conveyance capacity? Consider field evidence as well as hydraulic/modeling studies (if available). Evaluate elevation of debris drift lines, deposited sediment, and consider elevation and risk of bankfull flows.
- 3) Estimate existing channel roughness and vegetation condition based on annual inspections.

B. Assess specific in-channel vegetation conditions:

- 1) Identify the in-channel and bank vegetation types.
- 2) Evaluate the relative composition and how much of the channel vegetation is native (and riparian suitable) versus non-native and problematic invasive species.
- 3) Assess channel reach for evidence of vegetation obstructing flows, accumulating other debris, deflecting flows and causing bank scouring, or directing flows toward other infrastructure, toward banks, or causing other flow related issues. Excessive bank scour is considered when more than 1 ft. of bank is actively eroded in the lateral dimension.
- 4) Consider the ecology and functions of the existing channel vegetation. Is the existing vegetation providing nesting, cover, or other supportive functions for specific species or their habitats? Is the existing vegetation providing root wads/mass for overhanging banks? Is the existing vegetation providing significant shading? Is the existing vegetation weedy and capable of suppressing native species establishment.
 - i. Significant shading is considered when a tree provides important shade functions (i.e., shading over pools) and is likely the only tree in the area providing shade.

- ii. Consider the overall shade provided by existing vegetation – and if that shade is provided by the vegetation along the entire bank slope, just the upper bank, or just the lower bank?
- iii. Consider what would be the anticipated cover and growth habitat when the existing vegetation continues to mature. How would this trajectory affect the overall riparian ecology (beneficial or detrimental)?

4.2 Vegetation Management Triggers

During the vegetation assessment process, the SCWA maintenance manager also evaluates the channel vegetation conditions for specific conditions which would trigger or require vegetation management activities. In general, vegetation management is appropriate when any of the following conditions occur:

- Vegetation growth is significantly causing bank scour or decreasing flood conveyance capacity, particularly where infrastructure or adjacent properties are at risk;
- Invasive non-native plants are reducing the success of native vegetation recruitment; or
- Vegetation management offers good opportunities to improve habitat value for fish and wildlife.

These triggers are evaluated in the field by the SCWA maintenance manager or trained personnel whom have experience with regional vegetation and wetland ecology. Vegetation management actions which are triggered through the assessment process include removal, thinning, and preservation of vegetation. The decision to remove, thin, or preserve individual trees will be made in the field by SMP field staff familiar with regional vegetation and wetland ecology. The decision making process and rationale to preserve, remove, or thin vegetation is described below.

4.3 Rationale and Decision Making for Tree Removal and Thinning

Mature healthy trees

Mature, healthy, native trees are generally only removed if channel capacity is significantly limited or if the tree is creating unacceptably high hydraulic roughness in the channel and the situation cannot be rectified through limbing or pruning.

Sick, dying, or dead mature trees

Sick, dying, or dead mature trees may be removed if they are determined to be reducing channel capacity, increasing roughness, have the likely potential of falling into the 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 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 and 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.

This approach has been successfully used by cities including Seattle, WA and Victoria, B.C. (Williams 2001).

Factors for tree removal and thinning

Removal involves considering the tree in the context of its setting including a functional evaluation of the current and future ecological role being provided, the role that should be provided in this situation, what could or should be used to replace it or not, and how does it fit with the long term vision for the channel vegetation and morphology. Consideration for individual tree removal or thinning will be based on several factors including:

- What is the type and age of the tree? Are there a lot of these trees already in the channel reach? Are there better trees to preserve? Are there any natives nearby that could replace the function of the tree in question in the next year?
- What is the degree of blockage across the channel and where is the tree located in the channel?
- Can the individual tree be pruned or thinned (before consideration of removal) to provide the necessary conveyance capacity?
- Does the tree under consideration provide significant shade or other habitat benefits?
- Does the tree under question provide longer-term canopy development or riparian corridor benefits?

The rationale to either thin, prune, or remove trees are based on addressing these questions above. Answering these questions requires the oversight and guidance of a biologist or arborist that is familiar with the vegetation in the area and knowledgeable of channel botanical conditions.

Managing trees for their role/function in the channel

In general, trees are managed according to their location and spacing in the channel. The following bullets provide a summary of the decision process in evaluating tree removal, thinning, and preservation for specific locations across the channel cross-section.

- 1) **Upper bank:** generally native trees that are located on the upper side banks are retained unless they are a fall or safety hazard, have already fallen, or present an access issue.
- 2) **Mid bank (side bank):** generally native trees and shrubs that are located on the side banks are retained unless they are causing significant debris accumulation, causing bank scour, presenting a fall hazard, or are limiting access. Often native shrubs naturally recruited are retained in this area but are not actively planted.
- 3) **Lower bank (toe of bank):** generally native trees located at the toe and on the side bank are retained unless the following conditions occur:
 - a) presence of Arroyo willow with a very horizontal growth habit (cannot be pruned to grow upright);
 - b) there is other vegetation with horizontal or flow blocking growth and cannot be pruned to facilitate flows;

- c) vegetation is causing significant debris accumulation (whereby a debris pile deeper than 2 ft or covering more than 100 sq. ft. of lower bank or instream channel area is covered);
- d) vegetation is causing bank scour; or
- e) vegetation is presenting a considerable fall hazard.

4) **Instream:** vegetation is targeted for thinning and removal when:

- an aggressive stand of Arroyo willow is developing and significantly constricting channel capacity;
- instream vegetation is demonstrated to catch significant debris; or
- Instream vegetation is it causing excessive bank scour.

Exceptions to this thinning and removal approach include:

- when in channel trees show no evidence of bank scour and minimal debris accumulation.
- when single trunk or prunable red and Pacific willows, alder, Fremont poplar, bigleaf maple, and Oregon ash are observed. These species are generally retained in the channel, especially if they provide significant shade or are developing instream habitat that is not destabilizing the tree itself or the side bank.
- when the channel has enough capacity to allow trees well spaced (on approximately 30 foot centers) and upright to establish and mature in the channel.

Tree relocation opportunities

When a native tree requires removal, it will be evaluated for potential use in another location within the channel or at a different site. Trees that may be desirable include those with a single trunk that provide canopy such as alders, red willow, or Pacific willow. If it is determined that the tree may be used in another location where it would not present issues for channel flow or roughness, the tree will be removed with root structure intact, pruned to compensate for root damage, and immediately planted and watered. The vacated root structure site will be managed as a bank stabilization project and treated with bioengineered methods as described in SMP Manual Chapter 6, Section 6.4. Large red or yellow willows that require removal may also be cut into large sprigs and planted on the toe or mid-bank with the use of an auger.

Large woody debris removal and preservation

The flood control channels of the program area will also be assessed for the presence of large woody debris (LWD). Prior to conducting sediment removal activities, an effort will be taken to maintain and not remove large woody debris (LWD) that provides channel stability, anchors in-channel bars, or provides other habitat benefits. LWD, including tree stumps, 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 channel crossing or other facility. While the habitat benefits of LWD are sought in the program 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. If LWD would have the potential to adversely affect channel banks or conveyance capacity, the LWD would be removed from the channel. The preference is to relocate

the LWD to another location that would not affect banks or conveyance capacity and provide in-channel habitat for aquatic species. The LWD would be anchored in place and monitored annually. If no suitable locations are appropriate for LWD relocation, the piece will be chipped with other vegetation requiring removal and used as mulch.

5. Description of Vegetation Management Activities

Vegetation management refers to the trimming and removal of potentially problematic vegetation in engineered channels and other constructed facilities. The vegetation assessment process and the decision making process used to evaluate the need for removal or thinning are described above. In this section the techniques and procedures for vegetation maintenance are described, though some discussion of the assessment and selection process may also be covered.

Vegetation management activities also include the planting of new trees in engineered channels at the top-of-bank and just above the toe-of-slope. Vegetation management does not include any ground-disturbing activities except as described below.

Vegetation management activities described in this section includes:

- 5.1 General Information Related to Vegetation Work
- 5.2 Tree Pruning
- 5.3 Willow Pruning and Removal
- 5.4 Removal of Exotic Trees
- 5.5 Removal of Exotic Bushes
- 5.6 Removal of Exotic Aquatic Plants
- 5.7 Nursery Stock Tree Planting
- 5.8 Mowing Activities

Vegetation management at other non-channel facilities, including in-channel engineered structures, reservoirs, and sediment basins, is described in the SMP Manual Chapter 6, Section 6.5.3.

5.1 General Information Related to Vegetation Work

Non ground breaking vegetation work on the upper banks of stream channels may be conducted year round. If the channel is dry, and with notification and approval by the CDFG, non ground-disturbing vegetation thinning and pruning work may be conducted in the channel zone beyond the primary maintenance work window of June 15 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 the general period of implementation are shown below.

- Routine vegetation pruning and removal (trees, Ludwigia, cattails, blackberries) on the lower bank and in channel bed – June 15th to October 31st (with the potential for an extension dependent upon dry conditions and agency notification and approval).

- Tree planting, relocating, and/or transplanting – all year
- Upper bank planting, pruning, and removal, access road and v-ditch clearing – all year
- Nursery stock tree planting – December 1st to May 31st
- Mowing (access roads and dam faces) – March 1st to August 31st
- Access road herbicide spraying – April 1st to May 31st

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 channels may require annual vegetation management while others do not. This largely depends on the type of vegetation in the channel. For example, channels characterized by early seral cattails or young willows may need annual pruning while channels with a later seral mature riparian canopy (especially on the upper bank) generally require less vegetation thinning and removal to maintain flow capacity.

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 blackberries, or a backhoe or rubber-tracked excavator that is used for removing material from the channel.

Herbicides are used sparingly, mostly for persistent blackberry patches or applied to cut arroyo willow stumps or other exotic woody species targeted for removal following functional evaluation. In these cases, herbicides are applied carefully with a hand applicator. For context, only 30-40 gallons of herbicides are used annually under the SMP for in-channel vegetation treatment. These are used sparingly for the hand sprayer application to blackberries (Section 5.5 below) and hand painted application to cut arroyo willows (Section 5.3 below).

Vegetation management activities vary depending on the type of facility involved. While the methods described here are the common practices of SCWA, maintenance techniques may shift over time and by location depending on site constraints and new technologies. The following sections describe more specific aspects of vegetation management activities.

5.2 Tree Pruning

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

In the top-of-bank area outside the stream channel (including the access road and adjacent above channel area), healthy mature native trees are only trimmed if a limb is blocking the access road, hanging over a fence into a private yard, appears unbalanced or broken, or to maintain appropriate

spacing for access (targeted ideal spacing). Enough space will be maintained along the access road to allow maintenance and emergency vehicles.

Tree pruning considers the extent of local riparian canopy and vegetation in general. For example, if the active channel is fully shaded by early seral arroyo willow, the complete removal of which would expose the channel to direct sunlight, pruning and thinning techniques, such as allowing a narrow strip of vegetation to persist on the sides of the banks to shade the channel, will be used. This process is repeated for each tree assessed for removal. For example, if a privet is providing the only shade and vertical element along the channel it will be retained until such time as a replacement has developed to replace and improve the ecologic function. In other words, vegetation removal may be phased to reduce potential impacts of reducing channel shade. The reach will also be identified for planting of more desirable trees the following planting season.

Pruning on the bank side slopes usually requires careful hand clearing 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.

Pruning and removal of arroyo willows is the major activity related to vegetation management. This topic is addressed in the section below.

5.3 Willow Pruning and Removal

Arroyo willows are the most prominent vegetation maintenance issue in the SMP due to their rapid growth (over 1.5 inches in diameter per year) and the bushy structure of the plant which is effective at slowing flows and trapping debris. White alder, big leaf maple, Oregon ash, red and Pacific willow species are better suited to flood control channels because they generally form a single main trunk that can be limbed up and pruned so as not to extensively block the channel cross section. The rapid growth, multi-stemmed base, and bushy nature of arroyo willow generally prevent this type of management approach, though in some cases (especially where arroyo willow is the dominant tree along a stretch of channel), these trees are being managed toward a more upright stature. In general, arroyo willow pruning to form an upright tree requires considerably more management effort since the form of the tree is not naturally upright and the attempt is working against the central tendency of the tree. Species like red, yellow, and Pacific willow are retained where they do not present issues for flows or roughness, or where possible, are transplanted when feasible.

Willows are perhaps the most common channel vegetation type throughout the program area. Willows generally grow from the lower bank slope (near or at the toe-of-slope) and can grow into and across the channel bed quickly, often within a single season. SCWA generally conducts willow removal from June 15th to October 31st.

Arroyo willows will be removed wherever they are significantly impeding flows and reducing the channel conveyance capacity. If arroyo willows are not removed (in cases where the canopy is needed and channel integrity is not at risk), they will be pruned to minimize their ability to catch debris and impede the flow of water. Red and yellow willows will generally be retained, but be pruned to reduce the number of branches and trunks below the top of the channel banks.

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 (see SMP Manual Chapter 6, Section 6.5.5 for additional detail). Cut vegetation must then be removed from the 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 channel from top-of-bank, using a skid-steer with a grapple bucket, by angled pulls using a line and two vehicles, or using a winch on a truck or tractor.

In cases where arroyo willow root wads protrude from the channel bottom after limbs have been pruned, these are generally left in place but depending on the channel size and geometry, the root wad may require removal to reduce roughness on the channel bed. If necessary, removal of a root wad generally requires the use of heavy equipment such as an excavator. Arroyo willow removal may also be combined with sediment removal. In such cases, the channel is cleared of both sediment and arroyo willow roots in order to increase channel capacity and to decrease the rate of return of arroyo willows (see SMP Manual Chapter 6, Section 6.3.2).

5.4 Removal of Exotic Trees

Non-native, invasive trees (e.g., tree of heaven, acacia, white poplar Lombardy poplar, eucalyptus, Indian bean and London plane tree) may be cleared from the top-of-bank area or within the channel.

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 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.

5.5 Removal of Exotic Bushes

Non-native, invasive bushes (e.g., blackberry, privet, brooms, red clusterberry, and ivy), may be cleared from the top-of-bank area or within the channel.

Blackberries are commonly found in reaches with little to no riparian canopy. This species generally grows from the bank slope, particularly near (or at) the toe-of-slope and can grow into and across the channel bed quickly, often within a single season. Blackberries are generally removed using a bladed weed-eater, or an excavator or Bobcat® with a flail mower attachment. Stalks are then raked together, picked up, and removed from the site using a dump truck. If a technique is used such as a flail mower or other violent chopping machine, efforts to remove all slash, sawdust, cuttings, etc. will be taken to leave the site free of significant quantities of vegetative debris. Remaining cut stalks are then sprayed with an herbicide (generally AquaMaster®) using a small backpack sprayer to control re-growth. The development of a canopy encouraged by tree planting also helps to reduce the re-growth of blackberries.

Other invasive bush species are removed using similar methods as for blackberries. However, herbicides are not applied on other species.

5.6 Removal of Exotic Aquatic Plants

The majority of vegetation removed from the channel bed portions of maintenance sites are cattails and water primrose (*Ludwigia*).

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 channel is cleared of both sediment and cattails using methods described in SMP Manual Chapter 6, Section 6.3.2 in order to increase 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. Over the long-term, cattail growth is further discouraged by the development of a canopy over the channel, strategic planting of cattail competitors, and the establishment of a low-flow channel.

Water primrose (*Ludwigia peploides montevidensis*) is an invasive, exotic, aquatic weed found in apparently increasing occurrence on the west coast as well as nationally. The species occurs in the Russian River as well as in the Laguna de Santa Rosa (Laguna) and in tributaries to the Laguna system. This plant can completely fill channels and accelerate sediment deposition (SMP Manual Figure 6-16). However, *Ludwigia* also provides some beneficial function similar to the native species (*Ludwigia peploides peploides*) including, toe stabilization, nutrient exchange and uptake, and cover for young fish and amphibians. While these functions may not be enough to support the presence in Agency flood control channels, it does provide sound reasoning for leaving it in a channel with no other emergent cover.

Ludwigia growth and channel blockages have been observed in some of the low-lying flood control channels of the Program Area draining to the Laguna de Santa Rosa west of Highway 101. Generally, in most SCWA flood control channels streamflow rises above the *Ludwigia* patches and is not necessarily problematic in conveying flood flows. SCWA anticipates that the need to manage *Ludwigia* and the appropriate methodology will be developed during the ongoing implementation of the SMP. *Ludwigia* removal activities will be conducted between June 15th and October 31st.

Mechanical removal will be the primary method of control for *Ludwigia* and will generally be conducted using a long-reach excavator from maintenance roads adjacent to the project site channel. Where the channel is too wide, the excavator may occasionally travel partially down the bank in areas that will not impact existing native and riparian vegetation. The excavator will work from the mid-bank position, thus reducing the need for multiple trips along the bank slope by smaller equipment. Aquatic harvesters may be used to remove vegetation from the main Laguna channel.

5.7 Nursery Stock Tree Planting

Planting of nursery stock trees typically occurs from December 1st to May 31st. This is timed during the typically wetter months of the year so that newly planted trees have the opportunity to establish before the hotter and drier summer months. Planted nursery stock trees are generally

planted as 1 to 15 gallon container trees. Once planted, trees are monitored and watered by hand during the dry season as necessary for approximately 2 to 3 years or until established. Trees planted on the upper bank require irrigation longer than those located closer to the toe-of-slope. Some trees planted near the toe-of-slope may not require irrigation (although all planted trees will be monitored for watering needs).

Trees are planted just up from the toe-of-slope and along the top of the bank slope. Trees planted along the top-of-bank may include big leaf maple, oaks, box elder, buckeye, and Fremont poplar. Trees planted at the ordinary high water mark, slightly above the toe-of-slope may include alders, ash, maples, and red or yellow willows. Trees will be spaced appropriately to allow room for a mature tree canopy to develop (typically 30 ft. on center) and thinned later as necessary to maximize canopy yet retain channel capacity.

The SMP Manual includes recommended plant palettes according to channel geomorphic form. These are shown in SMP Manual Table 8-3 and Figures 8-2 and 8-3. All listed plants are native riparian species found in Sonoma 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. Planting is expected to improve boundary conditions that set basic stream dimension and function, thereby improving stream stability.

5.8 Mowing

Grasses in the top-of-bank area are mowed up to three times annually using a flail mower where space allows or with hand-held tools such as a weed-whacker where a flail mower is not practical. If a flail mower or other violent chopping machine is used, then all slash, sawdust, cuttings, will be left in place as mulch (except in the active channel).

6. Impact Reduction, Minimization Measures, and Best Management Practices (BMPs)

SMP Manual Table 7-1 includes three specific BMPs to avoid or minimize potential impacts from vegetation management activities. BMP measure VEG-1 *Removal of Existing Vegetation* requires preservation of as much existing vegetation as 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 possible to reduce impacts from machinery. BMP measure VEG-2 *Use of Herbicides* will ensure the use and handling of herbicides for maintenance activities is consistent with federal, state, and local regulations. BMP measure VEG-3 *Planting and Revegetation after Soil Disturbance* ensures that work sites are properly replanted and monitored for successful revegetation. The complete description of these measures is provided below.

BMP ID	Name	BMP
VEG-1	Removal of Existing Vegetation	<ol style="list-style-type: none"> 1. Vegetation pruning and removal activities will be conducted under the guidance of a staff biologist or certified arborist. For tree relocation activities, a botanist, certified arborist, or other vegetation specialist will be on site to help direct maintenance activities and to consult if questions and/or issues arise. 2. Only vegetation that is noxious, invasive, hazardous, or could obstruct 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 (<i>Quercus</i> spp.) 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 (<i>Alnus</i> spp.) and cottonwoods (<i>Populus</i> 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. 4. Vegetation will be removed and/or pruned in such a manner that 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 flood flows 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 flood flows, and pruning into a “fan” roughly parallel to flow direction. In areas where extensive vegetation removal is desirable to maintain flood flow capacity, <i>phasing of removal</i> 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

		<p>mature trees that provide well developed overstory for bird habitat, canopy closure for stream shading, and add vertical complexity to the riparian corridor. 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 (<i>Salix lasiolepis</i>). Trees will never be topped as this encourages shrubby growth and weak branch attachments</p> <ol style="list-style-type: none"> 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. 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. 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	Use of Herbicides	<ol style="list-style-type: none"> All herbicide use shall be consistent with all Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) label instructions and any use conditions issued by the Sonoma County Agricultural Commissioner. Herbicide use will be restricted to the minimum amount needed to ensure adequate control of vegetation. Application of herbicides to upland areas shall not be made within 72 hours of predicted rainfall. Herbicides will not be directly applied to waters of the U.S., such as for Ludwigia eradication. Herbicides, 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. This includes areas in Zones 1A and 3A, as well as Zones 8A and 9A (see SMP Manual Figure 3-29 for detail on where these areas are located.) The Agency will review the details and exceptions in the court order and comply with the herbicide use buffers as appropriate. As required by the Court-Ordered Stipulated Injunction for pesticide use near Pacific salmon-supporting waters in Sonoma County, pesticides specified in the injunction including triclopyr (Renovate©) will not be used within 20 yards of salmon-supporting waters. The Agency will review the details and exceptions in the court order and comply with the herbicide use buffers as appropriate.
VEG-3	Planting and Revegetation After Soil Disturbance	<ol style="list-style-type: none"> 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. Revegetation will occur at a ratio of at least 1½: 1 to account for initial mortality of plantings. 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.
 6. Revegetation shall be regularly monitored for survival for at five years or until minimum survival/cover 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.
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7. Mitigation for Vegetation Management Activities

This section includes two aspects of the SMP's mitigation program for vegetation management activities. First, three additional environmental commitments are described which provide additional clarification or assurances to the information described above. Secondly, mitigation requirements for vegetation management activities are described. These requirements were developed in consultation with staff from the California Department of Fish and Game (CDFG) and the North Coast and San Francisco Bay Regional Water Quality Control Boards (RWQCBs).

7.1 Environmental Commitments for Vegetation Management

- SCWA will describe their vegetation management strategies in a *Vegetation Management Plan* that will be included as an appendix to the SMP Manual (this plan). The *Vegetation Management Plan* will include a discussion of relevant impact avoidance and minimization measures undertaken when planning and implementing vegetation management activities. Additionally, the vegetation management plan will describe the criteria and rationale used to identify and determine vegetation management actions and also describe the protocols used to remove or thin bank and in-stream vegetation.
- SCWA shall limit the removal of vegetation to plants and trees that directly affect the hydraulic capacity of the channels as described in the SMP Manual. SCWA will avoid and minimize impacts to the beneficial uses that vegetation provides including cover, shade, and aquatic habitat support.
- The SMP vegetation management approach includes developing and enhancing the riparian canopy throughout the SMP program area. This is achieved through the planting of native and suitable riparian vegetation, and the thinning and selective removal of non-suitable species. If and when vegetation thinning and removal are to occur, such actions should be implemented in a phased approach such that channel areas are not left wholly void of vegetation that provides shade. Mitigation requirements for vegetation removal are described below.

7.2 Mitigation for Vegetation Management

- SCWA shall mitigate for the loss of beneficial uses due to SMP vegetation management activities.
- To help clarify the mitigation requirements for the vegetation removal activities of the SMP, the following three vegetation classes have been identified:

Class 1: *Native Riparian Vegetation* - native vegetation (except for those species listed under Class 2, below) shall be retained wherever possible, and pruned or thinned where necessary so as to foster the development of a riparian canopy. Examples of native riparian vegetation include: white alder, big leaf maple, Oregon ash, red willow, Pacific willow, Fremont's poplar, and oaks as appropriate. The removal of such native

vegetation will be avoided to the greatest extent possible. Where such native vegetation has to be removed due to flood management considerations (leaning, down, diseased, or compromising channel integrity), the following limitations and mitigation shall apply:

- The removal of native vegetation with any single stem greater than 4" dbh (diameter at breast height) will be monitored, recorded, and mitigated at a 2:1 ratio, whereby 2 trees are replaced for every tree removed. Replacement trees shall include, but not be limited to, suitable riparian species such as alder, willow, Oregon ash, etc.

Class 2: Problematic In-Channel Vegetation: These species inhibits and prevent the establishment of a native riparian canopy and limit the beneficial uses that can be achieved in the riparian zone. This class of vegetation includes the following species:

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| 1. Cattails (<i>Typha</i> sp.) | 11. Brooms (<i>Spartium</i> and <i>Genista</i> spp.) |
| 2. Himalaya blackberry (<i>Rubus discolor</i>) | 12. Sweet fennel (<i>Foeniculum vulgare</i>) |
| 3. Arroyo willow (<i>Salix lasiolepis</i>) | 13. Harding grass (<i>Phalaris aquatica</i>) |
| 4. Giant reed (<i>Arundo donax</i>) | 14. Water primrose (<i>Ludwigia peploides montevidensis</i>) |
| 5. Pampas grass (<i>Cotaderia selloana</i> , and <i>C. jubata</i>) | 15. Eucalyptus (<i>Eucalyptus</i> spp.) |
| 6. Indian bean (<i>Catalpa bignoniodes</i>) | 16. Tree of heaven (<i>Ailanthus altissima</i>) |
| 7. Privet (<i>Ligustrum</i> sp.) | 17. Acacia (<i>Acacia</i> spp.) |
| 8. English and Algerian ivy (<i>Hedera helix</i> , <i>H. canariensis</i>) | 18. White poplar (<i>Populus alba</i>) |
| 9. Periwinkle (<i>Vinca major</i> .) | 19. Lombardy poplar (<i>Populous nigra Italicia</i>) |
| 10. Red clusterberry (<i>Contoneaster</i> sp.) | 20. Tamarisk (<i>Tamarix</i> spp.) |
| | 21. Rattlebox (<i>Sesbania punicea</i>) |

These species are identified as particularly problematic for flood management purposes and because they limit the beneficial uses that can be achieved in the riparian zone. Impact avoidance and minimization approaches applied for the removal and thinning of these species is described in the SMP Manual. Regulatory provisions for the removal and management of these species are included in the Agreement for Routine Maintenance (ARM) with the California Department of Fish and Game (CDFG). The thinning and removal of these species do not require any additional specific mitigation requirements.

Class 3: Other Non Native Vegetation Class 3 vegetation consists of non-native species that are not listed under Class 2, above. Examples of Class 3 vegetation include various landscaping species that are establishing in the flood control channels but are recognized as providing beneficial uses similar to their native counterparts. These species include a variety of ash species (Modesto ash (*Fraxinus velutina*), green ash (*F. pennsylvanica*), raywood ash (*F. oxycarpa*), and evergreen ash (*F. uhdei*), London plane tree (*Platanus acerifolia*), and Carolina poplar (*Populus canadensis*). While these species are not as ecologically preferred as Class 1 vegetation, it is acknowledged that they may provide beneficial uses. As such, the removal of Class 3 vegetation with any single stem greater than 4" dbh (diameter at breast height) will be monitored, recorded, and mitigated at a 1.5:1 ratio.

- When replacing Class 1 and Class 3 trees, replacement trees shall consist of native riparian species such as alder, willow, Oregon ash, or other suitable species. The mitigation replacement of trees may either occur at the reach under maintenance or at another suitable SCWA channel reach in need of riparian canopy. The number of removed trees will be reported in the annual summary report of maintenance activities and the replacement of trees as mitigation will be reported through the annual maintenance reports as well. Similar to the requirements for on-site and off-site mitigation and restoration activities, the performance criteria for replacement planting for vegetation mitigation shall be 85% success, and mitigation plantings shall be monitored for 5 years. In addition to overall success, planted trees shall be evaluated for their overall health and vigor.
- The pruning of trees, including native trees, in order to promote a more upright, mature riparian canopy does not require mitigation.
- Grass mowing and shrub thinning activities are not anticipated to adversely affect shade or habitat benefits, and as such, do not require mitigation.

8. Annual Work Cycle and Reporting

The annual work cycle for vegetation management is discussed in Chapter 9 of the SMP Manual. Vegetation management activities shall be notified to the pertinent regulatory agencies overseeing the SMP through an annual notification report. This annual notification will occur in the spring or early summer following the vegetation assessment. The annual notification for vegetation management activities may be included with the annual notification for sediment and bank stabilization activities. Or, it may be submitted as a separate volume depending upon the timing of the annual channel assessments. The vegetation management notification package will include identification of the reaches where vegetation management activities will be conducted, the general type of vegetation to be worked on, and a reference to the standard SMP maintenance activities from Chapter 6 of the SMP Manual.

In the fall, following the season's maintenance activities an annual maintenance report shall be submitted to the pertinent regulatory agencies overseeing the SMP. In the annual summary report, details of the conducted vegetation management activities shall be confirmed. This summary report shall include a brief description of the number, size (dbh), and species of trees removed. This information will also provide the basis for SMP mitigation required for the previously

conducted vegetation management activities. A summary table will be provided which describes the information related to tree removal and the number of replacement trees needed for mitigation. The annual program summary report shall also describe the monitoring status of on-going mitigation activities and include information regarding the monitoring period (following the mitigation), description of current status of the mitigated trees, and a report of their success.

9. References

California Department of Fish and Game (CDFG). 2006. Agreement for Routine Maintenance for the Sonoma County Water Agency (SCWA) Stream Maintenance Program (SMP).

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